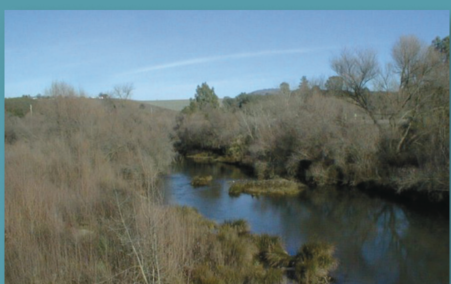
Mokelumne/Amador/Calaveras

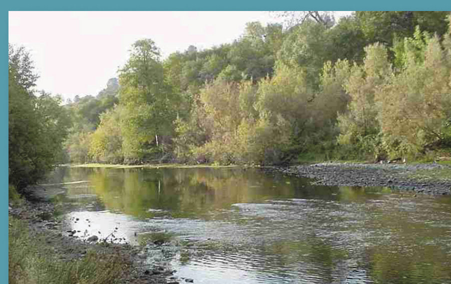
Integrated Regional Water Management Plan Update











January 2013

Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update

Prepared by:

RMC
Water and Environment

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Acronyms

ACS	American Community Survey
AF	Acre-foot
AFY	Acre-foot per Year
ARSA	Amador Regional Sanitation Authority
AWA	Amador Water Agency
AWS	Amador Water System
BMP	Best Management Practice
CABY	Cosumnes, American, Bear & Yuba
CAMRA	Calaveras-Amador-Mokelumne River Authority
CANS	Camanche North Shore
CARWSP	Camanche Area Regional Water Supply Plan
CASS	Camanche South Shore
CAWP	Central Amador Water Project
CDP	Census Designated Place
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CCWD	Calaveras County Water District
CDPH	California Department of Public Health
cfs	Cubic feet per second
CII	Commercial, industrial, institutional
CPUD	Calaveras Public Utility District
CSA	County Service Area
CT	Centroid timing
CWC	California Water Code
CWP	California Water Plan
DAC	Disadvantaged community
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utility District
FEMA	Federal Emergency Management Act
GHG	Greenhouse gas
GPCD	Gallons per capita per day
IPCC	Intergovernmental Panel on Climate Change

IRWM	Integrated regional water management
IRWMP	Integrated regional water management plan
JVID	Jackson Valley Irrigation District
LFD	Low flow duration
MAC	Mokelumne/Amador/Calaveras
MAF	Mean annual flow
MGD	Million gallons per day
MHI	Median household income
MOU	Memorandum of understanding
MRF	Mokelumne River Forum
MW	Megawatts
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPS	Non-point source
PG&E	Pacific Gas and Electric Company
Prop 84	Proposition 84
RAP	Region Acceptance Process
RMS	Resource management strategy(ies)
RPC	Regional Participants Committee
SEWD	Stockton East Water District
SOI	Sphere of influence
SWRCB	State Water Resources Control Board
TLZ	Timberland Preservation Zone
TM	Technical memorandum
TMDL	Total maximum daily load
T-S	Tuolumne-Stanislaus
UMRWA	Upper Mokelumne River Watershed Authority
USFS	United State Forest Service
USGS	United States Geological Survey
USDA	United States Department of Agriculture
UWMP	Urban Water Management Plan
WID	Woodbridge Irrigation District
WTP	Water treatment plant
WWTP	Wastewater treatment plant

Update Overview

In November 2006, the Mokelumne/Amador/Calaveras (MAC) regional partners completed the MAC Integrated Regional Water Management Plan (IRWMP or Plan). The 2006 version of the MAC IRWMP (MAC Plan) was based on guidelines and standards included in Proposition 50 as interpreted by the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB). In September 2008, Governor Schwarzenegger signed SBxx 1, which contains appropriations for the IRWM program from Propositions 84 and 1E (Prop 84/1E) along with criteria that DWR must apply in updating statewide standards for IRWMPs. These revised State standards for IRWMPs were released in August of 2010 and provided the guidelines by which the MAC Plan Update will be prepared. The MAC Plan Update was developed to comply with the 2012 Guidelines which were finalized by DWR in December 2012.

The MAC IRWMP update began in 2008 with a reconstituted stakeholder committee (called the Regional Participants Committee or RPC), the development of Governing Procedures to guide the RPC's work, and the preparation of a Community Outreach Plan. This update is being conducted under a governance structure different than that developed for the original plan development. Specifically, the Upper Mokelumne River Watershed Authority (UMRWA), a regional water management group as defined by the California Water Code, has assumed lead agency responsibility for the preparation and adoption of the updated IRWMP, and has established two subcommittees to oversee the document update. A Regional Participants Committee (or RPC) was formed to directly oversee the Plan update. This committee includes representatives from various governmental and non-governmental organizations within the IRWM planning region, and has clear, well-defined rules for operation. The Board Advisory Committee has also been established (replacing the earlier Steering Committee) with Board representatives from three UMRWA member agencies. This committee is charged with reconciling conflicts that may occur at the RPC, providing guidance to the Executive Officer and consultants, and ultimately recommending the updated plan for adoption by the UMRWA governing board.

In addition to the updating of selected Plan sections in 2008, UMRWA also completed the Region Acceptance Process (RAP), as required by DWR, in order to become an approved IRWM region. Additionally, technical work related to climate change (undertaken on behalf of UMRWA member EBMUD in 2010) has also been completed. Consequently, to complete the updating of the MAC Plan both previously completed and new additional work must be assimilated into the updated Plan. The previous Plan was organized by chapter according to the IRWM Plan Standards. However, IRWM Plans are not required to follow the exact outline of the IRWM Plan Standards, provided that the required information is included in the Plan. For the Plan Update, a revised organization has been applied. The Plan outline provides a more logical progression of topics and information, hopefully making the Plan a more useful tool for the region's water managers. The MAC Plan Update addresses all required Plan elements as identified in the IRWM Plan Standards, as summarized in the following table.

Location of IRWM Plan Standards in MAC IRWM Plan Update

Plan Standard No.	IRWM Plan Standard	MAC IRWMP Update Section
1	Governance	Section 2 Governance
2	Region Description	Section 1 MAC Region
3	Objectives	Section 3.1 Policies, Goals, Objectives, and Performance Measures
4	Resource Management Strategies	Section 3.2 Resource Management Strategies
5	Integration	Section 2.4 Integration and Section 4.1.4 Project Integration
6	Project Review Process	Section 4.1 Project Review Process
7	Impact and Benefit	Section 4.3 Impact and Benefit Analysis
8	Plan Performance and Monitoring	Section 5.1 Plan Performance and Monitoring
9	Data Management	Section 5.2 Data Management
10	Finance	Section 4.4 Financing Plan
11	Technical Analysis	Section 4.5 Technical Analysis
12	Relation to Local Water Planning	Section 4.2 Coordination with Water and Land Use Agencies
13	Relation to Local Land Use Planning	Section 4.2 Coordination with Water and Land Use Agencies
14	Stakeholder Involvement	Section 2.3 Stakeholder Involvement
15	Coordination	Section 2.5 Coordination with Other IRWM Regions and State/Federal Agencies
16	Climate Change	Refer to the following table

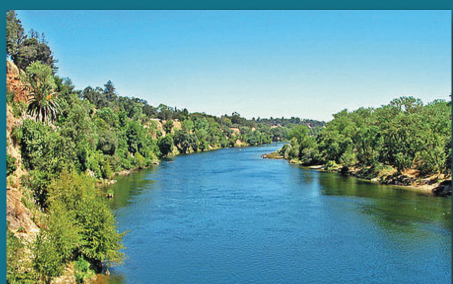
The following table is adapted from Table 7 - Addressing Climate Change Within Existing IRWM Plan Standards from the Prop 84 and 1E IRWM Grant Program Guidelines (DWR, 2012). This table presents the locations where Climate Change standards are addressed in the MAC IRWM Plan Update.

Location of Climate Change Standards in MAC IRWM Plan Update

Plan Standard	Climate Change-related Requirement	MAC Plan Update Section
Region Description	IRWM plans must contain language in their Region Description Section that describes likely Climate Change impacts on their region as determined from the vulnerability assessment	Section 1.3 Climate Change
Plan Objectives	*<u>Adapting to Climate Change:</u>* In developing plan objectives, IRWM regions must consider the following: • IRWM Plans should address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge. • IRWM Plans need to consider the effects of SLR on water supply conditions and identify suitable adaptation measures. RWMGs should consider the guidance provided in the OPC's SLR Policy. *<u>Reducing Emissions</u>* • IRWM plans can also help mitigate Climate Change by reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions. • In evaluating different ways to meet IRWM plan objectives, where practical, RWMGs should consider the strategies adopted by CARB in its AB 32 Scoping Plan. • In addition to offsetting emissions, RWMGs also may consider options for carbon sequestration and using renewable energy where such options are integrally tied to supporting IRWM Plan objectives.	Section 3.1 Policies, Goals, and Objectives
Resource Management Strategies	Identify and implement, using vulnerability assessments and tools such as those provided in the Climate Change Handbook, Adaptation Strategies that address region-specific climate change impacts. • An IRWM region must demonstrate how the effects of Climate Change on its region are factored into its resource management strategies. • IRWM Plans should address adapting to changes in the amount, intensity, timing, quality and variability of runoff and recharge. • IRWM Plans need to consider the effects of SLR on water supply conditions and identify suitable adaptation measures. • IRWM Plans also can help mitigate Climate Change by reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions. • IRWM regions should pursue increasing water use	Section 1.3.6 Adaptation and Mitigation

Plan Standard	Climate Change-related Requirement	MAC Plan Update Section
	efficiency, practice integrated flood management, and seek to enhance and sustain ecosystems.	
Project Review Process	The Project Review Process must include the following factors: • *Contribution of the project to adapting to Climate Change*: RWMGs must include potential effects of Climate Change on their region and consider if adaptations to the water management system are necessary. • *Contribution of the project in reducing GHG emissions as compared to project alternatives*: The RWMG needs to consider a project's ability to help the IRWM region reduce GHG emissions as new projects are implemented over the 20-year planning horizon. Considerations include energy efficiency and reduction of GHG emissions when choosing between project alternatives. *CEQA project-level analyses:* In preparing a project-level GHG emissions analysis, RWMGs and the project proponents should estimate GHG emissions from the project; establish significance criteria; identify those project components that may support carbon sequestration; and, if applicable, explain how the project may help in adapting to effects of Climate Change.	Section 4.1 Project Review Process and Appendix C – Project Summary and Evaluation
Relation to Local Water Planning	IRWM Plans must consider and incorporate water management issues and Climate Change	Section 4.2 Coordination with Water and Land Use Agencies
Relation to Local Land Use Planning	IRWM regions must demonstrate information sharing and collaboration with regional land use planning in order to manage multiple water demands throughout the state, as described in CWP Update 2009, adapt water management systems to Climate Change, and potentially offset Climate Change impacts to water supply in California.	Section 4.2 Coordination with Water and Land Use Agencies
Plan Performance and Monitoring	IRWM Plans should contain policies and procedures that promote adaptive management. As more effects of Climate Change manifest, new tools are developed, and new information becomes available, RWMGs must adjust their IRWM plans accordingly.	Section 1.3.7 Plan for Further Data Gathering
Coordination	• RWMGs should stay involved in CNRA's California Adaptation Strategy process to help shape the document through their participation. • Agencies that are part of an IRWM effort should consider joining The Climate Registry, http://www.theclimateregistry.org/.	Section 2.5 Coordination with Other IRWM Regions and State and Federal Agencies

1. MAC Region



1. MAC Region

Integrated Regional Water Management (IRWM) Plans must include a description of:

- The watersheds and the water systems, natural and anthropogenic (i.e. "man-made"), including major water related infrastructure, flood management infrastructure, and major land-use divisions;
- The quality and quantity of water resources within the region (i.e. surface waters, groundwater, reclaimed water, imported water, and desalinated water);
- Areas and species of special biological significance and other sensitive habitats, such as marine protected areas and impaired water bodies within the region;
- Internal boundaries within the region;
- Water supplies and demands for a minimum 20-year planning horizon;
- Important ecological processes and environmental resources within the regional boundaries and the associated water demands to support environmental needs;
- Potential effects of climate change on the region;
- Comparison of current and future (or proposed) water quality conditions in the region, including water quality protection and improvement needs or requirements within the area of the Plan;
- Social and cultural makeup of the regional community, important cultural or social values, DACs in the management area, economic conditions and important economic trends within the region.
- Efforts to effective involve and collaborate with Tribal government representatives to better sustain Tribal and regional water and natural resources (if applicable);
- Major water related objectives and conflicts in the defined management region, including clear identification of problems within the region that focus on the objectives, implementation strategies, and implementation projects that ultimately provide resolution; and
- How the IRWM regional boundary was determined and why the region is an appropriate area for IRWM planning.

1.1. Regional Geography

The MAC IRWMP region incorporates all of Amador County and sizeable portions of Alpine and Calaveras counties. Included within the region's boundary are cities, water and irrigation districts, watershed management areas, portions of groundwater basins, disadvantaged communities, and large tracts of federally-owned and private lands. Figure 1-1 shows the MAC IRWMP region.

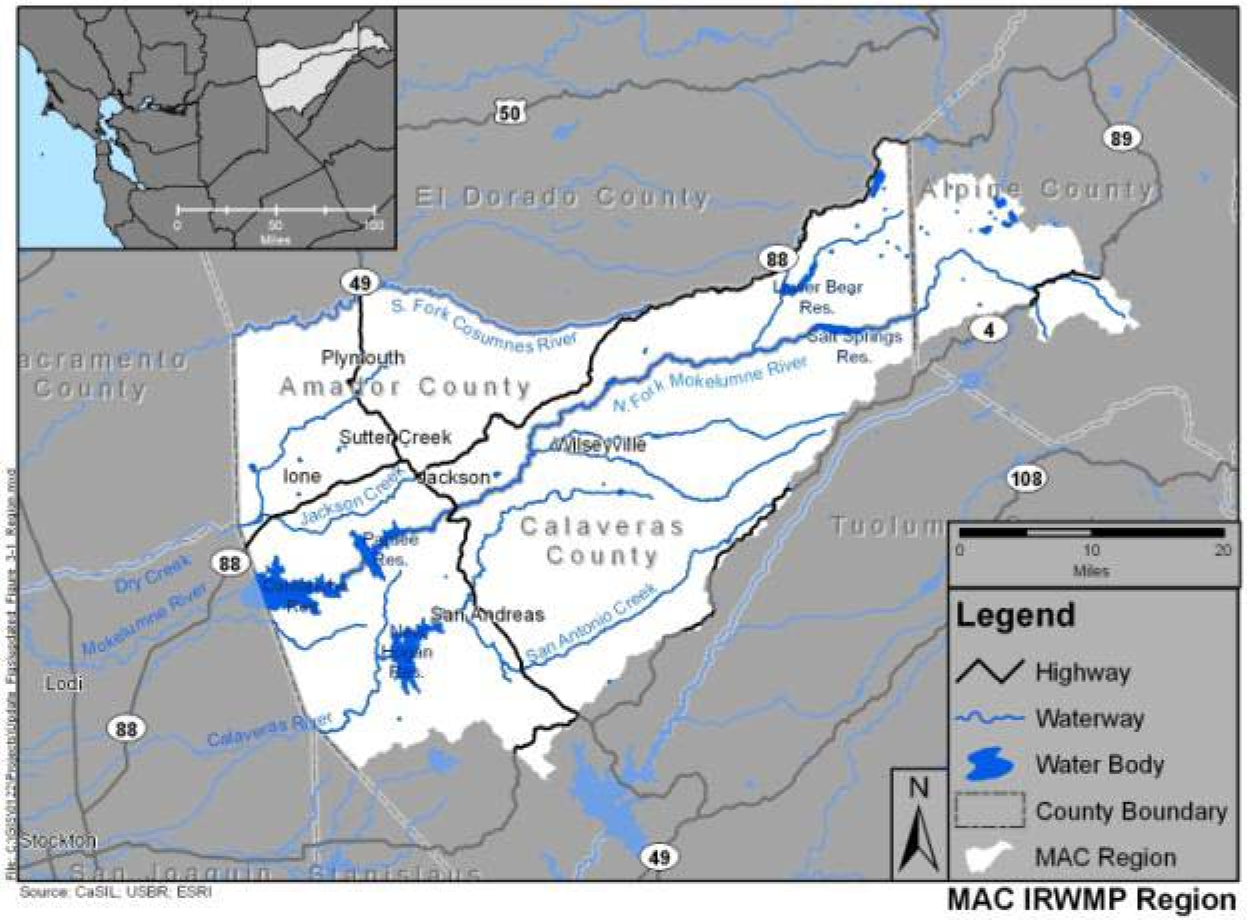


Figure 1-1: MAC IRWMP Region

The approximately 950,000 acre region (about 1,460 square miles) is located in the Sierra Nevada foothills, approximately 45 miles southeast of Sacramento. Situated in a transitional zone between the San Joaquin Valley and the Sierra Nevada, the region stretches across varied topography and microclimates. Warm, dry summers and mild winters are predominant in the western foothills with temperature ranging from the middle 30s to the high 90s (in degrees Fahrenheit, °F). Mild summers and cold winters characterize the mountainous eastern region with temperatures ranging from the low 20s to the middle 80s. Hot, dry summers and mild winters prevail in the Central Valley portion of the region with temperatures ranging from middle 30s to highs in excess of 100°F.

The primary sources of water in the region are the Mokelumne and Calaveras River watersheds (and to a lesser extent, the Cosumnes River watershed), with snowmelt and rainfall from the Sierra Nevada transported via the rivers and their tributaries. Although the region is famous for its historic mining and existing active mines (asbestos, gold, industrial minerals, limestone, sand, and gravel), current land uses also include cattle ranching, orchards, timber, vineyards, and row crops.

The MAC IRWMP region was formed using physical, political, and social boundaries. The Mokelumne River watershed forms the eastern border, while the Calaveras River watershed forms the southern boundary. The Amador County boundary generally follows the Mokelumne watershed boundary and roughly defines the northern border. The western boundary of the region extends to intersection of the San Joaquin County and the Calaveras County boundaries. This region was defined based on similar water supply and demand characteristics and the opportunities to facilitate water resources protection, development, and security.

1.1.1. Regional Boundary

The boundaries of the MAC IRWMP region were determined using a variety of physical, political, and water management considerations as discussed below. The primary physical determinant in establishing the region was the Mokelumne River watershed. The secondary determinant was the Calaveras River watershed. These two rivers and their watersheds are the predominant water features in the region, and during the past 150 years, have supported a myriad of activities including hydropower generation, agriculture, mining, timber harvesting, cattle grazing, domestic water supply, recreation, fisheries and more. The upper reaches of the watershed includes large portions of the Eldorado and Stanislaus National Forests.

The Mokelumne River is the boundary between Amador and Calaveras Counties, and the Eldorado and Stanislaus National Forests. The river has long served the needs of cities, communities, and forested habitats within these counties. Since the 1920s, the Mokelumne River has been the primary source of water used by East Bay Municipal Utility District (EBMUD) to serve East Bay communities. Thus, for nearly one hundred years, the local governments and water agencies of Amador and Calaveras Counties have competed with EBMUD and the environment for Mokelumne River water supply. During this period, there have been many water rights decisions, court decrees, agreements, and contracts pertaining to the Mokelumne River, some of which have settled, to some degree, the many disputes that have arisen between Amador and Calaveras agencies, downstream Mokelumne River users in San Joaquin County, and EBMUD. However, as the foothill and East Bay communities continue to grow, so does the need for additional water supply. Consequently, one of the primary purposes in establishing the MAC IRWM region has been to promote and facilitate a collaborative planning process to develop program and project solutions which address future Amador, Calaveras, and East Bay water resource needs.

While the Mokelumne River represents a key central feature in the MAC region, the geographic boundaries of the region define its relationship to neighboring regions. Presented below are the four primary regional boundaries and the reasons these boundaries were used in defining the MAC region.

<u>Northern Boundary</u>: The northern boundary defining the MAC region is the political boundary of Amador County. The county boundary was selected as the MAC region's northern border because (1) the City of Plymouth, the one incorporated community outside the Mokelumne River watershed in Amador County, receives water from the Mokelumne River by Amador Water Agency (AWA); and (2) the entire area south of the county boundary lies within Amador County and within AWA's service area. Both of these two Amador agencies (the County and AWA) are members of UMRWA, the regional water management group responsible for the MAC Plan Update and implementation.

It should be noted that the southern boundary of the Cosumnes, American, Bear & Yuba (CABY) IRWM region encroaches into the northern area of the MAC region. The CABY IRWM region uses the South Fork Cosumnes River watershed boundary as its regional delineator. In the Plymouth area, the Amador County border and Cosumnes River watershed boundaries overlap, resulting in an overlapping boundary between the two regions. This overlap is not considered to be a significant planning obstacle and the entities involved in IRWM development have agreed to communicate information on proposal relevant to the overlapping area. The CABY and MAC regions have begun execution of a Memorandum of Understanding (MOU) outlining the methods for working cooperatively with one another to complement planning efforts in the two regions.

Southern Boundary: The Calaveras River watershed forms the southern boundary of the MAC region. This watershed lies within Calaveras County. The Calaveras River watershed was selected to represent the southern border of the MAC region because (1) the proximity of the Calaveras River watershed and New Hogan reservoir to the Mokelumne River and Camanche Reservoir may present feasible water management opportunities during the regional planning process; (2) western Calaveras County overlies the upper reach of the Eastern San Joaquin Groundwater Basin that provides conjunctive use opportunities; (3) the Stanislaus River watershed, south of the Calaveras River watershed, is a major water source for communities in southern Calaveras and Tuolumne Counties; and (4) the Stanislaus River watershed is included in the Tuolumne-Stanislaus IRWM region.

Eastern Boundary: The eastern MAC boundary is defined by the eastern-most portion of the Mokelumne River watershed, which lies in Alpine County. There is also a small portion of the South Fork American River watershed (a portion of Amador County near Kirkwood Meadows) included in the region along the eastern boundary. The hydrologic boundaries of the Mokelumne River watershed was selected to represent the eastern MAC regional boundary because (1) this area is the headwaters of the river system which is a critical water supply source for MAC region communities, and (2) lands adjacent to and east of this boundary are generally contained in watersheds which drain eastward to the Carson River watershed, away from the MAC IRWM region.

Western Boundary: The political boundaries that separate Amador and Calaveras counties from their western neighbor, San Joaquin County, form the western boundary of the MAC region. This border was determined to be the best western extent of the MAC region because (1) the water supply issues facing the western portions of Amador and Calaveras counties must be addressed by water agencies with the authority and jurisdiction to do so (AWA and Calaveras County Water District [CCWD]); and (2) other than the western portion of Calaveras County that overlies the Eastern San Joaquin Groundwater Basin, the groundwater resource issues that predominately characterize the Eastern San Joaquin IRWM region are very different from the predominately surface water issues that must be addressed by the MAC region.

1.1.2. Neighboring and Overlapping Regions

The MAC region has three neighboring IRWM regions. To the north is the CABY region which generally encompasses the Cosumnes, American, Bear and Yuba river watersheds. The Eastern San Joaquin region is near the western boundary of the MAC region, and the Tuolumne-Stanislaus integrated water management region is immediately south. For each of these neighboring regions, the nature of its interface with the MAC region – overlapping or adjacent – and the primary differences between the neighboring regions and the MAC region are described below. Figure 1-2 shows the geographic relationship of these neighboring regions to the MAC region.

CABY Region – The CABY region, which lies directly north of and adjacent to the MAC region, overlaps the MAC region in two locations. These overlaps between the two regions are in part due to CABY's preference to establish all of its boundaries coincident with hydrologic boundaries. The MAC region instead has factored physical, political and water management considerations in determining region boundaries.

These different approaches to establishing regional boundaries result in two overlap areas: the northwest corner of Amador County, which lies within the South Fork Cosumnes River watershed (hereafter referred to as the *Cosumnes Overlap*), and the northeast corner of Amador County, which lies within the South Fork American River basin (referred to as the *American Overlap*).

The vast majority of the *Cosumnes Overlap* area is sparsely developed and contained within unincorporated Amador County. The balance of the area is contained within the City of Plymouth, also located in Amador County. The City of Plymouth obtains water from the Mokelumne River and provides domestic water to its city customers. Both Amador County and the City of Plymouth are represented on the MAC Plan RPC, and the current MAC Plan includes projects located in this area.

The *American Overlap* area is also entirely within Amador County. This area, and contiguous adjacent lands that lie within El Dorado and Alpine counties, comprise the uppermost 'headwaters' of the South Fork American River. Aside from the Kirkwood Ski Area, this area is very sparsely developed with seasonal homes and cabins. There are no representatives from this overlap area serving on the MAC Plan RPC.

CABY and MAC region officials have discussed the two overlap areas and acknowledge the different approaches used by the two regions in formulating their boundaries. A communication and coordination process has begun in which the CABY and MAC regions have drafted an MOU outlining methods for effective collaboration.

Eastern San Joaquin Region – The eastern border of the East San Joaquin region is near the western border of the MAC region. The county line between Amador County and San Joaquin County, and the county line between Calaveras County, Stanislaus County, and portions of San Joaquin County constitute the interface between the two regions. The two regions have remained separate IRWM regions because the water supply issues are significantly different (predominately groundwater in the East San Joaquin region versus surface water in the MAC region), the number of agencies and non-governmental organizations interested in water resource issues is significant in both the valley and the foothills, and the travel distances between the outlying areas of the two regions are great and therefore would be an impediment to participation.

The MAC region and the Eastern San Joaquin region have been engaged in regular coordination and communication for more than five years. The Mokelumne River Forum, a facilitated discussion between agencies involved in both regions, has been very effective in developing improved understanding among the valley interests and the foothill interests. This improved understanding is evidenced by a four-party agreement established between San Joaquin, Amador and Calaveras counties and EBMUD to jointly investigate water supply and conjunctive use opportunities. In addition, the IRWM Plans for both regions currently include a joint project that would jointly benefit both regions.

Tuolumne-Stanislaus Region – The Tuolumne-Stanislaus (T-S) region is immediately south of the MAC region with its northern boundary reflecting the watershed boundary of the North Fork Stanislaus River. The southern boundary of the MAC region, as stated previously, is the southern boundary of the South Fork of the Calaveras River. Calaveras County Water District, a MAC region member, is also participating in the emerging T-S IRWM program and will serve as a liaison between the IRWM regions. By participating in both IRWM efforts, CCWD will keep members of both regions informed of progress and activity and will identify potential conflicts in the event they arise.

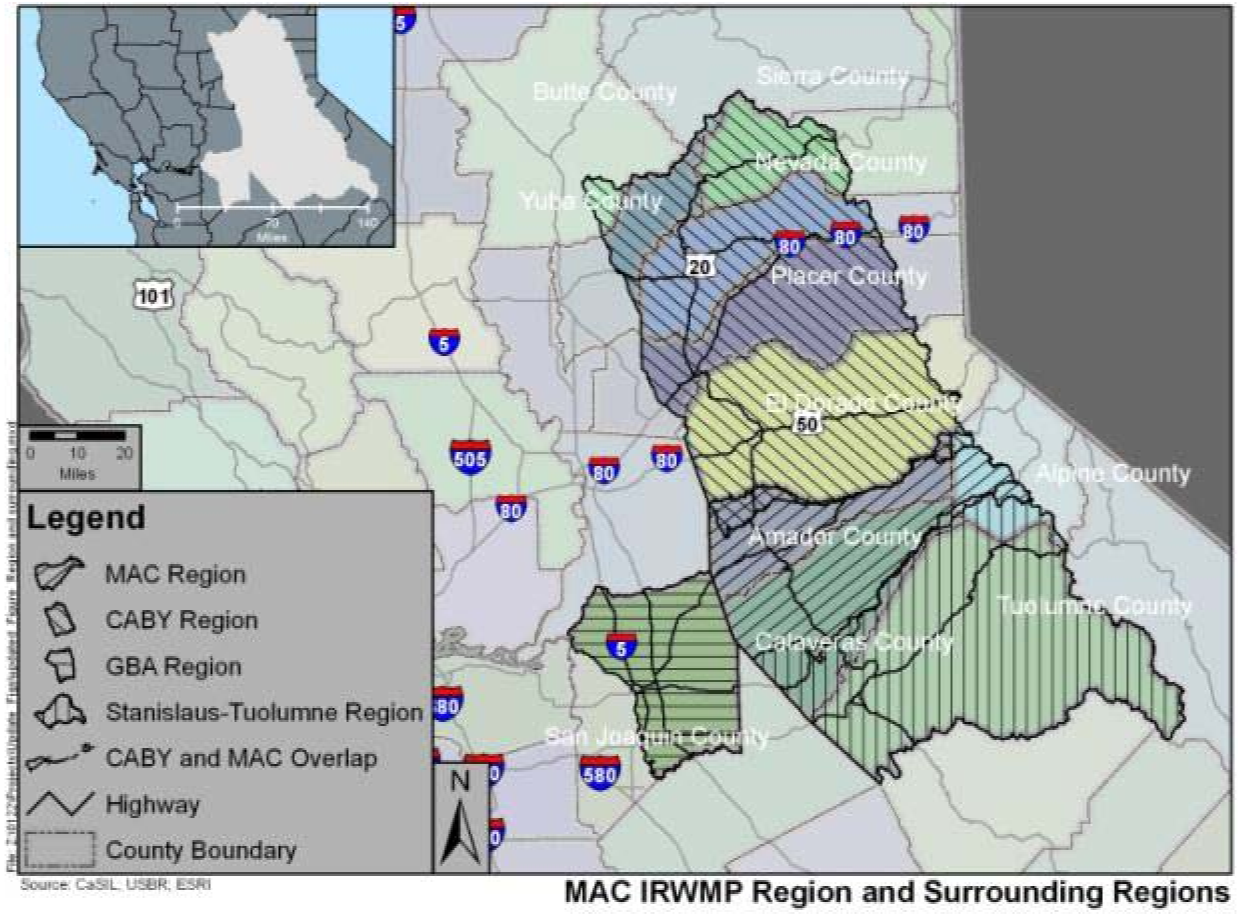


Figure 1-2: MAC IRWMP Region and Surrounding Regions

1.1.3. Internal Water-Related Boundaries

The following sections present the water-related components of the MAC region. These components include the physical elements - both natural and human-made - and institutional elements (i.e. the groups that manage these components, or influence their management) as described in Section 3.2.

The topography of the MAC IRWMP region varies greatly. The western boundary of the region is in the Central Valley, west of the City of Ione, which is very close to sea level. The eastern boundary of the region is in the Sierra Nevada at the headwaters of the Mokelumne River at an elevation well over 10,000 feet. The terrain from east to west becomes gentler as the mountains and foothills give way to the Central Valley. Figure 1-3 depicts the topography of the region.

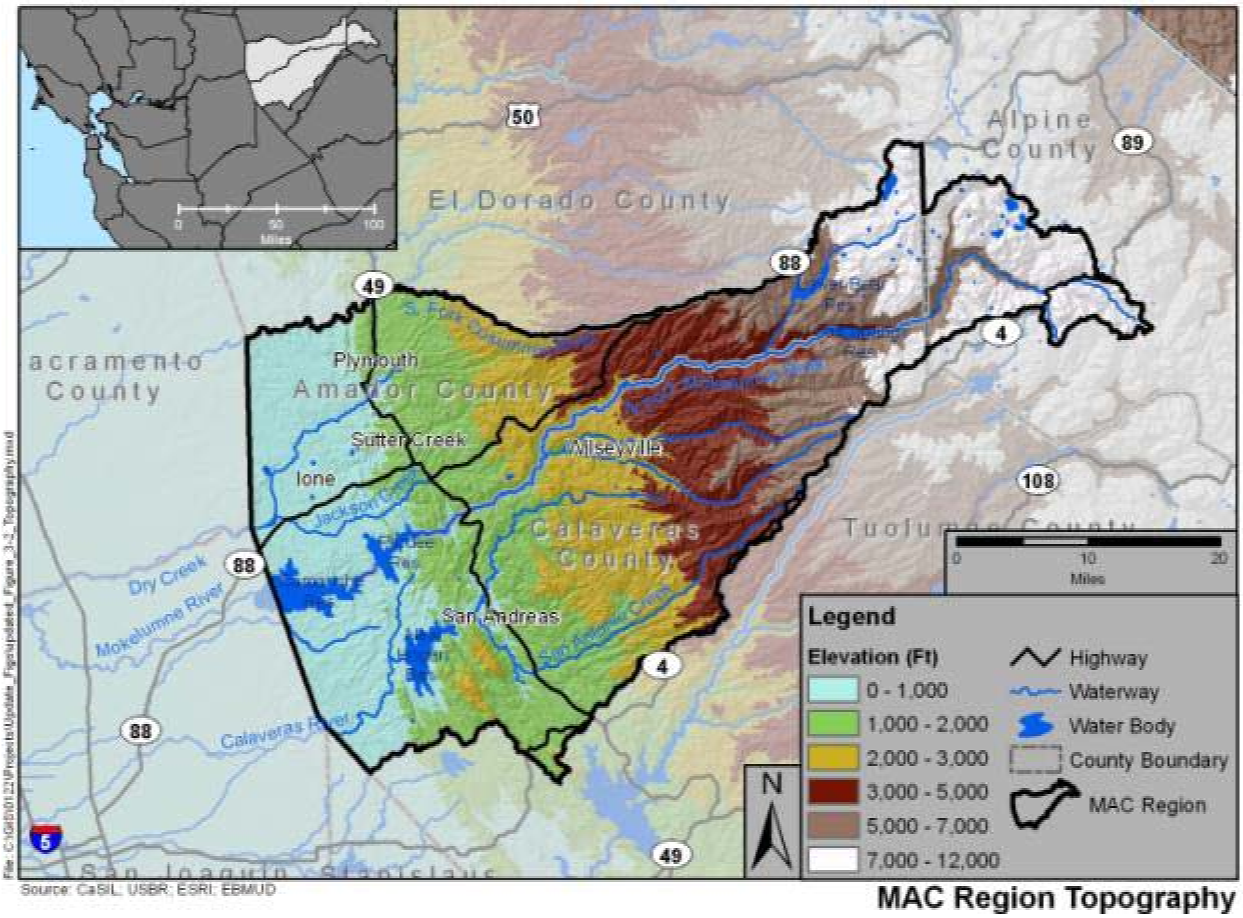


Figure 1-3: MAC Region Topography

The topography of the region has defined multiple watersheds within the region. The two watersheds (Mokelumne and Calaveras) that comprise the bulk of the region are described below. The watersheds of the region, as defined by the California Interagency Watershed Mapping Committee, are shown in Figure 1-4.

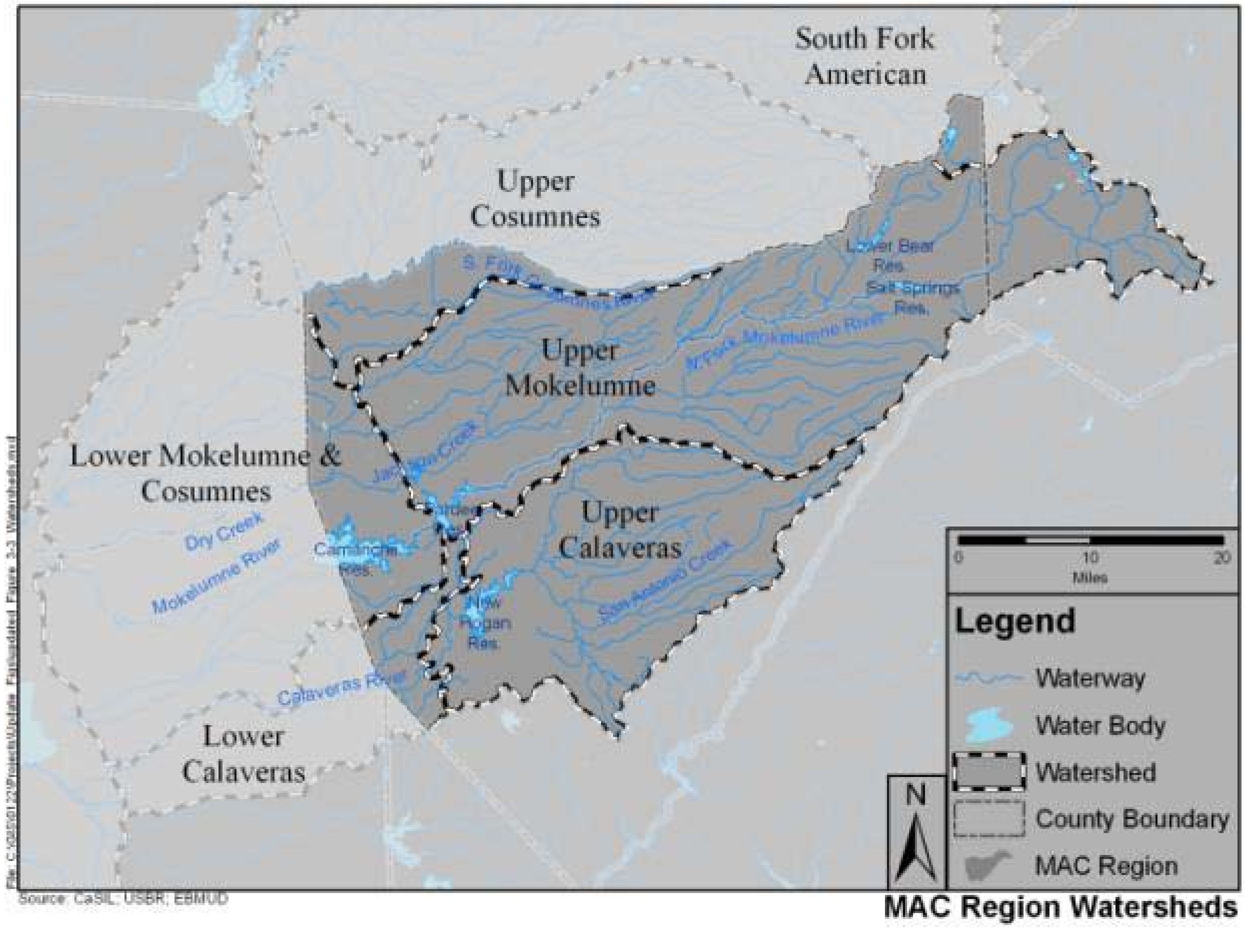


Figure 1-4: MAC Region Watersheds

Mokelumne River Watershed

The Mokelumne River originates in the Sierra Nevada and flows west to its confluence with the Cosumnes River in the Central Valley (San Joaquin County). With a watershed encompassing approximately 630 square miles, the annual average runoff of the Mokelumne River at Pardee Reservoir is 753,000 acre-feet (AF), with the majority of flow derived from snowmelt. Annual precipitation and streamflow in the Mokelumne River are extremely variable both month to month and year to year. Streamflow is influenced by upstream diversions and regulated by reservoir storage operations for hydroelectric power generation and water supply. The Mokelumne River watershed is typically subdivided into the Upper Mokelumne River watershed and Lower Mokelumne River watershed. The Upper Mokelumne River watershed extends from its headwaters within the Stanislaus National Forest in western Alpine County, past Pardee Reservoir downstream. The Lower Mokelumne River watershed begins just downstream of Pardee Reservoir through northeastern San Joaquin County to the river's confluence with the Cosumnes River.

Upper Mokelumne River Watershed

The Upper Mokelumne River watershed is approximately 550 square miles in area, and includes portions of the 105,165 acre Mokelumne Wilderness. The Mokelumne Wilderness, a federally designated wilderness area protected under the Wilderness Act of 1964, straddles the crest of the central Sierra Nevada within the Stanislaus, Eldorado, and Toiyabe National Forests and within portions of Calaveras, Alpine, and Amador counties. Watersheds within the Mokelumne Wilderness area drain to the Mokelumne River on the west slope and the Carson River on the east slope. The Upper Mokelumne River watershed is defined as all lands that drain into the North Fork, Middle Fork, South Fork, and Main Stem of the Mokelumne River and to Pardee Reservoir, the downstream boundary. The North Fork watershed is the largest tributary at 370 square miles, and contributes 85 percent of the river flow. The Upper Mokelumne River watershed topography is rugged, with elevations ranging from 600 to 10,400 feet. The watershed contains important habitat for sensitive species, is used by outdoor recreation enthusiasts throughout the year, and is the source of drinking water for one and a half million people living both within and outside of the watershed.

As the Mokelumne River flows westward from the watershed's western Sierra Nevada origins, the main river and its tributaries pass through several lakes and reservoirs, including Upper and Lower Blue lakes, Twin Lake, Meadow Lake, Lower Bear River Reservoir, Mosquito Lake, Salt Springs Reservoir, Tiger Creek Reservoir, Lake Amador, and Pardee Reservoir. Early settlers used the Mokelumne River during the second half of the 19th century for mining, hydropower development, and transportation. The most notable effects on the river, however, resulted from mining activity following the discovery of gold in 1848 and copper in 1861. Gold mining in the Mokelumne River watershed peaked in 1854, and declined steadily thereafter. Copper was discovered in 1861 and the area was mined heavily between 1899 and 1919. Mine effluent discharged into the river through these decades has impacted the area's natural resources.

Today, the Mokelumne River is used as a water supply for AWA, Calaveras Public Utilities District (CPUD), CCWD, Jackson Valley Irrigation District (JVID) and EBMUD. Pacific Gas & Electric Company (PG&E), EBMUD, and JVID also use the river for hydroelectric generation. Restoration activities began on the river in 1992 to improve the impacted aquatic community, resulting in increased salmon runs over those observed following the water project developments in decades past. Restoration activities are also taking place on National Forest lands in the upper watershed through land and resource management decisions made by the Eldorado and Stanislaus National Forests.

Lower Mokelumne River Watershed

The Lower Mokelumne River terminates at the confluence with the Cosumnes River in San Joaquin County. The combined area of the Lower Mokelumne River and Cosumnes River watersheds within the MAC region (i.e. the portions lying within Amador and Calaveras counties) is about 122 square miles in size. It contains the stretch of the Lower Mokelumne River that flows from Pardee Reservoir to Camanche Reservoir. The Camanche Dam is located within two miles of the county line that separates San Joaquin County from Amador and Calaveras counties.

Land uses within the portion of the Lower Mokelumne River watershed contained in the MAC region are predominately grazing, recreation, water storage within Camanche Reservoir, and very sparse residential/ranchette development. Water stored in Camanche Reservoir, a flood control and recreation reservoir, is used for downstream fisheries, recreation, hydroelectric generation and water supply.

Calaveras River Watershed

The 470-square mile Calaveras River watershed contains lands located in Calaveras and San Joaquin counties. The majority of the watershed lies in Calaveras County with the smaller western-most portion of the watershed located in San Joaquin County. The Calaveras River is tributary to the San Joaquin River.

Like the Mokelumne River, the Calaveras River watershed may be divided into the Upper Calaveras River watershed and the Lower Calaveras River watershed, with the dividing line occurring just west of New Hogan Reservoir. Flow in the Calaveras River is primarily derived from rainfall with small contributions by snowmelt. New Hogan Dam was constructed on the Calaveras River in 1963 for flood control as well as municipal, industrial and irrigation purposes. Releases from New Hogan Dam currently control flows on the Lower Calaveras River. The upper watershed above New Hogan reservoir covers 363 square miles with an average annual runoff of about 166,000 AF.

The Lower Calaveras River – Mormon Slough area is below New Hogan Dam. The watershed for this portion of the river encompasses approximately 115,000 acres and receives up to 90,000 AF of surface water supply from the Calaveras River. The four main tributaries below New Hogan are Cosgrove Creek, South Gulch, Indian Creek, and Duck Creek. Cosgrove Creek contributes the most flow to the Calaveras River, which has been as much as 8,500 AF in some years.

As with the Mokelumne River, land and water resource management decisions for the Calaveras River are made by a variety of entities, including many of the same organizations as for the Lower Mokelumne River. The major agencies that manage water resources within the MAC region are listed in Table 1-1 (a comprehensive list including smaller agencies is included Appendix A). One additional organization involved in the preservation and management of the Calaveras River is the Calaveras River Watershed Stewardship Group. They focus on the lower Calaveras River below the New Hogan Dam. Members of this group include the U.S. Fish and Wildlife Service, the California Department of Fish and Game, Stockton East Water District, CCWD, National Oceanic and Atmospheric Administration (NOAA) Fisheries, California Department of Water Resources (DWR), City of Stockton, and California Department of Conservation.

Table 1-1: Agencies with Major Water Resources Management Responsibilities in the Region

Agency Name	Location and Services Provided
Amador Water Agency (AWA)	AWA provides water and wastewater services to residents of Amador County. AWA uses water from the North Fork of the Mokelumne River for 6,600 service connections in western Amador County. AWA is now the primary water supplier for the City of Plymouth.
Amador County	Amador County is authorized to carry out flood control and stormwater management through its Public Works Department and the implementation of environmental health programs.
Alpine County	For portions of Alpine County within the MAC region, Alpine County, and its affiliated Alpine County Water Agency, has water management responsibilities related to water quality, water-dependent recreation and several small community service areas located on the western slope of the Sierra Nevada mountains.
Amador Regional Sanitation Authority (ARSA)	A JPA consisting of Amador County, Sutter Creek and Amador City for the primary purpose of transporting effluent from the secondary treatment facility at Sutter Creek to the treatment facility at Ione.
Calaveras County Water District (CCWD)	CCWD provides water and wastewater services to its customers in its service area which coincides with Calaveras County boundaries.
Calaveras Public Utility District (CPUD)	CPUD provides water to San Andreas, Mokelumne Hill and outlying areas.
Calaveras County	The county is authorized to carry out flood control and stormwater management through its Public Works Department and the implementation of environmental health programs.
East Bay Municipal Utility District (EBMUD)	EBMUD provides water and wastewater services to its service area within Alameda and Contra Costa counties near San Francisco and also to its recreation areas at Pardee and Camanche North Shore in Amador County and Camanche South Shore in Calaveras County.
City of Ione	The City has secondary and tertiary wastewater treatment facilities and relies on AWA for potable water service.
City of Jackson	The City relies on AWA for water service but maintains its own wastewater treatment facilities.
City of Plymouth	The City supplies domestic sanitary sewer facilities, storm sewer, water treatment and wastewater treatment facilities to city residents. Water service is provided primarily by AWA.
City of Sutter Creek	The City provides local wastewater treatment services to city residents of Sutter Creek and Martell. AWA provides the City's water services.
Jackson Valley Irrigation District (JVID)	Organized in 1956 and contains 12,800 acres along Jackson Creek in Amador County. Owned by farmers and ranchers to control, distribute, salvage any water, including sewage for beneficial use, and irrigation.
U.S. Forest Service (USFS)	Established in 1905 as an agency of the U.S. Department of Agriculture, it manages public lands in national forests and grasslands, including the Stanislaus National Forest and El Dorado National Forest within the MAC region. The Forest Service manages national forests for multiple uses and benefits and for the sustained yield of renewable resources such as water, forage, wildlife, wood, and recreation for the American people.

Groundwater

Groundwater is used in the Amador County portion of the MAC region. Groundwater quantity and quality in this area varies considerably between well sites due to the small and unpredictable yields of the fractured rock system that typifies the underlying geology. Groundwater accounts for approximately two percent of AWA's total water supply, and it is currently only used in the communities of La Mel Heights and Lake Camanche Village at a total rate of approximately 200 acre-feet per year (AFY). Wells serving the Lake Camanche Village area of Amador County are located within the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin. The Cosumnes Subbasin is approximately 439 square miles in size, and is bounded on the north and west by the Cosumnes River, on the east by the bedrock of the Sierra Nevada Mountains, and on the south by the Mokelumne River.

A portion of western Calaveras County overlies the Eastern San Joaquin Subbasin. This subbasin is a part of the larger San Joaquin Valley Groundwater Basin. This groundwater subbasin extends from the western corner of the County west of the cities of Stockton and Lodi. Use of groundwater for irrigation and municipal purposes has resulted in a continuous decline of available groundwater over the past 40 years. As of 1990, annual groundwater extractions in San Joaquin County had exceeded the estimated safe yield. Overdraft of the groundwater in this subbasin has created groundwater depressions in areas near Stockton and east of Lodi. The Cosumnes groundwater subbasin of the San Joaquin Valley Basin is located north of and adjacent to the Eastern San Joaquin Groundwater Subbasin.

Groundwater resources are known to exist in other areas of the MAC region, although there are no officially delineated groundwater basins defining these areas. In fact, most of the groundwater used within the region is obtained from areas outside of the Eastern San Joaquin Groundwater Subbasin. This groundwater may be found in hard rock formations and extracted in relatively small amounts from fractured rock, faults, or changes in rock strata.

Groundwater does not account for any of CCWD's water supply. In 2007, CCWD updated its adopted 2001 AB 3030 Groundwater Management Plan per SB 1938 requirements for the Camanche/Valley Springs area (which overlies the Eastern San Joaquin Groundwater Subbasin in western Calaveras County). CCWD has also completed a hydro-geologic assessment of groundwater conditions in the area. In 2008, CCWD was awarded a Proposition 50 Local Groundwater Assistance grant of $250,000 as part of a $425,000 total project budget to install nested monitoring wells and upgrade its groundwater monitoring activities. Because groundwater levels have declined in the basin, CCWD is moving toward integration of its surface water supplies with management of its share of the Eastern San Joaquin Valley Groundwater Basin.

1.1.4. Internal Institutional Boundaries

The following sections describe the institutions or groups that have varying degrees of responsibility or involvement related to the management of the water resources and infrastructure within the MAC region. These groups are organized and presented in the following order; county governments, city governments, special districts, joint powers agencies, stakeholder and special interest groups, PG&E, and federal and state agencies.

County Governments

The MAC region is contained within the boundaries of Amador, Calaveras, and Alpine counties. The region is sparsely inhabited and contains just five incorporated cities. The total combined population of the three counties was 84,844 (U.S. Census, 2011). Individual total county populations are shown in Table 1-2.

Table 1-2: MAC Region County Populations

	Alpine County	Amador County	Calaveras County
Number of Inhabitants in Entire County	1,175	38,091	45,578

Source: U.S. Census, 2011

The Boards of Supervisors for these three counties are responsible for overseeing a variety of services for county residents, primarily in unincorporated areas, but in some cities as well. Such countywide services include voter registration, health and welfare programs, court and law enforcement operations, jail facilities, the recording of official documents, tax assessment and collection, and social services. The supervisors are also responsible for providing some municipal-type services for residents of unincorporated areas. These include planning, zoning, and land use regulation, street maintenance, and in some cases sewage disposal, water, parks and recreational facilities, and other municipal services, although these needs are frequently met by special districts or cities as discussed below.

City Governments

There are five municipalities within the MAC region, all of which are located in Amador County: Amador City (2010 population - 185); Ione (2010 population - 7,918), Jackson (2010 population - 4,651), Plymouth (2010 population - 1,005) and Sutter Creek (2010 population - 2,501) (U.S. Census Bureau, 2011). Although there is one incorporated city within Calaveras County (Angels Camp), this city is outside the MAC region. Alpine County has no incorporated cities.

These city governments are responsible for providing services which directly affect the lives of their residents. To varying degrees, they provide fire and police protection, construct and maintain streets, provide facilities for sewage and storm drainage, and other community services. Additionally, each of the cities prepares land use plans and administers planning and zoning codes. There are Census Designated Places (CDPs) in Calaveras County which include Arnold, Dorrington, Forest Meadows, Mokelumne Hill, Mountain Ranch, Railroad Flat, Rancho Calaveras, San Andreas, Valley Springs, Wallace, and West Point. CDPs are geographic entities that serve as census data collection points in areas with concentrated population, housing, and commercial structures that are not within an incorporated city. The cities and CDPs within the MAC Region are shown in Figure 1-5.

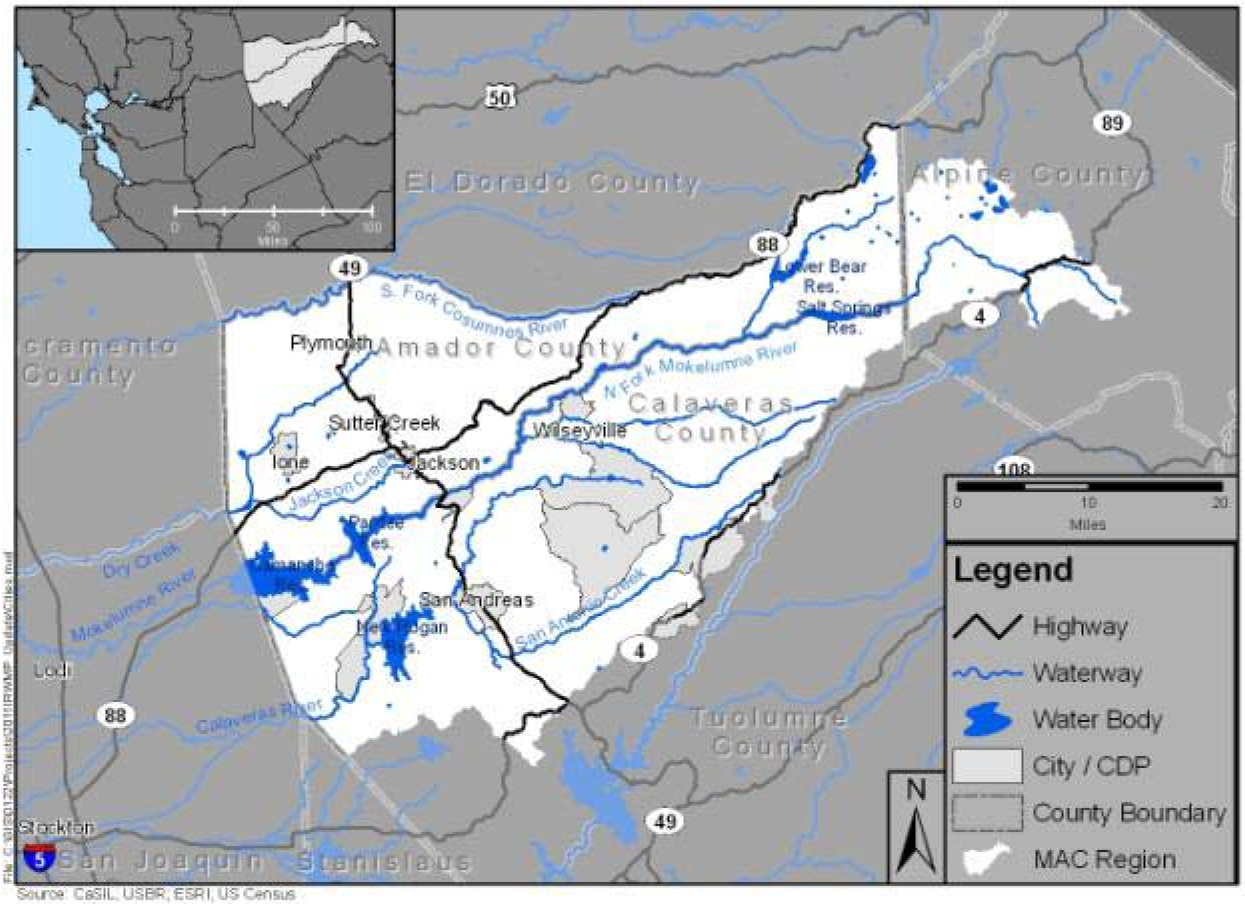


Figure 1-5: MAC IRWMP City and CDP Boundaries

Special Districts

Special districts are units of local government established by the residents within the MAC region to provide one or more special services not otherwise available. The special districts within the MAC region that provide water-related services are shown in Table 1-3.

Table 1-3: Water-Related Special Districts within the MAC Region

County	Special Districts
Alpine	Alpine County Water Agency
Amador	Amador Water Agency
	Jackson Valley Irrigation District
	East Bay Municipal Utility District
Calaveras	Calaveras County Water District
	Calaveras Public Utility District
	East Bay Municipal Utility District
	Mokelumne Hill Sanitary District
	Wallace Community Services District
	Valley Springs Public Utility District
	San Andreas Sanitation District

Joint Powers Agencies

Under provisions of the California Government Code, two or more public agencies may come together under a joint powers authority (JPA) to provide more efficient government services or solve a service delivery problem. Three JPAs have been formed within the MAC region to address water resource management and related matters.

Upper Mokelumne River Watershed Authority (UMRWA) – UMRWA is a joint powers authority comprised of the three MAC region counties (Alpine, Amador, and Calaveras) and six special districts which provide water and related services to areas within the MAC region. UMRWA is fully described in Chapter 2 of this report.

Amador Regional Sanitation Authority (ARSA) – ARSA is a joint powers authority consisting of Amador County, Sutter Creek, and Amador City. The JPA's primary purpose is to transport effluent from the secondary treatment facility at Sutter Creek to the tertiary treatment facility at Ione. Mule Creek State Prison and the Preston School of Industry, a California Youth Authority facility, also discharge to ARSA facilities.

Calaveras-Amador-Mokelumne River Authority (CAMRA) – CAMRA is a joint powers agency established in 1997 between Amador County, Calaveras County, CCWD, CPUD, AWA and JVID. The Authority provides an institutional vehicle for the counties and local water-related special districts to discuss water related issues and concerns.

Stakeholder and Special Interest Groups

Regional Participants Committee (RPC) – The RPC is a diverse committee organized with the primary objective of bringing stakeholder interests to the forefront during the development and administration of the MAC Plan. Members of the RPC represent the views of their respective organizations or interest groups within the community, commit time to take part in the plan development and updating processes, and work collaboratively with other RPC members, project staff, and UMRWA representatives. The RPC is more fully described in Section 2.2.1.

Mokelumne River Forum (MRF) – The MRF is an open stakeholder process intended to address Mokelumne River water resource conflicts between San Joaquin interests and MAC region stakeholders. In April 2005, members of the MRF and others signed a Memorandum of Understanding (MOU) and agreed to work cooperatively to develop mutually beneficial solutions to meet widely accepted water supply and related needs of the region. MOU signatories include DWR, Alpine County, Amador County, AWA, CCWD, CPUD, the City of Lodi, the City of Stockton, EBMUD, JVID, North San Joaquin Water Conservation District, San Joaquin County Flood Control and Water Conservation District and Mokelumne River Water and Power Authority, Stockton East Water District, Central San Joaquin Water Conservation District, Woodbridge Irrigation District (WID) and the San Joaquin Farm Bureau Federation. The MRF is also open to other organizations and groups that are not MOU signatories but have direct interest in the Forum's goals.

Because MRF participants include agencies responsible for preparing both the Eastern San Joaquin and MAC integrated regional water management plans, the MRF creates opportunities to propose and consider inter-regional projects which meet a broader range of needs and provide greater inter-regional benefits. A collaborative planning process is underway in which the MRF participants are coordinating several water resource planning efforts across regional boundaries with respect to river hydrology, facilities, infrastructure and institutional arrangements required for the inter-regional projects.

Foothill Conservancy – The Foothill Conservancy's stated mission is to protect, restore, and sustain the natural and human environment in Amador and Calaveras counties for the benefit of current and future generations. The Conservancy has been actively involved in water resource issues for many years, and its members serve on the Regional Participants Committee, Mokelumne Forum, and other stakeholder organizations involved with water resource issues in the MAC region.

Upper Mokelumne River Watershed Council (Council) - The Council was originally formed with a State Proposition 204 grant in the spring of 2000. The group has focused its efforts on water quality, watershed planning, watershed assessment/restoration, and public outreach and education in the Upper Mokelumne River, Dry Creek, and Upper Calaveras River watersheds. The mission of the Council is to work collaboratively with local stakeholders to restore and maintain the Upper Mokelumne River and other watersheds in a manner that ensures sustainable environmental, economic, educational, cultural, recreational, and water quality benefits for present and future generations.

Alpine Watershed Group – This organization operates similar to a watershed council. The Alpine Watershed Group works to preserve and enhance the natural system functions of Alpine County's watersheds for future generations. The Alpine Watershed Group is represented on the MAC region's RPC.

Pacific Gas and Electric Company

PG&E is the owner and operator of the Mokelumne River Hydroelectric Project (FERC license No. 137). The project consists of a series of storage and regulating reservoirs and associated tunnels and pipelines which supply water to four hydropower generating units located primarily on the North Fork of the Mokelumne River. PG&E operates the project in accordance with FERC license requirements and other operating obligations. A new FERC license, issued to PG&E in October 2001, requires the company to work with a stakeholder committee to adaptively manage project operations in a manner that balances the needs of recreation and the environment with power generation needs.

Federal and State Agencies

A number of federal and state agencies influence water resource decisions within the MAC region to some degree. Which agency or agencies have influence, and the extent of their influence, depends on the nature of the water resource matter being considered. Those agencies which would typically be expected to have input on water-related projects and programs in the MAC region are listed in Table 1-4.

Table 1-4: Federal and State Agencies with MAC Region Jurisdictions

Federal Agencies	State Agencies
U.S. Forest Service (Eldorado National Forest and Stanislaus National Forest)	Department of Water Resources
Bureau of Land Management	State Water Resources Control Board
Environmental Protection Agency	Department of Fish and Game
U.S. Army Corps of Engineers	Department of Public Health
U.S. Fish and Wildlife Service	Regional Water Quality Control Board
Federal Energy Regulatory Commission	Department of Parks and Recreation
	Department of Transportation

The U.S. Forest Service and the Bureau of Land Management are major landowners in the watershed and are described below.

- The U.S. Forest Service, established in 1905 as an agency of the U.S. Department of Agriculture, manages public lands in national forests and grasslands, including the Stanislaus National Forest and El Dorado National Forest within the MAC region. The Stanislaus National Forest encompasses about 898,000 acres on the western slope of the Sierra Nevada, located between Lake Tahoe and Yosemite. The El Dorado National Forest is located in the central Sierra Nevada within El Dorado, Amador, Alpine, and Placer counties.

- The Bureau of Land Management is an agency within the U.S. Department of Interior responsible for managing natural resources and administers 264 million acres of public lands, located primarily in the 12 Western states, including California. The mission of the Bureau of Land Management is to sustain the health, diversity, an productivity of public lands for the use and enjoyment of future generations.

1.1.5. Major Water-Related Infrastructure

Surface water provides the majority of water supply in the MAC region. Associated with the surface water bodies within the region are several major water-related projects. Figure 1-6 shows the major water infrastructure within the study region and highlights the regions dependence on the Mokelumne and Calaveras rivers. The water infrastructure includes major conveyances, water treatment plants, pump stations, and water storage facilities.

Amador Water System – The Amador Water System conveys Mokelumne River water transported via PG&E's Electra Tunnel to Lake Tabeaud. Lake Tabeaud then feeds the Amador Canal, transporting water to treatment plants in Sutter Hill and Ione. The 23-mile Amador Canal was replaced in 2008 with an 8-mile pipeline project. Ione and Tanner water treatment plants, located in Ione and Sutter Hill, respectively, are owned and operated by AWA and provide treated surface water to AWA's service area.

Camanche Dam and Reservoir – Owned and operated by EBMUD, Camanche Reservoir has a capacity of 417,120 AF. Camanche Reservoir is primarily operated for flood control and to meet downstream flow requirements and riparian needs. Hydroelectric power generation also occurs at the Camanche Reservoir. The reservoir regulates Mokelumne River water flows pursuant to agreements and entitlements held by WID and the North San Joaquin Water Conservation District, both located within San Joaquin County.

Central Amador Water Project (CAWP) System – The Central Amador Water Project System provides wholesale treated water to upcountry communities in Amador County such as Pine Grove, Pioneer, and the Mace Meadows areas. Water is diverted from the Tiger Creek Afterbay (a component of PG&E's Mokelumne River hydroelectric project) and pumped to the Buckhorn Treatment Plant (owned and operated by AWA) in Pioneer to be treated and distributed to the local communities.

Groundwater Wells – A single groundwater well, located in the La Mel Heights subdivision, is used by AWA to supply La Mel Heights customers. Four groundwater wells located in the Lake Camanche area are used to supply Lake Camanche residents.

Ione Pipeline – The Ione Pipeline transports raw water from the Tanner Reservoir to the Ione Water Treatment Plant (WTP) where it is treated for use by customers of Ione.

Jenny Lind System – The source of water for the Jenny Lind Improvement District is an infiltration gallery one mile below the New Hogan Dam on the Calaveras River. Water allocation is highly dependent on the water year. CCWD's water allocation for this system is 30,928 AFY plus riparian water rights of 350 AFY. Water for the system is treated at the Jenny Lind WTP. The Dr. Joe Waidhofer WTP capacity is rated at 45 million gallons per day (MGD), and delivers water to the City of Stockton. Eight MGD is also delivered to Jenny Lind WTP, which will be augmented with a new regional facility within the next five years, or as development pressures rebound from the slow economy.

Lake Tabeaud – Used by AWA to divert water from the Mokelumne River, Lake Tabeaud has a storage capacity of 1,170 AF. Water from Lake Tabeaud is conveyed by pipeline to the Tanner WTP where it is treated for use by the customers of Jackson, Sutter Creek, Amador City, and Drytown.

Mokelumne Aqueducts – Raw water from Pardee Reservoir is moved through the Pardee Tunnel to the three Mokelumne Aqueducts near Valley Springs in Calaveras County. All three steel pipelines extend 82.2 miles from the Pardee Tunnel to the east end of the Lafayette Aqueduct in Walnut Creek, east of San Francisco Bay.

New Hogan Dam and Reservoir – New Hogan Dam and Reservoir stores approximately 317,000 AF of water for municipal, industrial, irrigation, and flood control purposes. Flood control releases are controlled by the U.S. Army Corp of Engineers with Stockton East Water District operating the reservoir at all other times.

New York Ranch Reservoir - The New York Ranch reservoir, located just southwest of the intersection of Ridge and Climax Roads, currently serves as a holding basin for water flowing via the Amador Canal pipeline from Lake Tabeaud to the Tanner Reservoir near Sutter Hill.

Pardee Dam and Reservoir – Owned and operated by EBMUD, Pardee Reservoir has a capacity of 197,950 AF and is operated as a water supply reservoir. Water from Pardee is conveyed by the Mokelumne Aqueducts to the EBMUD service area approximately 91 miles away. Hydroelectric power generation (30 megawatts) is produced at the Pardee Powerhouse.

Tanner Reservoir – Tanner Reservoir stores raw water transferred from Lake Tabeaud via the Amador Canal pipeline. The raw water is then transferred to the Ione WTP via the Ione Pipeline for treatment and subsequent distribution to customers in Ione.

Tiger Creek Reservoir (Forebay and Afterbay) – The combined capacity of the Tiger Creek Forebay and Afterbay is approximately 4,000 AF. The Tiger Creek reservoirs are used by PG&E for power generation. AWA currently uses water stored in the Tiger Creek Afterbay for water supply. Water is pumped from the afterbay to Buckhorn WTP where it is treated and ready for use by the customers of Pine Grove, Pine Acres, Sunset Heights, Fairway Pines, Jackson Pines, Pioneer, Gayla Manor, Ranch House Estates, Pine Park East, Toma Lane, Sierra Highlands, Silver Lake Pines, Ridgeway Pines, Rabb Park, and Mace Meadows. Water from the afterbay is also gravity fed to the PG&E Tiger Creek Powerhouse treatment plant, which serves the PG&E Conference Center. Gravity piping is proposed that would connect Tiger Creek Regulatory, upstream of the Forebay, to Buckhorn WTP.

Electra and Middle Bar Runs - This small, scenic canyon on the Upper Mokelumne River, upstream of Pardee Reservoir, is a popular whitewater run. Located below PG&E's Electra powerhouse, this narrow, 1,000-foot-deep, wooded canyon is also a favorite place for other recreational activities such as fishing, picnicking, wading, wildflower viewing, gold panning, and spiritual rejuvenation.

Mokelumne River Fish Hatchery- The Mokelumne River Fish Hatchery is owned by EBMUD and operated by the California Department of Fish and Game. The fish hatchery raises and releases anadromous fish on the Mokelumne River, in addition to obtaining and maintaining data regarding the condition of fish stock in the river.

West Point/Wilseyville System – Sources of water for the West Point and Wilseyville water systems are Bear Creek and the Middle Fork of the Mokelumne River. CCWD has water rights for a year-round diversion of 4 cubic feet per second (cfs) and 150 AF of storage rights on Bear Creek for a total potential supply of 1,980 AF.

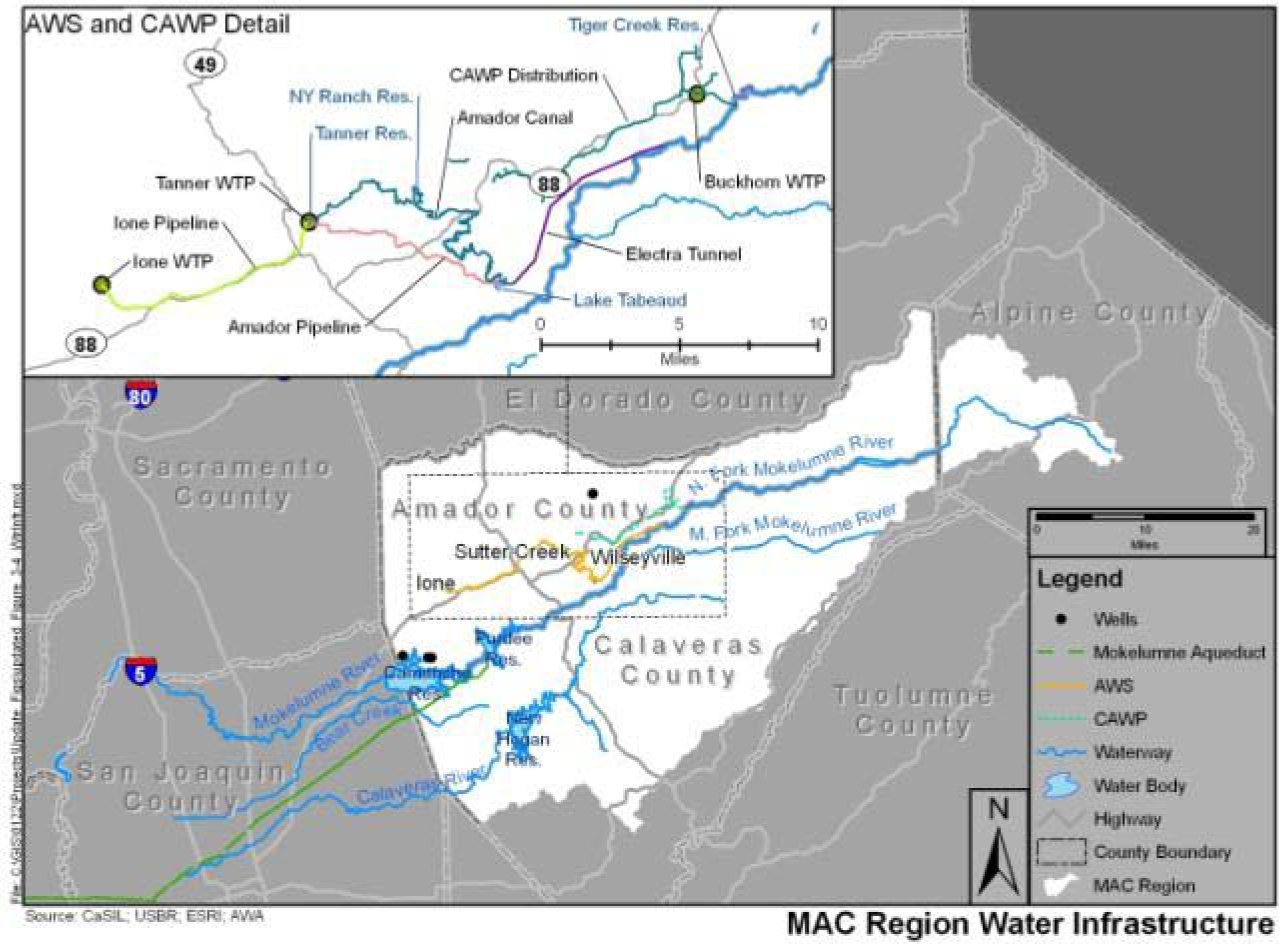


Figure 1-6: **MAC Region Water Infrastructure**

1.1.6. Social and Cultural Makeup

This section describes the social and cultural makeup of the MAC Region, discusses important cultural values, identifies the disadvantaged communities (DACs) in the Region, and describes the economic conditions and important economic trends within the region.

Land Use

Land use data are critical for identifying and evaluating a multitude of water resources management characteristics including water use, wastewater production, stormwater runoff, environmental habitats, and other natural resources. Land use data are available from DWR, the United States Geological Survey (USGS) and local governmental agencies. Figure 1-7 summarizes the major land uses in the MAC IRWM planning region. Development within the region, both urban and rural, is clustered around the major cities and highways. Agriculture, grazing, and open space dominate, representing a relatively large portion of the total regional land use. Other industries outside the urban setting include mining and timber harvesting, cattle grazing, where the majority of the land cover is forest, shrub and grassland.

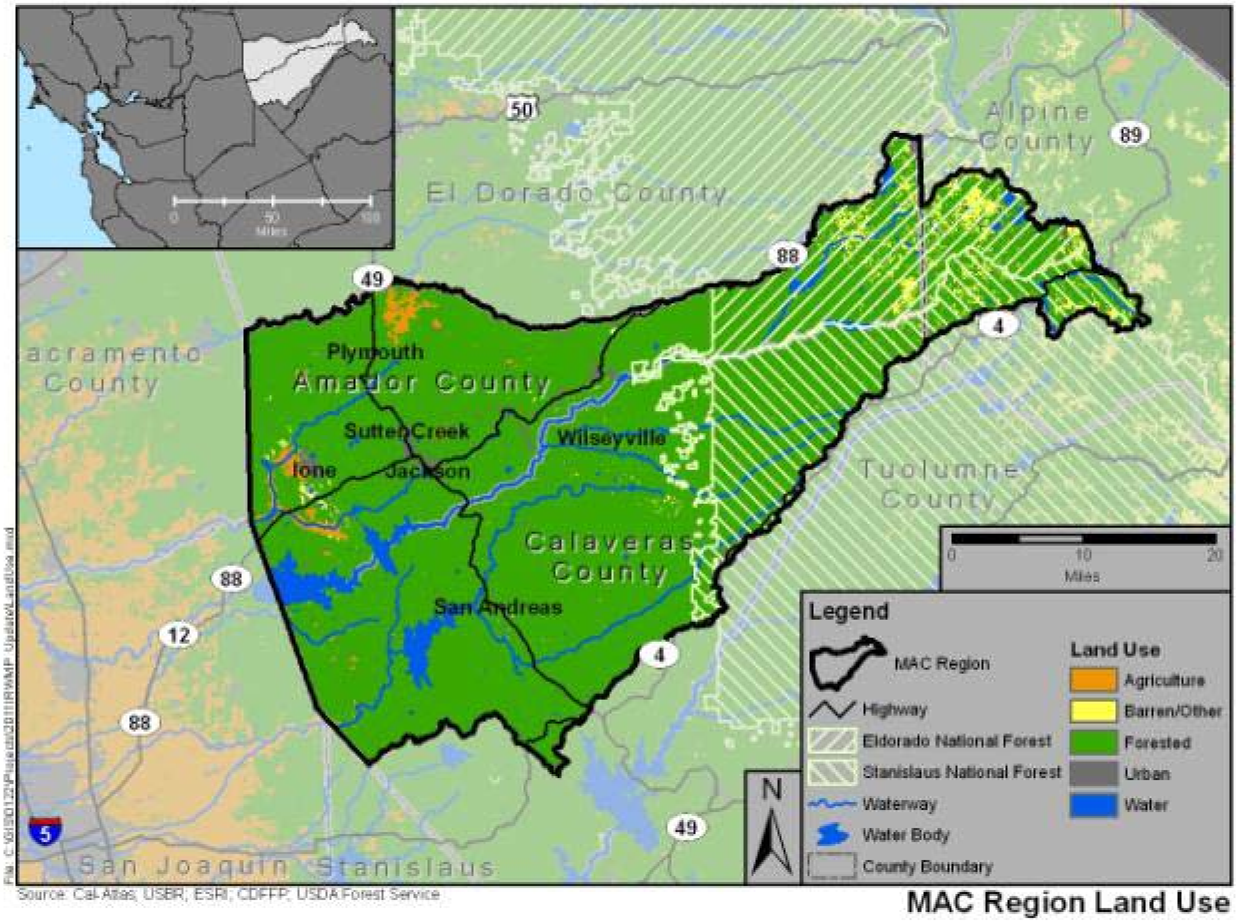


Figure 1-7: MAC Region Land Use

General land use trends in the region include development of rural and agricultural areas and a shift from grazing to viticulture and from viticulture to residential development.

Amador County

In recent years, Amador County has experienced increased urbanization and decreased farming and agriculture, though continued agriculture and preservation of agriculture lands is encouraged by the county. Primary farming commodities in the County include wine grapes and cattle. Grazing on public lands is still a custom and part of the County's culture. Large land holdings for timber harvesting of softwood forests exist in areas designated as Timberland Preservation Zones (TLZ), but significant urbanization pressures continue. Amador County is currently updating its General Plan; a draft was released in March 2011. This IRWMP is not intended to drive the General Plan process or influence growth patterns in the County. The Draft General Plan identified the greatest challenge facing successful implementation as insufficient available water and wastewater services. As of 2010, infill development was limited by a lack of water and sewer capacity (Amador County, 2011). Though the MAC Plan Update is not intended drive the General Plan Update in Amador County, or any other land use planning jurisdiction, the implementation of some of the projects included in the Plan could potentially have land use implications.

Calaveras County

Its General Plan divides Calaveras County into two categories based on land use: Natural Resource Lands and Community Development Lands. Natural Resource Lands are used for agriculture, timber and mining, or contain sensitive habitat. The Community Development Lands are already developed or slated for future development. The General Plan establishes target development densities within each of these categories such that Community Development Lands will be developed at higher densities and Natural Resource Lands density will be restricted to ensure future use, conservation, and the use of resources. Currently, Natural Resource Lands comprise approximately 55 percent of the land area (22 percent of that designated for Timber or Dam Areas), whereas 43 percent of the total area is designated as Community Development Lands. The remaining 2 percent is designated for the City of Angels and its sphere of influence. The Calaveras County General Plan is completing a comprehensive update to its General Plan with implementation expected in the fall of 2011. As with the Amador General Plan, this IRWMP is not intended to drive the General Plan Update process or to influence growth in the County.

Alpine County

Due to Alpine County's topography, minimal development pressure, and citizen appreciation for the conservation of the forest and mountain meadow environment, development will be concentrated in Kirkwood and Bear Valley, two ski-resort communities, consistent with the Land Use Element of Alpine County's General Plan. This will allow much of the County to remain designated as Open Space or Wilderness. Two types of residential subdivisions are recognized – standard and conservation. Lots in a standard subdivision will be a minimum of 20 acres whereas in a conservation subdivision, residential lot sizes will be reduced, provided that the overall density of development does not exceed one residential lot per 20 acres of land. Lands not included in residential lots shall be retained as open space. County population is expected to continue to grow at a slow and steady rate with increases over the next 10 years due primarily to demographic changes in age and household size. Population increases will directly increase demands for public services and facilities, including fire protection, sewage disposal, water systems, and other utilities (Alpine County, 2009).

Culture

Also known as the "Heart of the Mother Lode", the MAC IRWM region was first developed when the California gold rush began. Cities were developed around and nearby local mines to support the prospectors and hard rock miners. Evidence of the area's past is visible, with many historic buildings still standing as part of the current local culture. The area is now known for its vineyards and wines, small town charm and hospitality, scenic open space, and rich history.

The MAC IRWMP region is home to approximately 84,000 people, translating to an approximate population density of 55 people per square mile on average. The population density in rural areas is about 40 people per square mile. This low population density minimizes urban impacts to the region's water features, making the region valuable as a watershed and ideal for habitat and natural resources.

Disadvantaged Communities

According to the Prop 84 & 1E Guidelines, a "disadvantaged community" (DAC) is defined by the State of California as a community with an annual median household income (MHI) that is less than 80 percent of the statewide MHI Public Resources Code, 75005(g). The U.S. Census Bureau's American Community Survey (ACS) includes MHI data compiled for the 5-year period from 2006 to 2010. A community with an MHI of $48,706 or less is considered a DAC. The Census collects and compiles data for multiple census geographies including Place, Block Group, and Tract. A census tract is a region defined for the purpose of taking a census and usually coincides with city boundaries, towns, or other administrative areas. The U.S. defines census tracts as "relatively homogeneous units with respect to population characteristics, economic status, and living conditions, census tracts average about 4,000 inhabitants." Census tracts are subdivided into block groups which generally contain between 600 and 3,000 people with an optimum size of 1,500 people. Census places are designated each decennial census to provide data for settled concentrations of population that are identifiable by name. The following figure shows the census block groups within the MAC region that qualify as DACs. The census block groups that are disadvantaged constitute 25% of the area of region.

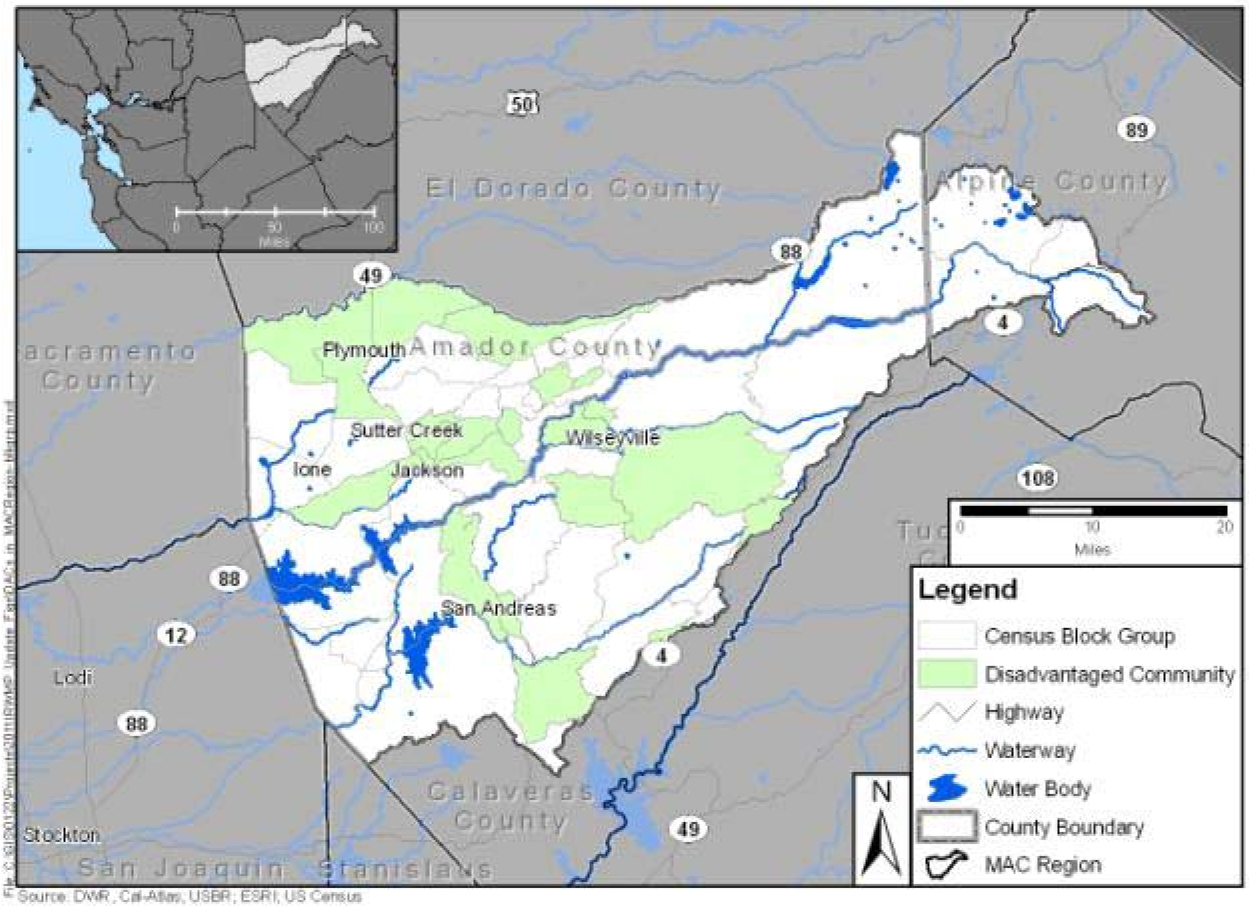


Figure 1-8: MAC Region DACs – Census Block Groups

Based on the ACS census place data, as shown in Figure 1-9, the cities or communities of Jackson, Plymouth, Sutter Creek, Drytown, Sutter Creek, Martell, Buena Vista, Camanche North Shore, West Point, Rail Road Flat, San Andreas, and Dorrington, are DACs. In 2005, AWA performed a survey of Lake Camanche Village and determined that it is a DAC as well. Kirkwood, Avery, Angels, and Murphys are DACs that are partially located in the MAC Region. There are no DACs in the portion of Alpine County within the MAC IRWM planning region.

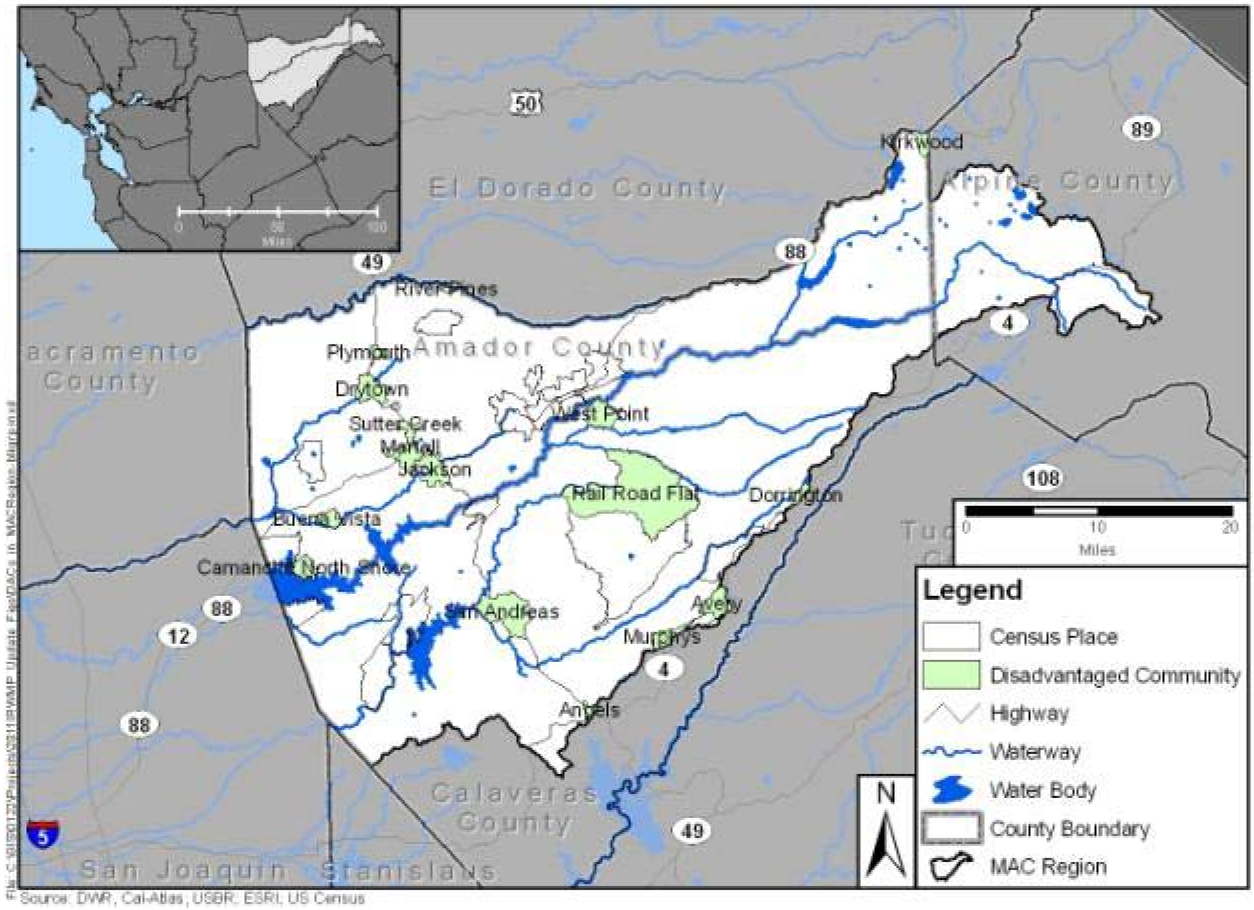


Figure 1-9: MAC Region DACs - Census Places

Table 1-5 summarizes the Census/ACS data and the MHI statistics.

Table 1-5: Median Household Income Statistics

City/Community (County)	Median Household Income (5-year average, 2006-2010)	Percent of State MHI
California	$60,882(80% = $48,706)	
Jackson (Amador)	$46,932	77%
Plymouth (Amador)	$31,250	51%
Sutter Creek (Amador)	$47,909	79%
Martell (Amador)	$43,167	71%
Buena Vista (Amador)	$31,885	52%
Camanche North Shore (Amador)	$41,848	69%
Drytown (Amador)	$40,909	67%
River Pines (Amador)	$19,918	33%
Lake Camanche Village [a] (Amador)	$36,000-$36,999	61%
Dorrington (Calaveras)	$38,857	64%
Rail Road Flat (Calaveras)	$26,771	44%
San Andreas (Calaveras)	$43,274	71%
West Point (Calaveras)	$32,865	54%

a) Mercy Housing performed survey and provided MHI.

b) Kirkwood, Murphys, Avery, and Angels are also DACs, but are not presented in the table as they are no wholly within the MAC Region.

Environmental justice is addressed by providing all stakeholders with ample opportunities for involvement in decision-making processes and ensuring that minority and/or low-income populations do not bear disproportionate quality of life, human health, and / or environmental impacts. DACs existing with the MAC Region and increases in water or wastewater service rates that could accompany the implementation of several projects discussed herein could affect these communities. A priority of the IRWMP RPC is to seek external grant funding or subventions to offset the cost of implementing new, and often expensive, projects. External funding assistance will help offset costs to existing ratepayers in the region - especially those ratepayers with a limited ability to pay - and will help to ensure that those ratepayers are affected as little as possible. Additionally, the MAC IRWMP projects will be reviewed for compliance with CEQA, NEPA, and any other local, state, and federal requirements. Through any necessary environmental documentation review (to be completed by project proponents prior to implementing projects and not as part of the IRWM Plan), compliance with Executive Order 12898 will be addressed on a project-by-project basis.

Construction of project facilities will create short-term environmental impacts (noise, dust, traffic disruption) potentially affecting neighboring land uses. A preliminary analysis of the areas affected by construction of project facilities will assist in minimizing adverse impacts to minority and/or low-income populations.

1.1.7. Ecological and Environmental Resources

The MAC IRWMP region is a largely natural area with significant portions designated as rural or open space, including large portions of two national forests. The region is host to an abundance of water features in the form of rivers, creeks, ponds, lakes, and reservoirs. As such, the region provides a great deal of varied habitat for numerous species. There are a number of special-status biological species in the MAC IRWMP region. Table 1-6 summarizes the species that are listed in the 10/08 California Natural

Diversity Database designated as "Threatened," "Endangered," or "Candidate," with the latter indicating that the species is under consideration for official listing in the future. Additionally, there are several "Special" animal and plant species in the MAC region that have been designated as such by either the California Department of Fish and Game or the California Native Plant Society due to declining population levels, limited ranges and/or continuing threats that make them vulnerable to extinction.

Table 1-6: Special-Status Species Potentially within the MAC IRWMP Region

Common Name	CA State Status	Federal Status	National Forest Service Status
Valley elderberry longhorn beetle	None	Threatened	Threatened
Bald eagle	Endangered	Delisted	Sensitive
California tiger salamander	Threatened	Threatened	--
California wolverine	Threatened	Candidate	Sensitive
Great gray owl	Endangered	None	Sensitive
Ione buckwheat	Endangered	Endangered	--
Ione manzanita	None	Threatened	--
Irish Hill buckwheat	Endangered	Endangered	--
Pacific fisher	None	Candidate	Sensitive
Sierra Nevada red fox	Threatened	None	Sensitive
Sierra Nevada yellow-legged frog	Candidate Endangered	Candidate	--
California red-legged frog	None	Threatened	Threatened
Lahontan cutthroat trout	None	Threatened	Threatened
Yosemite toad	None	Candidate	Sensitive
Swainson's hawk	--	--	Sensitive
Willow flycatcher	--	--	Sensitive
Peregrine falcon	--	--	Sensitive
Western red bat	--	--	Sensitive
Northern goshawk	--	--	Sensitive
California spotted owl	--	--	Sensitive
Pallid bat	--	--	Sensitive
Townsend's big-eared bat	--	--	Sensitive
American marten	--	--	Sensitive
Mountain yellow-legged frog	--	--	Sensitive
Delta smelt	--	--	Threatened
Central Valley steelhead	--	--	Threatened
Relictual slender salamander	--	--	Sensitive
Limestone salamander	--	--	Sensitive
Foothill yellow-legged frog	--	--	Sensitive
Western pond turtle	--	--	Sensitive
Hardhead	--	--	Sensitive
Nissenan Manzanita	--	--	Sensitive
Big-scale balsamroot	--	--	Sensitive
Common moonwort	--	--	Sensitive

Common Name	CA State Status	Federal Status	National Forest Service Status
Lake Tahoe draba	--	--	Sensitive
Blandow's bog moss	--	--	Sensitive
Party's horkelia	--	--	Sensitive
Slender lupine	--	--	Sensitive
Elongate copper moss	--	--	Sensitive
Jepson's onion	--	--	Sensitive
Three-bracted onion	--	--	Sensitive
Upswept moonwort	--	--	Sensitive
Scalloped moonwort	--	--	Sensitive
Mingan moonwort	--	--	Sensitive
Mountain moonwort	--	--	Sensitive
Bolander's brachia	--	--	Sensitive
Clubhair mariposa lily	--	--	Sensitive
Mountain lady's slipper	--	--	Sensitive
Sub-alpine fireweed	--	--	Sensitive
Tuolumne fawn lily	--	--	Sensitive
Brook pocket moss	--	--	Sensitive
Short leaved hulsea	--	--	Sensitive
Veined water lichen	--	--	Sensitive
Tuolumne iris	--	--	Sensitive
Kellogg's lewisia	--	--	Sensitive
Stebbin's lomatium	--	--	Sensitive
Three ranked hump moss	--	--	Sensitive
Broad nerved hump moss	--	--	Sensitive
Pansy monkey flower	--	--	Sensitive
Whitebark pine	--	--	Sensitive

Source: California Natural Diversity Database, September 2011

In addition to these special-status species, the MAC region is home to a wide variety of plant and animal life in many different environments, including riparian, wetland, forest, and alpine. Wildlife in the area includes noteworthy rainbow and brown trout fisheries, black bear and deer populations, furbearers, 119 different bird species - including peregrine falcons, cliff swallows, spotted owls, and many more - and a vast array of amphibians and reptiles, including foothill yellow-legged frogs, western fence lizards, Gilbert skink, western rattlesnake, and pacific treefrog. Non-native, invasive aquatic and terrestrial species are also present in the region which can threaten biological diversity. Non-native plants can alter nutrient cycles, hydrology, wildfire frequency, and hybridize with native species, as well as spread into protected areas and wildlands and reduce the species and communities these sites were created to protect.

1.2. Water Resource Conditions

1.2.1. Water Supplies and Demands

The regional water supplies and demands included in this section are agency estimates based on the best available information and projections. Demands are very sensitive to population and land use, and the increasing demands reflect regional trends. To help offset increasing demands, agencies are implementing demand management measures as described in their respective Urban Water Management Plans (UWMPs).

Amador County

AWA provides potable water and raw water to more than 25,000 people in its four service areas, Amador Water System, Central Amador Water Project System, La Mel Heights, and Lake Camanche Village, for municipal, industrial, and irrigation uses. Demands have flattened during the recent economic recession, but AWA continues to manage its water supplies and demands over a range of normal and emergency conditions.

As part of the 2010 UWMP, AWA calculated its baseline daily per capita water use and interim and urban water use targets as required by Senate Bill x7-7 (SBx7-7). As a result, future water demands were calculated assuming the required reduction in daily per capita water use would be achieved in future years. Demands were estimated based on the projected growth described in the local general plans and housing elements, the Amador County Housing Element average of 2.25 persons per household, and the daily per capita water use target for 2020 of 166 gallons per capita per day (GPCD) calculated as required by SBx7-7.

The domestic sector of AWA's water service customers includes permanent and seasonal, single and multi-family residences. Since JVID is the primary supplier of agricultural water, AWA does not supply agricultural water except for incidental purposes. AWA also serves water or recycled water to several commercial/industrial consumers and golf courses. Past and projected water demands are shown in Table 1-7.

Table 1-7: Past and Projected Water Demands (AFY)

Water Use	2005	2010	2015	2020	2025	2030
Total Water Deliveries [a]	3,312	3,129	3,590	4,574	5,218	5,879
Sales to Other Water Agencies [b]	1,683	1,377	1,482	1,787	1,941	2,116
Additional Water Uses and Losses [c]	4,738	3,901	3,980	4,137	4,248	4,362
TOTAL	9,733	8,407	9,052	10,498	11,407	12,356

Source: AWA, 2011.

Footnotes:

a. Water deliveries include deliveries to the following: single family residential, multi-family residential, commercial/institutional, industrial.
b. Sales to other water agencies includes sales to Drytown County Water District, City of Jackson, Mace Meadows Water Association, Pine Grove Community Services District, City of Plymouth, Rabb Park Community Services District.
c. Additional water uses and losses includes Backwash Water, Raw Water Billed, Raw Water Losses, Recycled Water and System Losses.

Surface water accounts for approximately 97 percent of AWA's total water supply and it is the sole source of water for the Amador Water System and the Central Amador Water Project. Groundwater accounts for the remaining 3 percent of AWA's total water supply and is only used in the La Mel Heights community and Lake Camanche Village. Due to growth in the area and concerns over groundwater quality and basin overdraft, the Lake Camanche Village area is planning to phase out the use of groundwater. There are currently plans for a joint surface water treatment plant project between EBMUD, AWA, and CCWD to supply surface water to this area; this project is still in the planning stages and surface water rights have not been identified.

The La Mel Heights area has restricted growth potential and build-out will be achieved in the next ten years. Therefore, the amount of groundwater projected to be pumped is held constant after the year 2020. To help meet the water demand of La Mel Heights, AWA completed the construction of a second well which has a yield of 50 AFY. The old well has been retained as a back-up source. Table 1-8 summarizes the amount of groundwater expected to be pumped through 2030.

Table 1-8: Amount of Groundwater Projected to be Pumped, AFY

Basin Name	2010	2015	2020	2025	2030
San Joaquin Valley Cosumnes Basin 5-22.16 (Lake Camanche Village wells)	280	349	419	488	558
Unclassified Groundwater Aquifer (La Mel Heights well) [a]	16.3	19.7	22.7	22.7	22.7
% of AWA's Total Supply	3.2%	3.7%	3.8%	4.1%	4.4%

Source: AWA, 2011.
Footnotes:
a) La Mel Heights area assumed to be built out by 2020.

Table 1-9 summarizes AWA's current and future water supplies. Future water supplies were developed as part of AWA's 2010 Urban Water Management Plan and are based on the following assumptions.

- La Mel Heights will reach build out in 2020 and not require additional water supply.
- Lake Camanche Village will switch to surface water in 2015. Depending on the schedule of the joint surface water treatment plant project between EBMUD, AWA, and CCWD, the switch to surface water supply in 2015 could be delayed.

AWA previously used the Amador Canal to transfer the Amador Water System surface water from Lake Tabeaud to Tanner Reservoir, but almost half of the diverted water was lost due to open ditch conveyance leakage. As a result, the Amador Transmission Pipeline was constructed. The reduction in losses associated with pipeline conveyance allows surface water in excess of the Amador Water System demand to remain in the Mokelumne River and be incidentally captured in EBMUD's reservoirs. EBMUD participated in funding the pipeline but was not guaranteed a specific amount of water. As Amador Water System water demand increases, incidental transfer to EBMUD reservoirs will be reduced. AWA is not pursuing any other water transfers or exchanges at this time. AWA does not currently produce any recycled water, but in the future it anticipates development of a regional reclaimed water supply to offset raw and potable water demands.

Table 1-9 describes current and projected maximum water supplies available to AWA.

Table 1-9: Current and Planned Water Supplies, AFY

Water Type	2010	2015	2020	2025	2030
Surface Water [a]	16,150	17,200	17,200	17,200	17,200
Supplier Produced Groundwater	296	369	442	511	581
Recycled Water [b]	0	0	0	0	0
Incidental Transfer to EBMUD [c]	N/A	N/A	N/A	N/A	N/A
TOTAL [d]	16,446	17,569	17,642	17,711	17,781

Source: AWA, 2011.

Footnotes:

a) It is anticipated AWA will obtain additional water rights in CAWP, increasing the right from 1,150 to 2,200 AFY.
b) Recycled water is not supplied by AWA but it is used in a small portion of its service area. Future supply does not include several potential uses that are currently being investigated.
c) Quantities transferred to EBMUD are incidental and not guaranteed for any specific amount; therefore, they are not projected.
d) Total does not reflect amount of water incidentally transferred out of supply to EBMUD.
Source: AWA, 2011

Comparing supply and demand as presented in Table 1-10 highlights the decreased future margin of confidence that AWA will be able to provide its future customers. Projects within the IRWMP will help to increase that margin to better accommodate current and future water demands (AWA, 2011).

Table 1-10: Supply and Demand Comparison

	2010	2015	2020	2025	2030
Water Supply [a]	16,446	17,569	17,642	17,711	17,781
Water Demand [b]	8,407	9,052	10,498	11,407	12,356
Difference	8,039	8,517	7,144	6,304	5,425

Footnotes:

a) Water supplies as shown in Table 1-9.
b) Water demands as shown in Table 1-7.

Calaveras County

Since the 1990s and until the recent economic downturn, Calaveras County has exhibited one of the fastest growing populations in the State. From 1990 to 2000 the County's population increased by 12.4 percent. Adjacent areas in San Joaquin Valley are preparing plans to deal with a population of over one million people, and spillover population effects are likely to occur in Calaveras County. In addition to the population growth, Calaveras County boundaries overlap three separate watersheds. Only the Calaveras River watershed is currently included in the MAC region. In the future, the region definition may be modified to include specific rapidly expanding water systems outside of the current southern boundary of the region. This section will be updated with quantity and demand for these systems as the regional definition is expanded.

CCWD

CCWD is the primary water service provider to Calaveras County. CCWD is participating in the IRWMP with the goal of enhancing its ability to efficiently use supplies among all of its service areas and conjunctively use its surface and groundwater supplies. CCWD faces challenges associated with rapid development, growth in agricultural development, failing groundwater supplies, and annexation of small water supply systems. The projects anticipated under the IRWMP would protect and promote the health and welfare of Calaveras County residents by improving CCWD's ability to protect against localized drought, regulatory uncertainty, infrastructure limitations and other localized system issues.

CCWD provides water service to nearly 13,000 municipal and residential/commercial customers through five independent water systems located throughout the County. CCWD's boundaries align with Calaveras County's boundary, but CCWD does not provide water and/or wastewater services to all communities in the county, as some are served by private wells or other public or private agencies. CCWD services municipal, residential, and commercial customers in the following five independent water systems within Calaveras County.

- Jenny Lind
- Copper Cove / Copperopolis
- Ebbetts Pass
- West Point
- Sheep Ranch

These service areas are geographically distinct and do not currently interact or connect with one another. In the past, decisions were made to keep the water systems local. Due to recent trends of rapid growth, regional systems have become more attractive due to the potential for economies of scale and system redundancy. However, since the water systems currently remain local, no redundancy is in place to protect individual water systems, should their water supplies be unavailable. Regional projects proposed in this IRWMP may improve interconnectivity of the existing water systems, improving reliability of all systems. Of the five service areas, the Jenny Lind and West Point/Wilseyville systems are within the MAC Region.

CCWD service areas include primarily domestic and light commercial uses, with no major industry or large agricultural demands. Most of Calaveras County is rural, with many small communities. Some of these communities, particularly those on the western border, are rapidly urbanizing. According to the Housing Element of the Calaveras County General Plan, the annual growth rate between 2001 and 2009 was 2.7 percent, though this number is very sensitive to construction and is constantly being updated. Demand is expected to increase at approximately the same rate as population growth.

Surface water is the sole source of supply for CCWD's five systems. CCWD obtains its water supplies from three main watersheds that drain the western slope of the Sierra Nevada. The Stanislaus River watershed serves communities along the Highway 4 corridor (communities not within the MAC region). The Calaveras River watershed serves the Jenny Lind service area while the Mokelumne River watershed serves West Point. Three of CCWD's systems incorporate recycled water to irrigate golf courses, and CCWD is seeking to expand its recycled water use to additional agricultural users and public activities where water is unavailable.

Groundwater is not a reliable source of supply in much of the County due to the small and unpredictable yields of the local fractured rock system. CCWD has adopted a Groundwater Management Plan to address a 30,000-acre alluvial area within the San Joaquin Valley Groundwater Basin, located in the Camanche / Valley Springs region in the northwest corner of Calaveras County (DWR Bulletin 118). The GWMP includes efforts to protect water supply reliability such as conjunctive use, groundwater recharge projects, as well as other measures. CCWD's water supplies and demands for the two water systems in the MAC region are included in Table 1-11.

Table 1-11: CCWD Projected Supply and Demand, AFY

System	2015	2020	2025	2030	2035
New Hogan / Camanche / Valley Springs[a]					
Supply					
Surface Water	31,278	31,278	31,278	31,278	31,278
Recycled Water	509	756	1,003	1,250	1,497
Total Supply	31,787	32,034	32,281	32,528	32,775
Demand					
Potable	2,754	2,944	3,231	3,517	3,827
Recycled	245	245	245	245	245
Raw	12,846	16,010	20,175	24,339	28,503
Total Demand	15,845	19,199	23,651	28,101	32,575
West Point / Wilseyville					
Supply					
Surface Water	2,080	2,080	2,080	2,080	2,080
Total Supply	2,080	2,080	2,080	2,080	2,080
Demand					
Potable	376	418	465	513	540
Raw	0	2,000	2,000	2,000	2,000
Total Demand	376	2,418	2,465	2,513	2,540

Footnotes:

a) Regionalization demand and serving areas with failing groundwater could increase potable and raw surface water demand above projected volumes.

b) Values based on upper limits of permit or contract right for Mokelumne River.

Source: CCWD, 2011. Tables 7-1 and 7-4

Combined with projected growth and potential environmental demands, CCWD is examining cost-effective alternatives to maximize supply through increased storage to provide improved supply reliability. CCWD's water supplies are currently projected to be sufficient to meet demands for the two water systems within the region for a 20-year horizon. However, variability in supply availability and dependence on local, aging infrastructure have caused CCWD to plan for additional water supply, system redundancy, and upgraded infrastructure to avoid water shortages.

CPUD

Calaveras Public Utility District (CPUD) obtains its water at a diversion dam and pump station near the confluence of the Licking Fork and South Fork of the Mokelumne River. Water is pumped to Jeff Davis Reservoir and gravity-fed to a treatment plant, where it is then conveyed to storage tanks in the communities of Rail Road Flat, Mokelumne Hill, Paloma, and San Andreas. CPUD also derives a small amount of agricultural water from the Calaveras River. CPUD's boundaries cover 21,543 acres, including areas within and around the communities of Mokelumne Hill and San Andreas. CPUD's Sphere of Influence (SOI) is L-shaped, covering an area of approximately 64,553 acres. In 2001, CPUD's water sales were 962 AF, approximately 9 percent of its water rights. CPUD has 1,720 customers within the following customer classes: single-family residential (82 percent), multi-family residential (6 percent), commercial (12 percent), and agricultural (less than 1 percent).

CPUD's SOI may expand to encompass a total of 179,464 acres in future years. The areas proposed for inclusion in the SOI currently rely on groundwater sources, which vary dramatically in availability and quality. The need for water in the proposed CPUD SOI depends on multiple factors including: continued growth in the area, density of new development, desire to have high quality water, need for fire protection, and availability of grants and loans to fund expansion of the distribution system.

According to the Calaveras County Water Master Plan, by 2040, water demand is projected to be between 4,335 AF and 5,898 AF annually. CPUD's water rights from the Mokelumne River amount to 10,950 AFY, so available supplies should be sufficient to meet demands through 2040, provided that demands follow the slower growth curve. If demands progress according to the high demand curve, supplies are projected to be sufficient to meet demands through approximately 2025.

Alpine County

Alpine County has experienced relatively slow, steady population growth. Population is expected to grow more quickly in Bear Valley, Kirkwood, Markleeville, and Woodfords than in other parts of the county, in part due to the increased availability of public water and sewer services. In contrast, much of the county is served by on-site wells and septic systems.

Extra-Regional Demands

EBMUD is the primary user of Mokelumne River water outside the MAC Region. On an average annual basis, approximately 90 percent of the water used by EBMUD comes from the Mokelumne River watershed. EBMUD has water rights that allow for delivery of up to 325 MGD from the Mokelumne River, subject to annual runoff and senior water rights of other users. EBMUD's position in the hierarchy of Mokelumne water users is established by a variety of agreements between Mokelumne water rights holders, the appropriative water rights permits and licenses which have been issued by the State, pre-1914 rights, and riparian rights.

EBMUD's Mokelumne River supply facilities include Pardee Dam and Reservoir, located near Valley Springs, and Camanche Dam and Reservoir, located approximately 10 miles downstream. EBMUD diverts supplies at Pardee Reservoir, conveying stored Mokelumne River supplies to its primary users in the East Bay portion of the San Francisco Bay Area via the Pardee Tunnel, Mokelumne Aqueducts, and Lafayette Aqueducts.

1.2.2. Water Quality Conditions

The MAC IRWMP region obtains the majority of its supplies from the Mokelumne and Calaveras river watersheds. In Amador County, only 3 percent of the domestic or treated water supply is from groundwater sources, and 97 percent of supply is from the Mokelumne River. Calaveras County derives nearly all its water supply from surface water, as does the portion of Alpine County located with the MAC IRWMP region.

Surface Water

Surface Water Supplies

The winter snow pack in the Sierra Nevada serves as the primary source of water for the Mokelumne River. There are four water systems in Amador County that draw water from the Mokelumne River watershed. The Amador Water System and the Central Amador Water Project have yearly Mokelumne River surface water allotments of 15,000 AFY) and 1,150 AF (with a possibility of expanding to 2,200 AF), respectively. The Lake Camanche Area and La Mel Heights service areas pump groundwater within the watershed. In addition, JVID has water rights to 3,800 AF per year from Pardee Reservoir for agricultural irrigation, and CPUD pumps 920 AF per year from the South Fork of the Mokelumne River. EBMUD has water rights and facilities to divert 325 MGD (approximately 364,072 AFY) from the Mokelumne River. CCWD uses Bear Creek water (a tributary of the Mokelumne River) as a primary source of water. The Mokelumne River serves as a backup source for the West Point, Wilseyville, and Bummerville water systems.

Communities in Calaveras County within the IRWM planning region also rely heavily on the Calaveras River as a source of water. Unlike the Mokelumne River, the Calaveras River depends almost totally on rainfall. River flows are controlled by New Hogan Dam and Reservoir, which is operated by Stockton East Water District (SEWD) and the U.S. Army Corps of Engineers. Both SEWD and CCWD have rights to the yield from New Hogan, with SEWD's supplies subject to reduction based on CCWD's future demands.

Surface Water Quality

The Mokelumne River provides high quality source water for most of the year. According to the 2010 Amador UWMP Update, the water may become somewhat turbid during storm events. Additionally, there are some potential water quality issues at specific locations in the IRWMP region. Table 1-12 summarizes the impaired water bodies within the IRWMP region listed on the State Water Resources Control Board 303(d) list.

Table 1-12: Impaired Water Bodies within the MAC IRWMP region

Water Body	Pollutant	Total Maximum Daily Load (TMDL) Priority	Estimated Size Affected
Bear Creek	Mercury	Medium	15 miles
Lower Bear Reservoir	Diazinon	Medium	21 miles
Upper Bear Reservoir	Mercury	Medium	10 miles
Lower Calaveras River	Diazinon Organic Enrichment Pathogens	Low Low Low	5.8 miles
Camanche Reservoir	Copper Zinc	Low Low	7,389 acres
Five Mile Slough (Alexandria Place to Fourteen Mile Slough)	Chloropyrifos Diazinon Organic Enrichment Pathogens	Medium Medium Low Low	1.6 miles
Lower Mokelumne River	Copper Zinc	Low Low	29 miles [a]
Mosher Slough (upstream of I-5)	Pathogens	Low	3.5 miles

Footnotes:

a) Not all 29 miles are necessarily within the study area

Source: 2002 CWA Section 303(d) List of Water Quality Limited Segment, Region 5.

Flooding

Flooding is a concern for many areas within the MAC IRWM planning region. Many cities and communities are included in 100-year floodplains (of both the Mokelumne River and its tributaries), including Sutter Creek, Jackson, Ione, and Mokelumne Hill. In some cases, like in the City of Plymouth, flooding is due to an inadequate storm drainage system, unable to handle heavy storms during winter and spring seasons. The Calaveras County General Plan discusses three basic types of potential flood hazards: stream-side overbank flows, areas of flat terrain with slow surface drainage, and inundation due to structural dam failure. Flooding can occur from heavy rainfall, rapid snow melt, saturated soils, or a combination of these conditions. Also, increasing development leads to an increase in impervious surface areas and a decrease in natural vegetative cover, which reduces the detention and attenuation characteristics of the overland areas. Documented flooding in the past has caused the following general damages and impacts to areas within the region.

- Property Damage: Extensive water damage to building contents.
- Structural Damage: Structural damage to residential and commercial buildings, as well as sewer system pipes/infrastructure.
- Business/Economic Impact: Some businesses must close for a period of time after flooding.
- Road/School/Other Closures: Bridges routinely close during high-water periods and floods.
- Federal Emergency Management Act (FEMA) funds have been available after floods in the past to assist with recovery.

Groundwater

Groundwater quantity and quality in the MAC IRWMP region varies considerably between well sites due to the small and unpredictable yields of the fractured rock system that typifies the foothill geology. Groundwater accounts for approximately 3 percent of AWA's total water supplies. It is only used in the communities of La Mel Heights and Lake Camanche Village. There is one well in La Mel Heights which has a safe yield of 50 AFY, in addition to a backup well. In the Lake Camanche Village area, AWA operates 4 wells that pump approximately 1,300 AFY of water from the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin. The well locations overlying the Cosumnes Subbasin are shown in Figure 1-10.

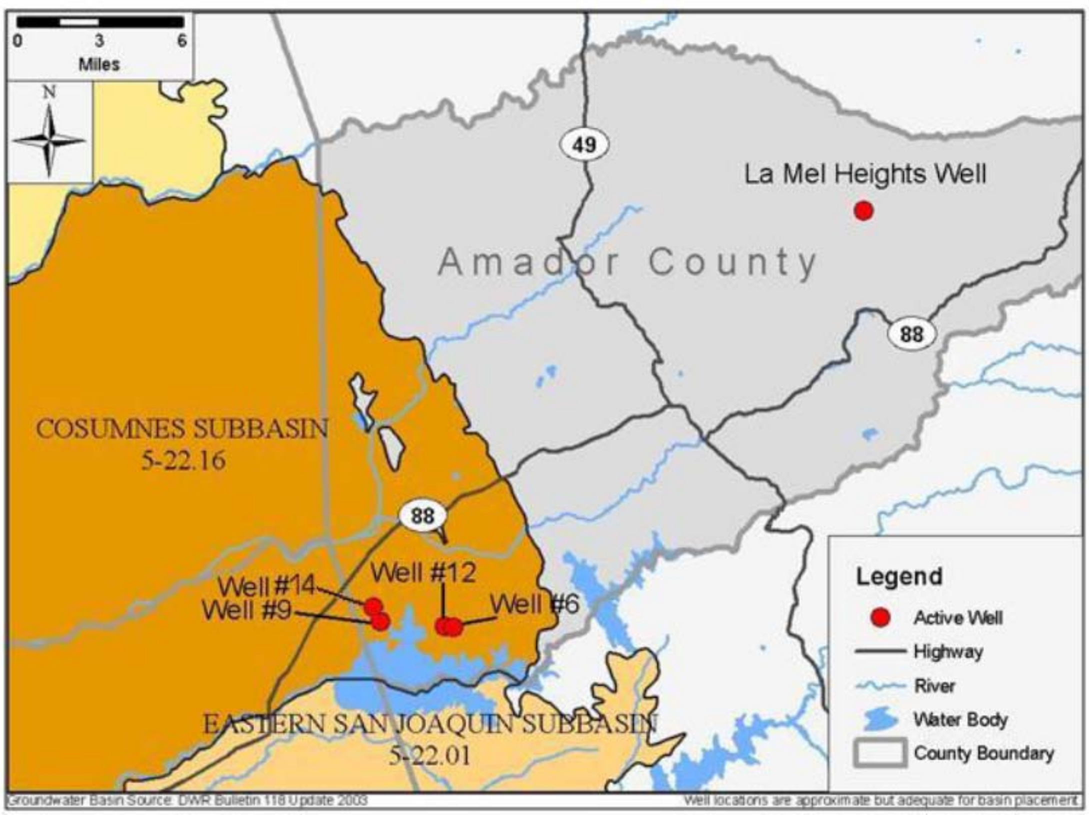


Figure 1-10: Cosumnes Subbasin and AWA Wells in Lake Camanche Village (AWA, 2011)

The Cosumnes Subbasin is approximately 439 square miles in size, and is bounded on the north and west by the Cosumnes River, on the east by the bedrock of the Sierra Nevada, and on the south by the Mokelumne River. The groundwater level has paralleled the available surface water supply over the past 25 years. Table 1-13 summarizes the rise and fall of groundwater levels.

Table 1-13: Historic Groundwater Levels in Cosumnes Subbasin

Time Period	Change in Level	Change from Reference Level[a]
Mid-1960s	0	0
Mid-1960s - 1980	-20 to -30 feet	-20 to -30 feet
1980-1986	5 to 10 feet	-10 to -25 feet
1987-1992	-10 to -15 feet	-20 to -40 feet
1993-2000	15 to 20 feet	-5 to -20

Footnotes:

a) Reference level is taken to be the groundwater level during the mid-1960s.

Source: California's Groundwater Bulletin 118 Updated 2/06

As shown in Table 1-13, the groundwater levels in 2000 were approximately the same or slightly higher than those in the mid-1980s. The groundwater storage capacity is estimated to be about 6,000,000 AF with an average specific yield of 7.4 percent. Basin inflows are estimated to be about 269,500 AFY. Water leaves the Subbasin through subsurface flow (144,600 AFY), urban extraction (35,000 AFY), and agricultural extraction (94,200 AFY). Based on this water balance, the Subbasin is in overdraft by about 4,300 AFY (DWR, 2006b).

Groundwater does not account for any of CCWD's water supply. CCWD owns one well west of the Jenny Lind system in the Camanche/Valley Springs Area, but it is not operated. Located in the northwestern portion of Calaveras County, the Camanche/Valley Springs area is part of the Eastern San Joaquin Subbasin (DWR, 2006a), which is identified by DWR Bulletin 118 as being in the San Joaquin Valley Groundwater Basin. The Eastern San Joaquin Subbasin is approximately 1,105 square miles in size and is bounded on the south, southwest, and west by the Modesto, Delta-Mendota and Tracy Subbasins, respectively, and on the northwest and north by the Solano, South American, and Cosumnes Subbasins. The Solano and South American Subbasins are located in the Sacramento Valley Groundwater Basin. The Eastern San Joaquin Subbasin is drained by the San Joaquin, Stanislaus, Calaveras and Mokelumne Rivers. Based on a 1990 study by the U.S. Bureau of Reclamation, annual groundwater extractions total about 731,000 AFY, which exceeds the estimated safe yield of 618,000 AFY; hence the Subbasin was determined to be in a state of overdraft. The Eastern San Joaquin Subbasin is currently being managed under an AB3030 Groundwater Management Plan (GMP), prepared by the Northeastern San Joaquin County Groundwater Banking Authority. The Camanche/Valley Springs area is managed under a separate GMP, adopted by CCWD in 2001, for investigation of opportunities to improve management of groundwater resources in western Calaveras County.

Imported Water

CCWD does not import water from outside the basin, but it has purchased water from CPUD in the past. During summer and fall months, water from the Middle Fork of the Mokelumne River stored in Schaad's Reservoir is supplied to the West Point area if the Bear Creek supply is inadequate. An agreement between CCWD and CPUD allows exchange of up to 150 AFY.

Recycled Water

Several of the RPC members currently use recycled water to meet part of their water demands. The City of Ione operates a tertiary treatment facility, Castle Oaks Wastewater Reclamation Plant, which treats Amador Regional Sanitation Authority (ARSA) effluent from the City of Sutter Creek plant and produces a disinfected tertiary Title 22 effluent suitable for unrestricted reuse. The disinfected tertiary effluent is currently used to irrigate the Castle Oaks Golf Course. Additionally, a portion of the secondary effluent from the Sutter Creek Wastewater Treatment Plant conveyed to the ARSA outfall is delivered to the Bowers and Hoskins Ranches to irrigate land used for cattle grazing. The amount of water delivered to each plot is unknown, but has been approximated using an irrigated pasture application rate of 2.5 AFY per acre of pasture. Table 1-14 summarizes the current recycled water uses in the ARSA service area. The recycled water use at these sites in not projected to increase due to the limited acreage of these sites.

Table 1-14: Recycled Water Uses in the Amador County Service Area, AFY

User Type	Treatment Level	2005	2010	2015	2020	2025	2030
Landscape (Castle Oaks Golf Course)[a]	Tertiary	557	557	557	557	557	557
Bowers Ranch Irrigation[b]	Secondary	100	100	100	100	100	100
Hoskins Ranch Irrigation[c]	Secondary	150	150	150	150	150	150
Landscape (Mace Meadows Golf Course)	WTP Backwash[d]	56	56	56	56	56	56
	TOTAL	**863**	**863**	**863**	**863**	**863**	**863**

Footnotes:

a) Based on Year 2004 Castle Oaks Reclamation Plant effluent of 557 AFY .
b) Approximate delivery from ARSA. Based on 40 acres of cow pasture and an Irrigated Pasture application rate of 2.5 AFY/acre.
c) Approximate delivery from ARSA. Based on 60 acres of cow pasture and an Irrigated Pasture application rate of 2.5 AFY/acre.
d) Backwash water from AWA's Buckhorn WTP based on Year 2005 and 2006 average annual flows.

1.3. Climate Change

There is mounting scientific evidence that global climate conditions are changing and will continue to change as a result of the continued build-up of greenhouse gases (GHGs) in the Earth's atmosphere. Changes in climate can affect municipal water supplies through modifications in the timing, amount, and form of precipitation, as well as water demands and the quality of surface runoff. These changes can affect all elements of water supply systems, from watersheds to reservoirs, conveyance systems, and treatment plants.

Planning for and adapting to anticipated changes in climate will be essential to ensuring water supply reliability for all users and to protecting sensitive infrastructure against more frequent and extreme precipitation and wildfire events. This technical memorandum (TM) summarizes anticipated climate change impacts on the State of California and the Mokelumne/Amador/Calaveras (MAC) Integrated Regional Water Management (IRWM) region, evaluates the impacts of those changes with regards to water resource management, assesses the vulnerability of regional infrastructure to anticipated climate change impacts, and provides recommended adaptation and mitigation strategies to address uncertainty and reduce GHG emissions. In addition, a plan for ongoing data collection to fill data gaps and monitor the frequency and magnitude of local hydrologic and atmospheric changes is provided.

1.3.1. Background

Research conducted by the California Department of Water Resources (DWR), the American Water Works Association (AWWA), and the Intergovernmental Panel on Climate Change (IPCC), among others, indicates that North America will likely experience increased land and water temperatures and greater climatic variability in this century. While the impacts of climate change will be experienced differently by different regions and watersheds, water supply systems that exhibit the following characteristics are most likely to be impacted by climate change:

- Depend on surface storage for water supply and flood control;
- Depend on late spring snowmelt;
- Are sensitive to climatic variability;
- Contain biological habitats that are sensitive to water temperatures, quality and runoff timing;
- Are located in arid parts of western North America.

Because the primary sources of water in the MAC Region are the Mokelumne and Calaveras River watersheds, which rely on snowmelt and rainfall from the Sierra Mountain Range, the water supply systems within the Region display many of these characteristics. However, predicting future climate conditions and potential impacts on water resources is not an exact science. Detailed analysis relies on assumptions about future carbon emissions and coarse disaggregation of data from global and regional climate models into regional weather patterns.

1.3.2. Statewide Observation and Projections

In 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, ordering the State of California to assess the impacts of climate change on various sectors of the California economy, including the State's water supply. In response to the Governor's order, DWR, in collaboration with recognized industry and academic experts, prepared a report describing the progress made to incorporate climate change into water resources planning (DWR, 2006c). The report presented empirical evidence that the State's climate has indeed been changing over the course of the 20th century, and documented a methodology for forecasting future climate conditions by downscaling information from general circulation models (GCMs) to assess potential climate change impacts on the State's water resources. At the same time, the California Energy Commission's Public Interest Energy Research (PIER) and the California Climate Change Center (CCCC) prepared the first biennial science report (CEC, 2006) to evaluate and present potential impacts of climate change on specific sectors of the California economy, including water resources. This report presented a methodology similar to DWR's methodology, but also included approaches that are specific to the resource(s) being impacted by climate change (e.g. agriculture versus public health).

Predicting future climate conditions and the potential associated impacts on water resources is not an exact science and relies on several key assumptions. A number of studies have been conducted to-date to project possible future changes in temperature and precipitation, and many more are currently underway. While it is generally accepted that temperatures will increase in California over the next century, the rate of temperature rise and specific changes in regional precipitation patterns are less certain.

The DWR methodology for evaluating climate change impacts on water resources is summarized in Figure 1-11. This methodology, as published in the 2006 DWR report entitled *Progress on Incorporating Climate Change into Management of California Water Resources*, is a scenario-planning approach that uses two representative GCMs: the Geophysical Fluid Dynamic Lab model (GFDL) and the Parallel Climate Model (PCM). These models were selected from a multitude of available models currently being run at 18 modeling centers around the world to calculate future global climate conditions. The GFDL model was selected because it is relatively sensitive to GHGs in modeling global and regional temperatures, while the PCM was selected as a counterpoint as it is less sensitive. Both models, however, were within the mid-range of GHG predictions by GCMs in use at that time.

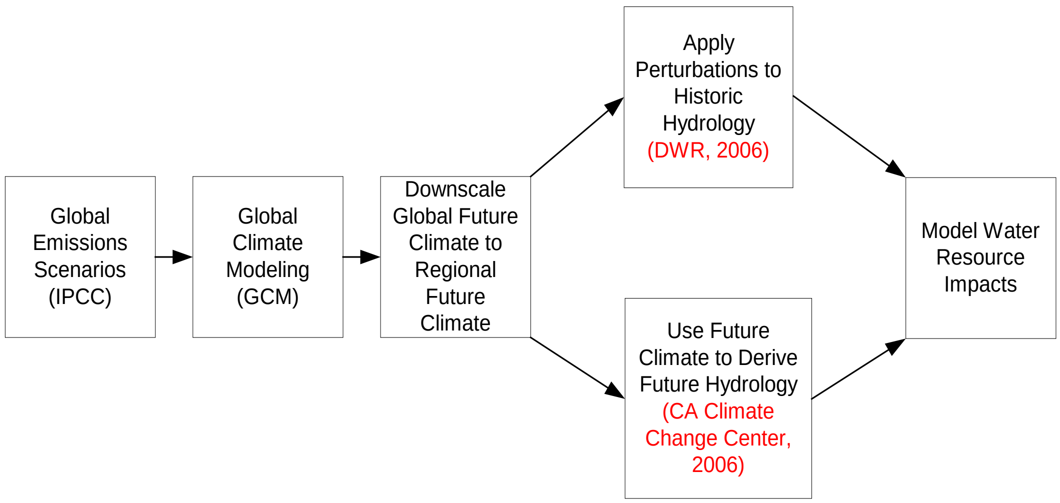


Figure 1-11: Summary of Climate Change Modeling

Additionally, both GCMs (GFDL and PCM) were evaluated under two emissions scenarios: the A2 emissions scenario and the B1 scenario. The A2 scenario is characterized by an increasing population, regionally oriented economic development and independently operating self-reliant nations with slow technological changes resulting in significantly higher GHG emissions. The B1 scenario reflects a more integrated and ecologically friendly future, combining a high level of environmental and social consciousness with global cooperation for sustainable development. This scenario is characterized by rapid economic growth, but with equally rapid changes toward a service- and information-based economy. This methodology again reflects the central range of modeling results, rather than the extremes.

The resulting changes in global climate were downscaled to obtain regional climate data relevant to the MAC IRWM planning program. Regional climate data were then used to predict regional streamflow runoff using an established hydrologic model (the Variable Infiltration Capacity or VIC model) relating regional temperature and precipitation to streamflow runoff. The model was calibrated by comparing historical streamflow data to modeled streamflow data generated using historic climate conditions. A comparison of monthly average model-generated flows under future climate conditions were then compared to historic streamflows to established monthly perturbation ratios or factors (a perturbation ratio is the ratio of the value of the relevant variable – in this case, streamflow – to the corresponding value of the same variable in the same month under baseline or historical conditions). The resulting perturbation factors were then applied to the historic hydrology of local watersheds to set up a perturbed (or modified) hydrology reflecting potential future conditions under a climate change scenario. In the DWR study, perturbation factors were developed for eleven key California watersheds for use in the state-wide modeling.

The CCCC, under the direction of Governor Schwarzenegger, developed an alternative methodology to assess impacts on several sectors of the California economy (including water resources, agriculture, and public health). For the agricultural sector in the Sacramento Valley, the methodology employed differed from the DWR approach mainly in how streamflows were generated from downscaled GCM data. In the DWR methodology, perturbed historic hydrology modified the magnitude of monthly streamflows but preserved the historic sequence of wet years and dry years (i.e. frequency and length of droughts remained constant). The CCCC methodology stipulated that, because the global climate is changing, past climate patterns are no longer an accurate guide for future patterns (Joyce et al, 2006). Like the DWR approach, the CCCC approach downscaled the GCM data to obtain regional climate data; however, these data were then input into a regional hydrologic model generating streamflow data for future years. The resulting climate-derived hydrologic conditions differ from the perturbed historic hydrologic conditions in that the historic annual and decadal patterns (e.g. length, magnitude, and frequency of droughts) were not preserved. The results of the two methods are summarized in Table 1-15.

Table 1-15: Summary of Predicted Water Resources Impacts in Northern California

	Predicted Impacts			
Method	**Snow Pack and Stream Flow Timing**	**Total Annual Precipitation**	**Drought Frequency**	**Drought Length**
Perturbed Historic Hydrology (DWR, 2006c)	Decreased Snow pack, Snowmelt earlier in year	Inconclusive – no major trends identified	None – historic patterns are preserved	Greater climate variability predicted (including potentially longer droughts)
Climate-Derived Hydrology (CCCC, 2006a)	Decreased Snow pack, Snowmelt earlier in year	Inconclusive – no major trends identified	Inconclusive - but some scenarios predict more frequent droughts	Inconclusive - but some scenarios predict longer droughts

Both methods (DWR and CCCC) relied on several assumptions, and neither can be used to exactly predict future conditions. Additionally, while projected temperature increases are significant, even as early as 2011-2040, and are consistent between models, the magnitude of annual precipitation has been shown to vary, sometimes significantly, between GCMs (Maurer, 2005). However, the use of scenario planning reduces variance by producing a bracketed range of results, and general trends are beginning to emerge from the modeling. The most consistent findings are that a predicted increase in surface temperature will cause a decrease in total annual snowpack and that snowmelt, and therefore spring runoff, will occur earlier in the year. Additionally, there is no conclusive evidence from either approach as to the frequency or severity of droughts, but DWR acknowledges the potential for increased climate variability (including the potential for more severe droughts) and some scenarios under the climate-derived hydrology method predict longer and more frequent droughts.

Temperature and Precipitation Changes

While California's average temperature has increased by 1°F in the last one hundred years, trends are not uniform across the state. The Central Valley has actually experienced a slight cooling trend in the summer, likely due to an increase in irrigation (CEC, 2008). Higher elevations have experienced the greatest temperature increases. Many of the State's rivers have seen increases in peak flows in the last 50 years (DWR, 2008).

GCMs project that in the first 30 years of the 21st century, overall summertime temperatures in California will increase by 0.9 to 3.6°F (CAT, 2009) and average temperatures will increase by 3.6 °F to 10.8°F by the end of this century (Cayan et al, 2006). Increases in temperature are not likely to be felt uniformly across California. Model projections generally project that warming will be greater in California in the summer than in the winter (CAT, 2009) and inland areas will experience more extreme warming than coastal areas

(CNRA, 2009). These non-uniform warming trends are among the reasons that regional approaches to addressing climate change are important.

While historical trends in precipitation do not show a statistically significant change in average precipitation over the last century, regional precipitation data show a trend of increasing annual precipitation in Northern California (DWR, 2006c) and decreasing annual precipitation throughout Southern California over the last 30 years (DWR, 2008). A key change in precipitation patterns has been more winter precipitation falling as rain instead of snow (CNRA, 2012), leading to increased streamflow in the winter and decreased streamflow in the spring and summer, when water demands are the greatest. This increased streamflow variability could lead to increased risks of flooding, levee failure, saline water intrusion and flood-induced habitat destruction.

While temperature projections exhibit high degrees of agreement across various models and emissions scenarios, projected changes in precipitation are more varied. Taken together, downscaled GCM results show little, if any, change in average precipitation for California before 2050 (DWR, 2006c), with a drying trend emerging after 2050 (BOR, 2011 and CCSP, 2009). While little change in precipitation is projected by the GCMs as a group, individual GCM results are considerably varied. Climate projections therefore imply an increase in the uncertainty of future precipitation conditions.

Sea level Rise, Snowpack Reduction, and Extreme Events

In the last century, the California coast has seen a sea level rise of seven inches (DWR 2008). The average April 1st snowpack in the Sierra Nevada region has decreased in the last half century (Howat and Tulaczyk, 2005, CCSP, 2008), and wildfires are becoming more frequent, longer, and more widespread (CCSP, 2008).

As the climate warms, snowpack in the Sierra Nevada (a primary storage mechanism for California's water supply) is anticipated to continue to shrink. Based on simulations conducted to date, Sierra Nevada snowpack is projected to shrink by 30% between 2070 and 2099, with drier higher warming scenarios projecting that number as high as 80% (Kahrl and Roland-Holst 2008). Additionally, extreme events are expected to become more frequent, including wildfires, floods, droughts, and heat waves. In contrast, freezing spells are expected to decrease in frequency over most of California (CNRA, 2009). While GCM projections may indicate little, if any, change in average precipitation moving into the future, extreme precipitation events are expected to become more commonplace (CBO, 2009). The combination of drier and warmer weather compounds expected impacts on water supplies and ecosystems in the Southwestern United States with wildfires expected to continue to increase in frequency and severity (CCSP, 2009).

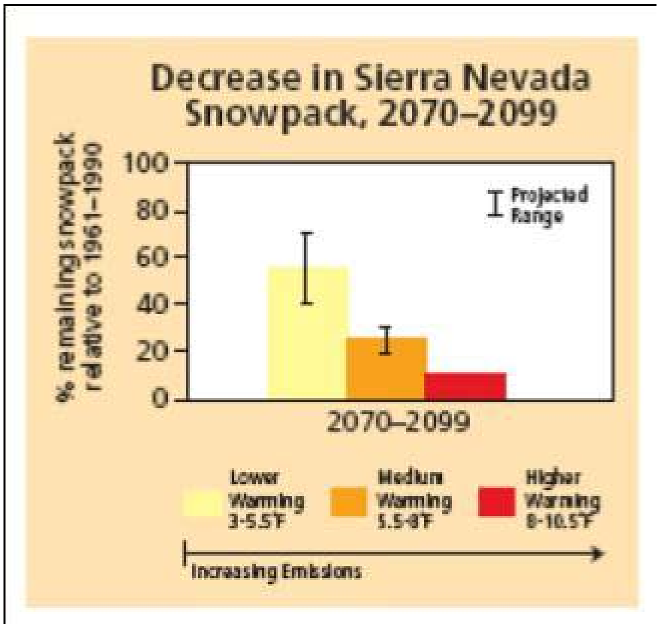


Figure 1-12: Projected Temperature and Precipitation Changes in California (Hopmans et al., 2008)

1.3.3. Legislative and Policy Context

In order to address currently-predicted climate change impacts to California's water resources, DWR's IRWM Grant Program Guidelines require that IRWM Plans describe, consider, and address the effects of climate change on their region, and consider reducing GHG emissions when developing and implementing projects. Part of this process involves framing the IRWM analysis and response actions in the context of State legislation and policies that have been formed to address climate change. The following summarizes the legislation and policies that were considered as part of this IRWM Plan.

Executive Order (EO) S-3-05 (2005)

EO S-3-05, signed on June 1, 2005 by Governor Arnold Schwarzenegger, is a key piece of legislation that has laid the foundation for California's climate change policy. This legislation recognized California's vulnerabilities to the impacts of climate change, including vulnerabilities of water resources. EO S-3-05 established three GHG reduction targets for California:

- By 2010, reduce GHG emissions to 2000 California levels
- By 2020, reduce GHG emissions to 1990 California levels
- By 2050, reduce GHG emissions to 80 percent below 1990 California levels

In addition to establishing GHG reduction targets for California, EO S-3-05 required the head Secretary of the California Environmental Protection Agency (CalEPA) to establish the Climate Action Team (CAT) for State agencies to coordinate oversight of efforts to meet these targets. As laid out in the EO, the CAT submits biannual reports to the governor and State legislature describing progress made toward reaching the targets.

There are currently 12 sub-groups within CAT, one of which is the Water-Energy group (also known as WET-CAT). WET-CAT was tasked with coordinating the study of GHG effects on California's water supply system, including the development of GHG mitigation strategies for energy consumption related to water use. Since the adoption of the Assembly Bill 32 Scoping Plan (see the following section), WET-CAT has been working on the implementation and analyses of six water-related measures identified in the Scoping Plan:

1. Water Use Efficiency
2. Water Recycling
3. Water System Energy Efficiency
4. Reuse Urban Runoff
5. Increase Renewable Energy Production
6. Public Goods Charge for Water

Assembly Bill 32: The California Global Warming Solutions Act of 2006 (2006)

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006 laid the foundation for California's response to climate change. In 2006, AB 32 was signed by Governor Schwarzenegger to codify the mid-term GHG reduction target established in EO S-3-05 (reduce GHG emissions to 1990 levels by 2020). AB 32 directed the California Air Resources Board (CARB) to develop discrete early actions to reduce GHG emissions by 2007, and to adopt regulations to implement early action measures by January 1, 2010.

Climate Change Scoping Plan (2008)

AB 32 required CARB to prepare a Scoping Plan to identify and achieve reductions in GHG emissions in California. The Climate Change Scoping Plan, adopted by CARB in December 2008, recommends specific strategies for different business sectors, including water management, to achieve the 2020 GHG emissions limit.

Senate Bill 97 (2007)

Senate Bill 97 (SB 97) recognized the need to analyze greenhouse gas emissions as part of the California Environmental Quality Act (CEQA) process. SB 97 directed the Governor's Office of Planning and Research (OPR) to develop, and the Natural Resources Agency to adopt, amendments to the CEQA Guidelines to address the analysis and mitigation of greenhouse gas emissions. On December 31, 2009, the Natural Resources Agency adopted amendments to the CEQA Guidelines and sent them to the California Office of Administrative Law for approval and filing with the Secretary of State (http://www.ceres.ca.gov /ceqa/guidelines/). The CEQA Guidelines are not prescriptive; rather they encourage lead agencies to consider many factors in performing a CEQA analysis, and maintain discretion with lead agencies to make their own determinations based on substantial evidence.

Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water (2008)

DWR, in collaboration with the State Water Resources Control Board (SWRCB), other state agencies, and numerous stakeholders, has initiated a number of projects to begin climate change adaptation planning for the water sector. In October 2008, DWR released the first state-level climate change adaptation strategy for water resources in the United States, and the first adaptation strategy for any sector in California. Entitled *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water,* the report details how climate change is currently affecting the state's water supplies, and sets forth ten adaptation strategies to help avoid or reduce climate change impacts to water resources.

Central to these adaptation efforts will be the full implementation of IRWM plans, which address regionally-appropriate management practices that incorporate climate change adaptation. These plans will evaluate and provide a comprehensive, economical, and sustainable water use strategy at the watershed level for California.

Executive Order S-13-08 (2008)

Given the potentially serious threat of sea level rise to California's water supply and coastal resources, and the subsequent impact it would have on our state's economy, population, and natural resources, Governor Schwarzenegger issued EO S-13-08 to enhance the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events. This order required the preparation of the first California Sea Level Rise Assessment Report (by the National Academy of Sciences) to inform the State as to how California should plan for future sea level rise; required all state agencies to consider a range of sea level rise scenarios for the years 2050 and 2100 in order to assess potential vulnerabilities of proposed projects and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise; and required the Climate Action Team to develop a state strategies for climate adaptation, water adaptation, ocean and coastal resources adaptation, infrastructure adaptation, biodiversity adaptation, working landscapes adaptation, and public health adaptation.

California Climate Adaptation Strategy (2009)

In response to the passage of EO S-13-08, the Natural Resource Agency wrote the report entitled *2009 California Climate Adaptation Strategy* (CAS) to summarize the best known science on climate change impacts in the state, to assess vulnerability, and to outline possible solutions that can be implemented within and across the state agencies to promote climate change resilience. The document outlined a set of guiding principles that were used in developing the strategy, and resulted in the preparation of 12 key recommendations as follows:

1. Appoint a Climate Adaptation Advisory Panel (CAAP) to assess the greatest risks to California from climate change and to recommend strategies to reduce those risks, building on the Climate Change Adaptation Strategy.
2. Implement the 20x2020 water use reductions and expand surface and groundwater storage; implement efforts to fix Delta water supply, quality and ecosystems; support agricultural water use efficiency; improve statewide water quality; improve Delta ecosystem conditions; and stabilize water supplies as developed in the Bay Delta Conservation Plan.
3. Consider project alternatives that avoid significant new development in areas that cannot be adequately protected from flooding, wildfire, and erosion due to climate change.
4. Prepare, as appropriate, agency-specific adaptation plans, guidance or criteria.
5. For all significant state projects, including infrastructure projects, consider the potential impacts of locating such projects in areas susceptible to hazards resulting from climate change.
6. The CAAP and other agencies will assess California’s vulnerability to climate change, identify impacts to state assets, and promote climate adaptation/mitigation awareness through the Hazard Mitigation Web Portal and My Hazards Website, as well as other appropriate sites.
7. Identify key California land and aquatic habitats that could change significantly during this century due to climate change.
8. The California Department of Public Health will develop guidance for use by local health departments and other agencies to assess mitigation and adaptation strategies, which include impacts on vulnerable populations and communities, and assessment of cumulative health impacts.
9. Communities with General Plans and Local Coastal Plans should begin, when possible, to amend their plans to assess climate change impacts, identify areas most vulnerable to these impacts, and develop reasonable and rational risk reduction strategies using the CAS as guidance.
10. State fire fighting agencies should begin immediately to include climate change impact information into fire program planning to inform future planning efforts.
11. State agencies should meet projected population growth and increased energy demand with greater energy conservation and an increased use of renewable energy.

12. New climate change impact research should be broadened and funded.

GHG Reporting Rule (2009)

While California has taken the lead in climate change policy and legislation, there have been several recent developments at the federal level affecting climate change legislation. On September 22, 2009, the U.S. Environmental Protection Agency (USEPA) released the Mandatory Reporting of Greenhouse Gases Rule (74FR56260, Reporting Rule) which requires reporting of GHG data and other relevant information from large sources and suppliers in the United States. Starting in 2010, facility owners that emit 25,000 metric tons of GHGs or more per year are required to submit to the USEPA an annual GHG emissions report with detailed calculations of facility GHG emissions. These activities will dovetail with the AB 32 reporting requirements in California.

Senate Bill 375 (2008)

The Sustainable Communities and Climate Protection Act of 2008 (Senate Bill [SB] 375) was passed to enhance the State's ability to reach its AB 32 goals by promoting good planning with a goal of more sustainable communities. SB 375 required the CARB to develop regional greenhouse gas emission reduction targets for passenger vehicles and 2020 and 2035 GHG emission targets for each region covered by one of the State's 18 California's metropolitan planning organizations (MPOs). Each of the MPOs then prepare a sustainable communities strategy that demonstrates how the region will meet its GHG reduction target through integrated land use, housing and transportation planning. Once adopted, these sustainable communities strategies are incorporated into the region's federally enforceable regional transportation plan.

California Water Plan Update (2009)

The *California Water Plan* (CWP) provides a collaborative planning framework for elected officials, agencies, tribes, water and resource managers, businesses, academia, stakeholders, and the public to develop findings and recommendations and make informed decisions for California's water future. The plan, updated every five years, presents the status and trends of California's water-dependent natural resources, water supplies, and agricultural, urban, and environmental water demands for a range of plausible future scenarios and evaluates different combinations of regional and statewide resource management strategies to reduce water demand, increase water supply, reduce flood risk, improve water quality, and enhance environmental and resource stewardship. Last updated in 2009, the CWP Update provided statewide water balances for eight water years (1998 through 2005), demonstrating the state's water demand and supply variability. The updated plan built on the framework and resource management strategies outlined in the CWP Update 2005 promoting IRWM and improved statewide water and flood management systems. The CWP Update 2009 provided the following 13 objectives to help achieve the CWP goals:

1. Expand integrated regional water management
2. Use and reuse water more efficiently
3. Expand conjunctive management of multiple supplies
4. Protect surface water and groundwater quality
5. Expand environmental stewardship
6. Practice integrated flood management
7. Manage a sustainable California Delta
8. Prepare Prevention, Response and Recovery Plans
9. Reduce energy consumption of water systems and uses
10. Improve data and analysis for decision-making
11. Invest in new water technology
12. Improve tribal water and natural resources

13. Ensure equitable distribution of benefits

The plan acknowledges an uncertain future with respect to population, land use, irrigated crop area, environmental water, background water conservation, water demands and climate change variability. To address this, the CWP Update 2009 presents 27 resource management strategies to provide a range of choices and building blocks to address future uncertainty. Finally, the *2009 CWP Update* provided regional reports that summarize regional settings and water conditions, provide regional water balance summaries, and describes regional water quality, flood management, and regional water and flood planning and management. The summaries also provide a summary of challenges facing each of the hydrologic regions and provided future scenarios for the region.

Climate Ready Utilities (2010)

In the fall of 2009, the USEPA convened a Climate Ready Water Utilities (CRWU) Working Group under the National Drinking Water Advisory Council (NDWAC). This working group prepared a report that documents 11 findings and 12 recommendations relating to the development of a program enabling water and wastewater utilities to prepare long-range plans that account for climate change impacts. The report, delivered to the USEPA in 2010, also included an adaptive response framework to guide climate-ready activities, and the identification of needed resources and possible incentives to support and encourage utility climate readiness. This report resulted in the preparation of the USEPA's Climate Ready Water Utilities Program and the development of tools and resources to support water and wastewater utilities in their planning. These tools and resources include:

- Climate Resilience Evaluation and Awareness Tool (CREAT) – a software tool to assist utility owners and operators in understanding potential climate change impacts and in assessing the related risks to their utilities.
- Climate Ready Water Utilities Toolbox – a searchable toolbox that contains resources that support all states of the decision process, from basic climate science through integration of mitigation and adaptation into long-term planning.
- Adaptation Strategies Guide – an interactive guide to assist utilities in gaining a better understanding of what climate-related impacts they may face in their region and what adaptation strategies can be used to prepare their system for those impacts.
- Climate Ready Water Utilities and Climate Ready Estuaries – USEPA initiative working to coordinate their efforts and support climate change risk assessment and adaptation planning.

National Water Program 2012 Strategy: Response to Climate Change (2012)

The USEPA has prepared and released its Draft *National Water Program 2012 Strategy: Response to Climate Change* to address climate change impacts on water resources and the USEPA's water programs. The report identifies core programmatic elements of the strategy in the form of programmatic visions, goals and strategic actions, with each long-term vision (or outcome) documented with an identified set of goals that reflect the same long-term time frame as the vision and several strategic actions to be implemented in the next three to eight years to pursue the longer-term goals and visions. The draft report also includes ten guiding principles for implementing the strategy outlined in the vision, goals and strategic actions and recommendations for cross-cutting program support.

1.3.4. Regional Climate Change Projections and Impacts

The regional climate change projections and impacts described herein were developed through a detailed climate change impact analysis conducted by the East Bay Municipal Utility District (EBMUD) as part of the Water Supply Management Program (WSMP) 2040. Because the Upper Mokelumne River Watershed is the primary source of EBMUD's water supply, the approach, methodology, and results focused on the

Upper Mokelumne River Watershed. Additionally, the EBMUD study focused on climate change impacts to the central portion of the Sierra Nevada. Given the breadth of GCM regionalization, anticipated climatic changes in temperatures and/or precipitation as modeled for the Upper Mokelumne River Watershed can also be considered applicable to the adjacent Calaveras River watershed and to the MAC IRWM region as a whole.

A key goal of EBMUD's WSMP was to develop solutions ensuring that EBMUD has the necessary water supply to meet its current and future demands through the year 2040 under a variety of hydrologic conditions. In deciding on the methodology for evaluating climate change impacts on the water supply system, methodologies used by other water agencies in the State of California for evaluating both climate change and drought impacts on their water systems were first explored. Then, considering these data in conjunction with additional information on the current state of climate change impact analysis science, a "Bottom-Up" approach was selected as the appropriate approach for use in the WSMP. The goal of this method was to test the watershed's sensitivity to a range of possible climate scenarios and then use this information to guide future water supply planning.

A Bottom-Up approach is a sensitivity analysis using historic hydrology to evaluate climate change impacts. Currently, neither global climate change models nor regional downscaling models offer concrete conclusions as to how California will be impacted by climate change; current methodologies only provide initial evaluations of the potential effects of climate change. In a Bottom-Up approach, the most critical vulnerabilities of the water supply system are identified, the causes of those vulnerabilities are articulated to suggest how climate change might or might not exacerbate those vulnerabilities, and steps are taken to address the vulnerability in the face of climatic uncertainty. The Bottom-Up approach is in contrast to a Top-Down approach which begins with climate-derived hydrology under various emission scenarios; these data are then downscaled to a local hydrologic model and water system model (Figure 1-13).

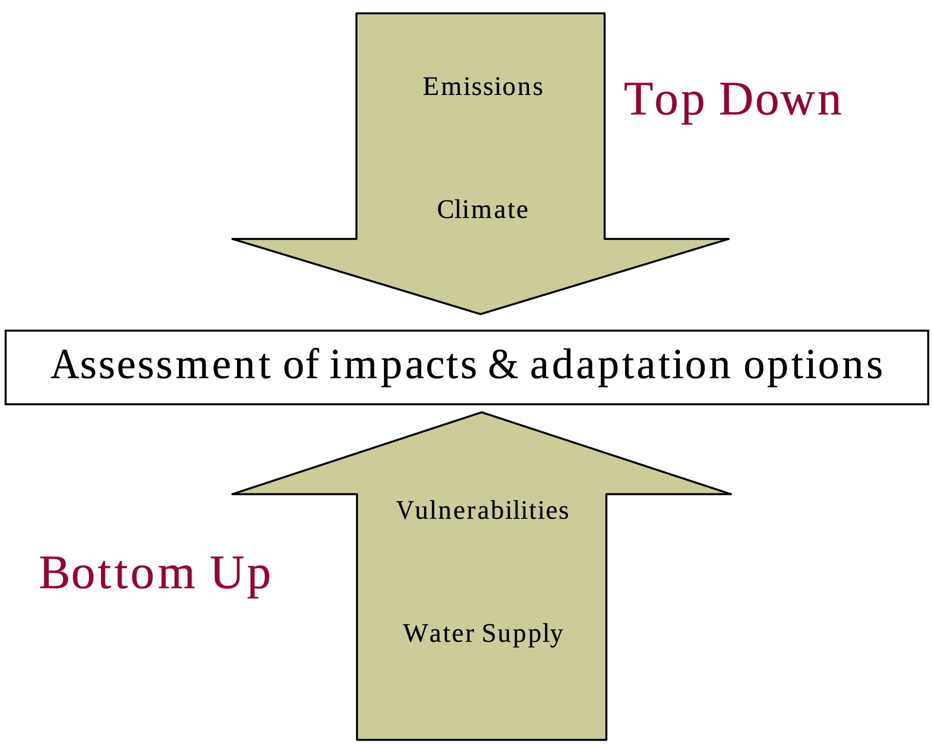


Figure 1-13: Methods for Assessing Climate Change Impacts

To expedite the analysis of possible climate change impacts to future water supplies, both under historic hydrologic conditions and a range of anticipated future climate scenarios, an integrated combination of the Water Evaluation And Planning (WEAP) system model and the EBMUD's operations model, called EBMUDSIM, was developed. This integrated model, referred to as the 'W-E model', was used as part of the process to evaluate climate change impacts. As part of the WSMP 2040 climate change analysis, the model of EBMUD's current water supply system was 'stressed' by systematically changing pre-identified factors and simulating results using the W-E model. The climate change scenarios were then compared to a baseline scenario to determine how sensitive the system was to each of the factors and to identify critical vulnerabilities. The identified sensitivities were then compared to the general predicted range of climate change affects.

For the sensitivity evaluation, the following three parameters were each individually modified in the W-E model:

- Mokelumne River annual runoff volume
- Mokelumne River runoff timing and pattern
- Length and frequency of multi-year droughts

Temperature Changes

Climate change is expected to cause an increase in regional air temperatures in future years, likely leading to an increase in water temperature in the Mokelumne River and watershed reservoirs. The effects of climate change have already been directly observed on the Mokelumne River watershed. Figure 1-14 shows maximum and minimum temperature at Camp Pardee, adjacent to Pardee Reservoir in Amador County (EBMUD, 2006). The data shown in this graph clearly depicts an upward trend in both minimum and maximum annual temperatures.

Evidence of warming trends is also apparent in winter temperatures in the Sierra Nevada; an increase of almost 2^{o}C (4^{o}F) was observed during the second half of the 20^{th} century. Unless there is a significant decrease in greenhouse gases, the incremental increase of an additional 2^{o}C (4^{o}F) is expected over the next half-century. In 2007, the IPCC released their Fourth Assessment Report. In this report, the IPCC presented best estimates and likely ranges for global average surface air warming. For the 'high' scenario (A1F1), the best estimate is an increase of 2^{o}C to over 9^{o}C, with a likely range between 2.4^{o}C and 6.4^{o}C.

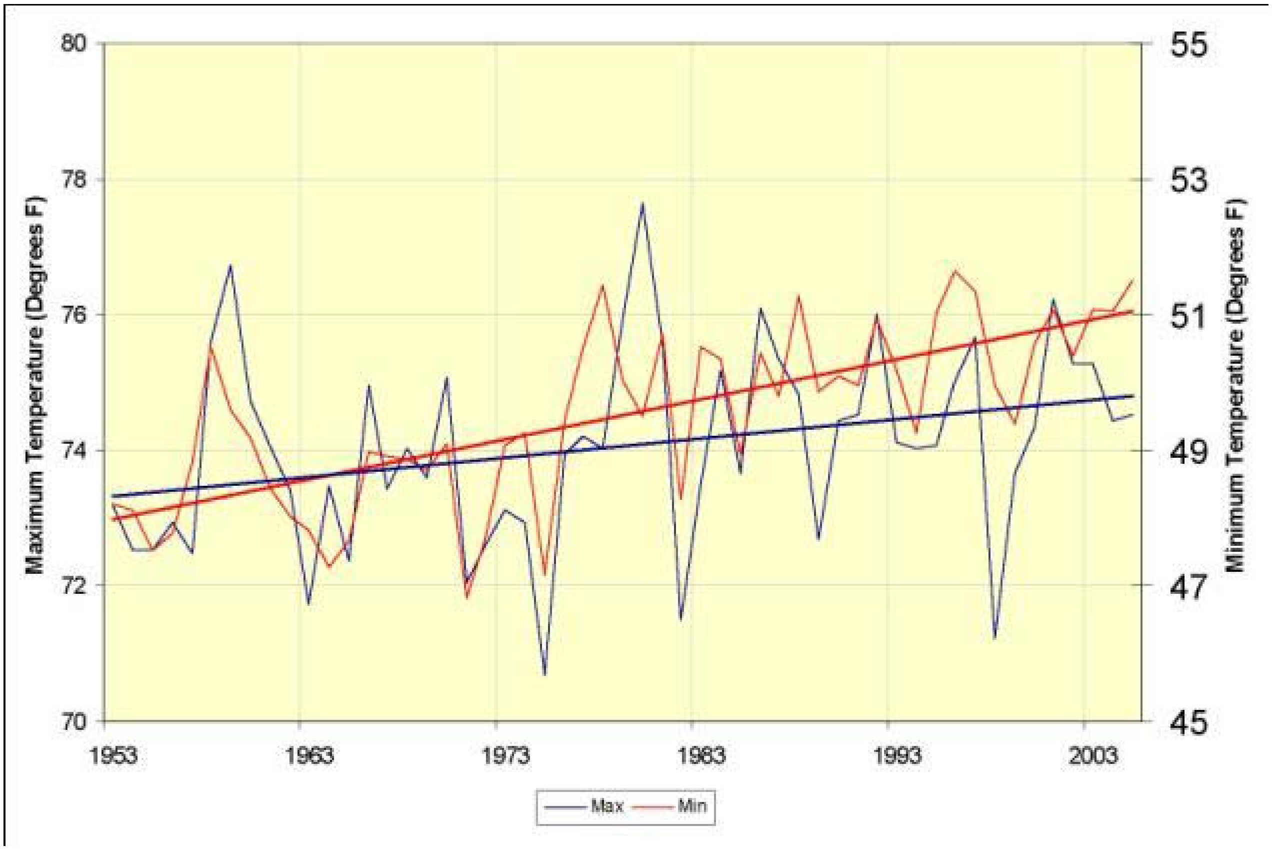


Figure 1-14: Camp Pardee Average Annual Temperature

Using similar ranges for global temperature increases, Michael Dettinger of the United States Geological Society (USGS) presented projected changes in annual precipitation in his 2004 paper entitled *From Climate-Change Spaghetti to Climate-Change Distribution* (Dettinger, 2004). This document presented the results of California-specific analyses conducted on behalf of the California Energy Commission which, in general, predict a +5°C warming between the years 2000 and 2100, with very little change in precipitation. This document also presents a detailed summary of studies conducted specifically for Northern California (including the Mokelumne and Calaveras River watersheds), presenting the range of anticipated changes in both temperature and precipitation. Based on this summary, Northern California can expect temperatures increases between +2°C to +6°C and precipitation changes between +20% to -20% by the year 2010. Precipitation is discussed in more detail in Section 5.2. Using Dettinger's graphs, as shown in Figure 1-15, this translates to a +4°C increase in air temperatures by the year 2040.

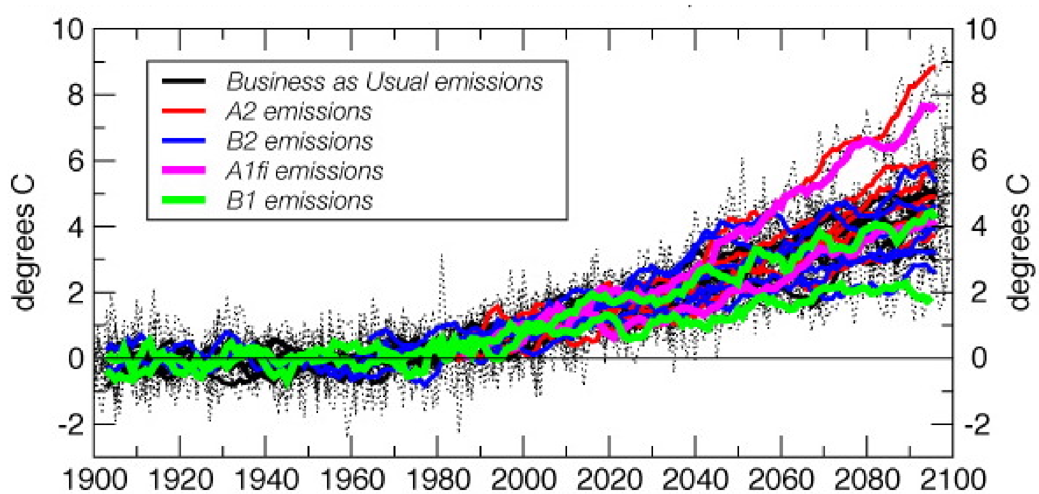


Figure 1-15: Projected Future Changes in Annual Temperature in Northern California (Dettinger, 2005)

Precipitation Changes

Global climate change models that have been downscaled to California regional areas have shown a greater degree in variability for predicted changes in precipitation than for temperature. Figure 1-16 shows the variability in projected changes in annual precipitation for Northern California (Dettinger, 2005), including the Mokelumne and Calaveras River watersheds. In general, based on the global climate change modeling published to date, precipitation volumes could increase by as much as 77% or decrease by as much as 25% by the year 2100, depending upon the future emissions scenario.

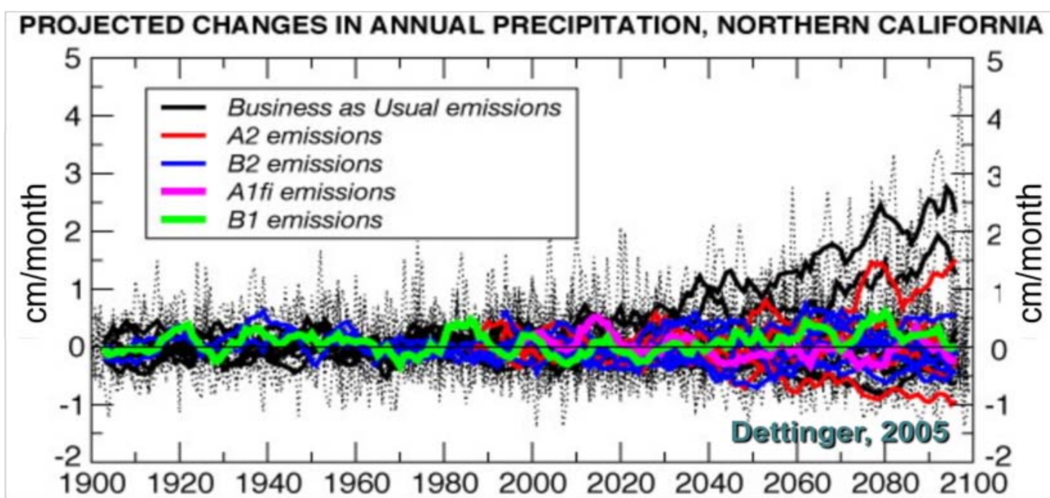


Figure 1-16: Projected Future Changes in Annual Precipitation in Northern California (Dettinger, 2005)

Precipitation increases can only enhance the volume of water available for supply. As the purpose of water supply planning is to ensure an available future water supply under a variety of dry conditions, potential future increases in precipitation in the Mokelumne River watershed were not part of the analysis conducted for EBMUD's WSMP 2040 and only future decreases in precipitation were considered in the sensitivity analysis modeling. To that end, impacts of 10% and 20% decreases in precipitation in the Mokelumne River watershed were evaluated with the W-E model assuming that the 10%- and 20%-decrease in precipitation volumes correspond directly to 10% and 20% decreases in river runoff. This potential future trend appears to correspond with observed data, as shown in Figure 1-17, which shows the April to July Mokelumne River flows as a fraction of a water year. In this figure, there is a downward trend in the fraction of river flows occurring during the spring runoff period (EBMUD, 2006); similar responses would be expected in the Calaveras River. Table 2 in Section 5.3 presents the estimated future decreases in precipitation (and therefore matching decrease in the historic Mokelumne and Calaveras River runoff) in five-year intervals with the corresponding anticipated changes in air temperature.

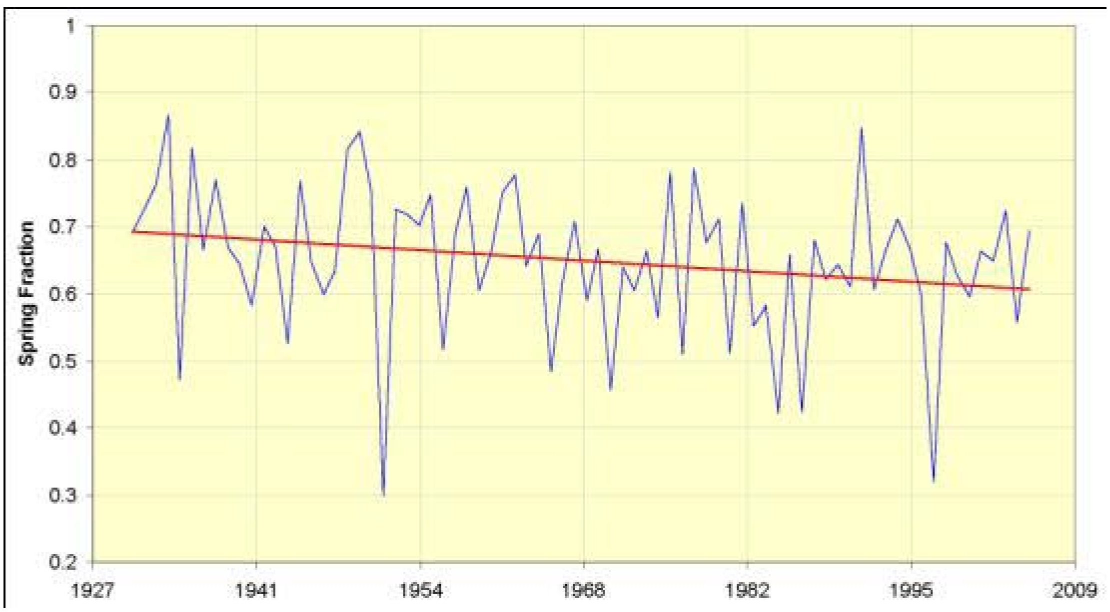


Figure 1-17: April – July Flow as Fraction of water Year – Mokelumne River

Historically, there have been three significant droughts of note on the Mokelumne River: 1929 to 1934, 1976 and 1977, and 1987 to 1992. Unfortunately, there is no historical regularity in the timing of the droughts that allows future drought frequency to be projected. In general, developing a protocol to simulate future droughts under a variety of climate change scenarios is challenging. By changing the timing of the river runoff and/or decreasing the volume of runoff in the W-E model, new ‘artificial’ droughts were generated in the EBMUD WSMP 2040 analysis that were then examined for their potential impacts on the Mokelumne River’s water supply system. It is assumed (conservatively) that all of Northern California will experience drought conditions at the same time, and therefore drought impacts on the Mokelumne River will also be experienced simultaneously on the Calaveras and other Northern California rivers.

Methodology

In addition to increasing air temperatures, climate change is anticipated to affect weather patterns in a variety of ways. For example, precipitation is anticipated to increase in some locations and decrease in others. Storms are expected to increase in severity, such that a greater percentage of annual precipitation is experienced in a smaller number of events. The precise nature of these changes is currently unknown and cannot be accurately simulated. The simulations described herein assume that air temperature will uniformly increase while other weather patterns and characteristics remain stable. The simulations do not adequately simulate changes to other meteorological parameters, and therefore cannot be considered to simulate the impacts of climate change. The results of the simulations present only estimates of the potential impacts to water temperature resulting from changes in ambient temperatures.

Although climate changes will most likely not occur in a steady and predictable fashion, it is better to prepare for the worst case scenario. A recent report from the National Research Council, *Abrupt Climate Change: Inevitable Surprises*, shows some major and widespread climatic changes have occurred with startling speed in the past, and can be expected to occur similarly in the future.

By the end of the 21st century, most scientists agree there will be a 3°C to 6°C increase in temperature in the western United States; projections for precipitation vary from 10% wetter to 20% drier. Therefore, based on this and other research available in published literature, the following anticipated changes were used to evaluate climate change impacts on EBMUD's system as part of their WSMP 2040 analysis:

- Increase in average daily temperatures by up to 4°C from 1980 by the year 2040 (2.15°C from 2005 by 2040)
- Decrease in precipitation rates by up to 20% from historical values by the year 2040

These values were selected to test the extreme predictions of climate change effects by the year 2040, thus defining the edges of the envelope of possible change. Intermediate values were also tested to determine if there were breakpoints in the response of the water supply system within that envelope.

In general, projected customer demands are expected to vary under climate change scenarios depending predominantly on temperature changes. While indoor water use is not expected to change significantly under climate change scenarios, changes in outdoor water use may have significant impacts on projected future customer demands. Past studies by Santa Clara Valley Water District (SCVWD) determined that, in general, a 1°C increase in temperature resulted in an approximate 1% increase in demands. For the purposes of modeling climate change impacts during the WSMP 2040 project, a revised demand estimate for the Year 2040 was prepared to incorporate climate change impacts assuming a 4°C increase in temperature, but no change in precipitation. Although a decrease in precipitation with an increase in air temperatures may seem to represent the most extreme climate change conditions, the analysis of projected future demands under such a scenario indicated that a 20% reduction in precipitation had little influence on overall customer demands in comparison to a 4°C increase in air temperature; therefore, only the 4°C increase in air temperatures was considered in the WSMP 2040 analysis.

Table 1-16: Temperature and Precipitation Assessment Assumptions [a]

	1980[b]	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055	2060
Temperature Change (in °C)	0	1.85	2	2.25	2.4	2.5	3	3.5	4	4.21	4.43	4.64	4.85
Temperature Change (in °F)	0	3.33	3.6	4.05	4.32	4.5	5.4	6.3	7.2	7.58	7.97	8.35	8.73
Precipitation Change (%)	0	-15	-15	-15	-20	-20	-20	-20	-20	-25	-25	-25	-25

Source: RMC, 2008.

Footnotes:

a. Data estimated from ensembles of future temperature and precipitation projections from six coupled ocean-atmosphere general circulation models (Dettinger, 2005).

b. 1980 is the 'start' of recorded temperature increases associated with climate change per Dettinger, 2004.

Procedure for Climate Change Sensitivity Analysis

For the EBMUD WSMP 2040 project, EBMUD's water supply system (including its Mokelumne River reservoirs) was assessed both qualitatively and quantitatively with respect to these vulnerabilities and potential impacts. The analysis for EBMUD was completed specifically for the Upper Mokelumne River watershed, as approximately 90% of the EBMUD's current water supply comes from this watershed. Therefore, the climate change analysis completed for the WSMP 2040 is directly applicable to the portion of the MAC Region that lies within the Upper Mokelumne River watershed, and the analysis is considered to be reflective of similar changes that would likely occur on the Calaveras River watershed due to the extent of regionalization of the GCMs (all of Northern California).

Additionally, a 2010 study conducted by Null et al. of the University of California Davis evaluated the hydrologic response and watershed sensitivity to climate change for the Sierra Nevada watersheds, including the Mokelumne and Calaveras Rivers. This study used a climate-forced rainfall-runoff model to explicitly simulate intra-basin hydrologic dynamics and understand localized sensitivity to climate warming. Using the WEAP model, the researchers simulated anticipated 2°C, 4°C and 6°C temperature increases and evaluated changes from baseline for three key parameters – mean annual flow, centroid timing, and low flow duration – to highlight relative differential responses across the Sierra Nevada watersheds and in relation to water resource development (water supply, hydropower and mountain meadow habitat, respectively).

EBMUD W-E Model

The first step in the WSMP 2040 climate change sensitivity analysis was to develop the scenarios to be modeled using the W-E model. As previously described, the current global climate models and corresponding regional models have indicated, for Northern California, future increases in temperatures accompanied by uncertain future precipitation rates. Additionally, studies have indicated the potential for a more unstable future hydrology, resulting in longer and more frequent droughts. Based on this information, the following scenarios were selected for variation in the W-E model:

- Change in customer demands resulting from a 4°C increase in air temperatures;
- Change in the timing of Mokelumne River runoff corresponding to 2°C, 3°C and 4°C increases in air temperature;
- Reductions in Mokelumne River runoff corresponding to a 10% and 20% reduction in precipitation.

While climate change could result in higher average runoff, only reduced runoff was evaluated because it would have an adverse effect on water supply.

Separate runs for evaluating a future with longer and more frequent droughts was not prepared as the runs evaluating decreases in Mokelumne River runoff inherently also include changes in future drought scenarios. The climate change sensitivity modeling studies changed only one variable at a time and did not evaluate combinations of changes, such as higher customer demand and reduced runoff. Compounding of climate change effects could have a greater overall impact on water supplies from the Mokelumne and Calaveras River watersheds.

For the WSMP 2040 climate change analysis, each proposed scenario was run (including a baseline scenario) through a Visual Basic script (VBS) that approximates Pacific Gas and Electric Company (PG&E) operations under the assumed conditions. Output from VBS provided the necessary hydrologic inputs to the EBMUDSIM model, including regulated inflow to Pardee and updated PG&E reservoir storage values. These results were then incorporated as model input to scenario-specific EBMUDSIM dynamic link libraries for use by WEAP in the sensitivity study. WEAP was then run for each specific scenario using EBMUD's baseline conditions. Following the W-E model simulations, the Upper Mokelumne River WARMF model was run to evaluate impacts of air temperature changes on Mokelumne River water. Again, while simulations were not conducted for the Calaveras River, the results of the analyses conducted on the Mokelumne River can be considered to qualitatively reflect likely impacts that may occur on the Calaveras River under similar changes in climatic conditions.

Simulation of the climate change scenarios required the development of assumptions regarding future hydrology and its correlation with the river flow and operations of facilities (i.e., powerhouses) on the river (in addition to case-specific climate change effects). Assumptions used in the climate change sensitivity study include:

- Reduction in precipitation is assumed to correspond to an equivalent reduction in runoff designated as true natural flow (TNF), the natural pattern of high and low flows.
- Snow depth and water content at elevations above Highland Meadow (greater than 8700 feet mean sea level) are assumed unchanged.
- Precipitation at snow courses is approximated with the Mokelumne Basin 4-Stations Average Index.
- At unmeasured snow courses, air temperature record is interpolated from observed relationship between Salt Springs Powerhouse on the Mokelumne River and Caples Lake, south of Lake Tahoe.
- Operating assumptions applied with respect to PG&E operation are the following:
    - When monthly unimpaired flow at Mokelumne Hill is less than historical, PG&E storage is not adjusted. The routine attempts to conserve as much water as possible without violating the flow requirements as required by the Lodi Decrees.
    - When monthly unimpaired flow at Mokelumne Hill is more than historical, the routine attempts to store as much as possible.
    - Hydrologic inputs required for executing VBS to approximate PG&E operations required modifications to year 1978 to be consistent with EBMUD's Drought Planning Sequence.
- Hydrologic period from 1953 to 2002 is used in the climate change sensitivity analysis.
- Negative flow values are rounded up to zero.
- Reduction in April through July runoff was deducted from the May to July period to be consistent with Maurice Roos' 1994 study.
- Existing flood control capacity requirement is applied in all simulations.

University of California, Davis Model

As previously noted, modeling by the University of California, Davis (UC Davis) was completed using the WEAP model. Unlike the model version used in the EBMUD modeling, the UC Davis modeling utilized the WEAP model's hydrologic programming to simulate snow accumulation, snowmelt, runoff, soil moisture storage, evapotranspiration, interflow, deep percolation and baseflow for each watershed simulated. Precipitation was partitioned as snow, runoff or infiltration depending on air temperature, land cover, soil depth and previous soil moisture conditions. Climate data (air temperature, precipitation and vapor pressure deficits) for the 1981-2001 period were used to generate modeled hydrology, while interpolated weather data from DAYMET was used in the model to represent temperature and precipitation variability caused from orographic effects. Climate conditions were assumed to be uniform within each watershed, but varied between watershed.

Unimpaired historic hydrology and uniform air temperature increases of 2^{o}C, 4^{o}C and 6^{o}C were modeled in this study as sensitivity analyses of discharge characteristics with respect to temperature. These temperature increases were selected to represent progressively severe warming over the projected period, with the 2^{o}C warming roughly representing climate warming projections from the HadCM3, a medium sensitive GCM utilizing the A1fi scenario for 2020 to 2049 or the PCM using the B1 scenario for the period from 2070 to 2099. The 4^{o}C warming approximately represents projections from 2070-2099 PCM GCM using the B1 scenario, while the 6^{o}C warming approximately the 2070-2099 Had CM3 GCM using the A1fi scenario.

Model Results

EBMUD W-E Model Results

Seven separate analyses were conducted during the EBMUD WSMP 2040 project to test the sensitivity of the current water supply system to variables that will likely be affected by future changing climate. Table 1-17 presents the context of each climate change analysis, and the results of each case are presented in Table 1-18.

Table 1-17: Summary of Climate Change Analysis Scenarios

Reference	Description	Explanation
CC 0	Baseline	No adjustment to True Natural Flow (TNF) (required to model approximate operation of PG&E operations). Assumes 267 MGD of demand and a 50-year hydrologic record between 1953 and 2002.
CC 1	Normalized Demand	The baseline case with an increased demand of 277 MGD, reflecting increased outdoor water use resulting from a 4°C temperature increase.
CC 2-1	Spring Runoff Shift	Models a18.7% shift in April to July TNF runoff to the November-March period due to a 2°C temperature increase.
CC 2-2	Spring Runoff Shift	Models a 28.3% shift in April to July TNF runoff to the November-March period due to a 3°C temperature increase.
CC 2-3	Spring Runoff Shift	Models a 37.9% shift in April to July TNF runoff to the November-March period due to a 4°C temperature increase.
CC 3-1	Decrease in Precipitation	Models a 10% reduction in TNF runoff resulting from a 10% decrease in precipitation.
CC 3-2	Decrease in Precipitation	Models a 20% reduction in TNF runoff resulting from a 20% decrease in precipitation.

In general, the results of the climate change sensitivity analyses identified that Mokelumne River supplies are most vulnerable to:

- A more extreme shift in spring-time runoff from the April-to-July period to winter months relative to what has been observed in historic years, further lowering spring runoff volumes.
- Decreases in annual runoff volumes (especially reductions of 20% or more in runoff).

Impacts to storage (measured at Pardee Reservoir) are expected to be moderately susceptible to shifts in early springtime runoff and increased customer demands, and very susceptible to decreases in annual runoff volumes. Shifts in springtime runoff on the Mokelumne River could result in an approximate 5% decrease in effective system storage. Additionally, decreasing Mokelumne River runoff by 10% and 20% could result in average decreases in effective system storage of 12% and 24%. Finally, the modeling results indicate that increases in water temperature can be expected with increases in air temperature; however, the severity of the impacts will depend on both the magnitude of air temperature increases and the hydrologic year type.

Overall, based on the W-E modeling results, additional storage combined with source diversity will provide water purveyors dependent upon the Mokelumne River and Calaveras River with the maximum amount of flexibility and the ability to adapt to unknown future conditions.

Table 1-18: Climate Change Analysis Results

Ref	Description	Explanation	October 1st Pardee Reservoir Storage
CC 0	Baseline	No adjustment to TNF (required because of the pre-processor)	Baseline
CC 1	Normalized Demand	The "baseline" case from above with a demand increase of 3.6% to reflect a 4°C temperature increase between 1980 and 2040	Storage decreased in 27 years; average decrease was 5%. Increases in storage were negligible.
CC 2-1	Spring Runoff Shift	Models a 18.7% shift of April to July runoff to the November to March period due to a 2°C temperature increase	Storage decreased in 26 years and increased in 15 years; average decrease was 3%, and average increase was also 3%
CC 2-2	Spring Runoff Shift	Models a 28.3% shift of April to July runoff to the Nov to March period due to a 3°C temperature increase	Storage decreased in 25 years and increased in 19 years; average decrease was 5%, and average increase was 3%
CC 2-3	Spring Runoff Shift	Models a 37.9% shift of April to July runoff to the November to March period due to a 4°C temperature increase	Storage decreased in 28 years and increased in 18 years; average decrease was 6%, and average increase was 4%
CC 3-1	Decrease in Precipitation	Models a 10% reduction in TNF runoff	Storage decreased in 31 years and increased in 19 years; average decrease was 12%, and average increase was 1%
CC 3-2	Decrease in Precipitation	Models a 20% reduction in TNF runoff	Storage decreased in 36 years and increased in 14 years; average decrease was 24%, and average increase was 0.4%

University of California, Davis Model Results

The Mokelumne River experienced a higher change in mean annual flow due to climate change compared to other Sierra Nevada watersheds and is considered to be more vulnerable based on its relatively small amount of water storage and changes in mean annual flow.

Modeling conducted by UC Davis researchers simulated anticipated 2°C, 4°C and 6°C temperature increases and evaluated changes from baseline for three key parameters – mean annual flow, centroid timing, and low flow duration – to highlight relative differential responses across the Sierra Nevada watersheds and in relation to water resource development (water supply, hydropower and mountain meadow habitat, respectively). The response of the Mokelumne and Calaveras River watersheds to these temperature changes is discussed below.

Modeled changes to climate warming in the Mokelumne and Calaveras River watersheds resulted in reductions in mean annual flow (MAF). Specifically, there were approximately 3%, 6% and 9% decreases in mean annual flow on both the Mokelumne and Calaveras Rivers resulting from 2°C, 4°C and 6°C increases in air temperature, respectively. These reductions in MAF impacts instream conditions and habitat for aquatic and riparian ecosystems.

Compared to other Sierra Nevada watersheds, the Mokelumne River experienced a higher change in MAF due to climate change, and given its relatively little total water storage relative to the American or Yuba Rivers, was therefore considered to be more vulnerable to climate warming based on total water stored and changes in MAF. This, in turn, may lead the watershed to having the most altered aquatic and riparian ecosystems under all climate alternatives. The Calaveras River, in contrast, had more moderate changes in MAF with respects to climate change, and therefore would be considered to be less vulnerable.

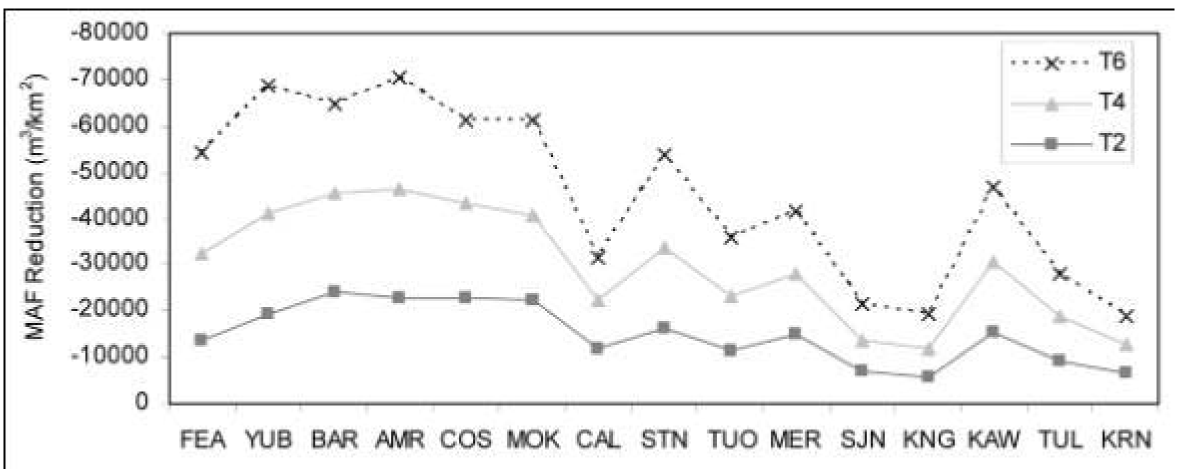


Figure 1-18: Reduction in Mean Annual Flow from Basecase by Watershed (Null et al., 2010)

The modeling also showed that runoff centroid timing (CT) was 2 weeks, 4 weeks, and 6 weeks earlier given the respective 2°C, 4°C and 6°C increases in air temperature in the Mokelumne River watershed. Changes in seasonal runoff timing may affect electrical generation capabilities, flood protection, water storage and deliveries. The Calaveras watershed, in contrast, had one of the smallest runoff timing shifts observed, with an average CT approximately one day earlier for each 2°C rise in air temperature. This is primarily due to the low elevation of this watershed and associated low snowpack potential.

The Mokelumne River currently contains seven hydropower facilities with a total online capacity of 374 megawatts (MW). In contrast, the Calaveras River has only one hydropower facility with a total online capacity of 2 MW. CT shifts are one indication of potential future climate impacts to hydropower generation capacity as a result of substantial changes in runoff timing with climate warming. Hydropower is often generated during high demand periods, which may be compromised if facilities are forced to spill due to higher magnitude flows or to accommodate early arrival of flows. The Mokelumne River demonstrated changes in CT due to climate warming will result in impacts to generating capacity on the river, making it one of the more vulnerable watersheds statewide. The Calaveras River is considered not to be vulnerable to CT shifts due to small changes in CT and relative little online hydropower capacity.

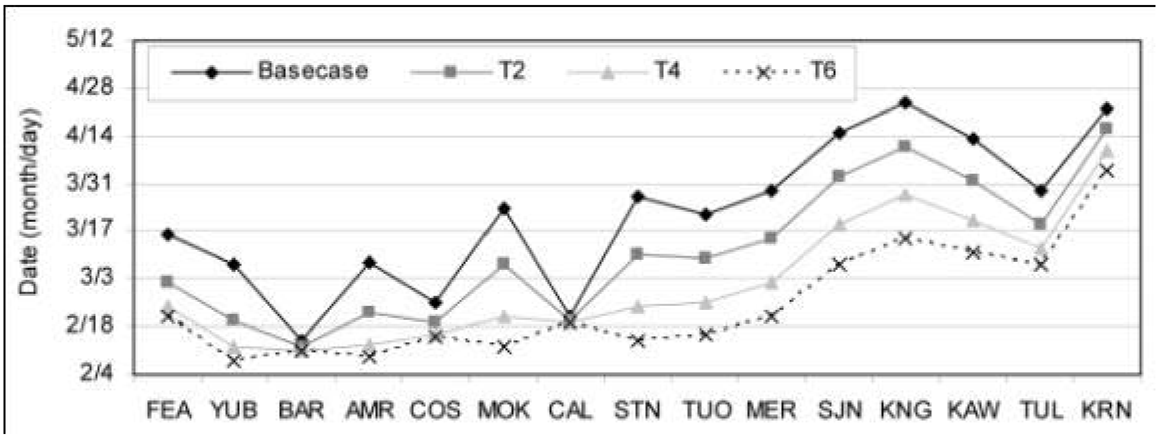


Figure 1-19: Average Annual Centroid Timing by Watershed (Null et al., 2010)

Finally, the study evaluated the average low flow duration (LFD) for the Sierra Nevada watersheds relative to climate change. The Mokelumne River had the greatest increase in LFD weeks (from basecase conditions to 6°C warming). In general, average low flow duration lasted 2, 3 and 4 weeks longer for the 2°C, 4°C and 6°C increases in air temperature, respectively. This suggests that as precipitation shifts from snowfall to rainfall, summer and autumn flows during wet years will be relatively drier as a result of flashier storms that do not replenish soil moisture from snowmelt. The Calaveras River, in contrast, had one of the shortest periods of low flow conditions of the watersheds studied.

Changes in LFD were considered a surrogate for montane ecosystems in the study as persistent low flow conditions deplete meadow groundwater reserves and soil moisture, reducing the downstream benefits of meadows. Meadows provide ecosystem services such as maintaining summertime flow during dry periods and reducing floods in winter; providing aquatic and riparian habitat for birds, fish, amphibians, and insects; promoting riparian vegetation rather than conifer or dry shrub vegetation that increases wildfire risks; and improving downstream water quality. The Mokelumne River watershed was considered vulnerable to LFD, and as a result, could experience habitat loss as a result of climate change. The Calaveras River watershed, having relatively little meadow area, was considered to be more resilient to LFD.

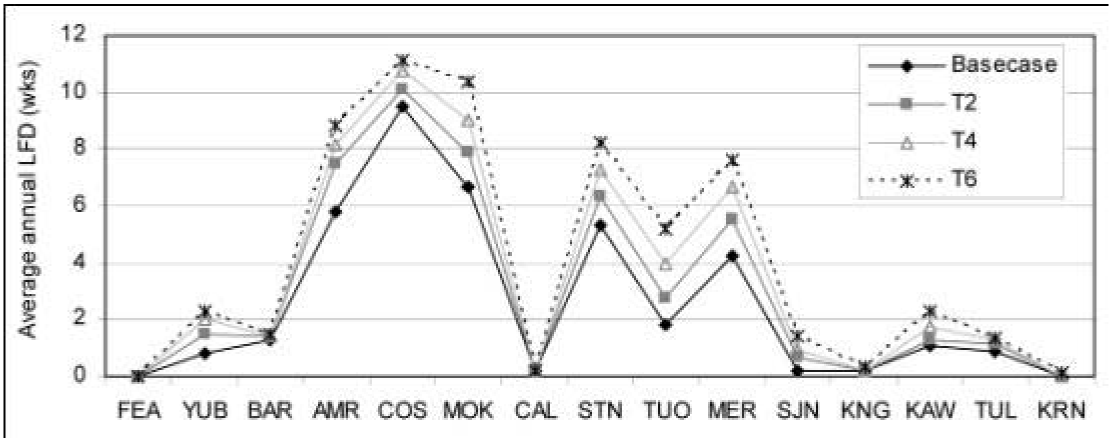


Figure 1-20: Average Annual Low Flow Duration by Watershed (Null et al., 2010)

1.3.5. Regional Water Resource Vulnerability

Primary water users in the MAC Region include agriculture, the environment, and urban users. Water supplies are derived from groundwater, surface water, and some recycled water, with surface water from the Mokelumne and Calaveras Rivers providing the majority of water supply in the Region. Groundwater is used in some areas of the MAC region, but quantity and quality vary considerably due to small and unpredictable yields from the fractured rock system and limited alluvial basins that typify the underlying geology. Groundwater accounts for approximately 2% of Amador Water Agency's (AWA)'s total water supply and is only used in the communities of La Mel Heights and Lake Camanche Village. Wells serving Lake Camanche Village are located within the Cosumnes Subbasin of the San Joaquin Valley Groundwater Basin. A portion of western Calaveras County overlies the Eastern San Joaquin Subbasin (also of the San Joaquin Valley Groundwater Basin), which is overdrafted due to extraction of groundwater for irrigation and municipal purposes exceeding the basin's safe yield.

Declining Sierra Nevada snowpack, earlier springtime runoff, and reduced spring and summer streamflows will likely affect the availability and quality of surface water supplies and may potentially shift reliance to groundwater resources, which are already of limited quantity and quality in many places.

Other anticipated regional impacts resulting from climate change (increased air temperatures and variable precipitation) include changes to water quality; increased flooding, wildfires and heat waves, and impacts to ecosystem health. Earlier springtime runoff will increase the risk of winter flooding as capturing earlier runoff to compensate for future reductions in snowpack would take up a large fraction of the available flood protection space, forcing a choice between winter flood prevention and maintaining water storage for use during dry periods in summer and fall.

The identified vulnerabilities within the MAC Region are summarized in Table 1-19 and further described in the following sections.

Table 1-19: MAC Region Vulnerabilities

Vulnerability	Description
Water Demand	Vulnerable to increased agricultural demands due to longer growing season, increased temperatures and evapotranspiration rates, and more frequent/severe droughts. Vulnerable to increased urban and commercial, industrial and institutional (CII) demand due to increased outside temperatures.
Water Supply and Quality	Vulnerable to decreased snowpack in the Sierra Nevada, shifts in timing of seasonal runoff, degraded surface and groundwater quality resulting from lower flows and increased overdraft conditions, a reduction of meadows that can provide contaminant reduction, and more frequent/severe droughts and storm events increasing turbidity in surface supplies.
Flood Management	More severe/flashier storm events and earlier springtime runoff leading to increased flooding, and a reduction of meadows which help reduce floods in the winter.
Hydropower	Vulnerable to increased customer demand combined with changes in timing of seasonal runoff and flashier storm systems affecting reservoir storage.
Ecosystem and Habitat	Vulnerable to decreased snowpack, more frequent/severe droughts and wildfires, shift in seasonal runoff, increased low flow periods and increased water temperatures (degraded water quality).

Water Demand

Land use / land cover in the MAC Region is dominated by forested areas and agricultural uses, including grazing, wine grapes, and timber harvesting. In general, irrigation water demand varies based on precipitation, and may or may not increase under future climate change conditions depending on precipitation changes. The effects of increased air temperatures on agriculture will include faster plant development, shorter growing seasons, changes to reference evapotranspiration and possible heat stress for some crops. Without accounting for evapotranspiration rates, agricultural crop and urban outdoor demands are expected to increase in the Sacramento Valley by as much as 6% in the future (Chung et al., 2009). The agricultural community will respond to these climate-induced changes primarily by increasing the acreage of land fallowing and retirement, augmenting crop water requirements by groundwater pumping, improving irrigation efficiency, and shifting to high-value and salt-tolerant crops (Hopmans et al., 2008).

The seasonal variability of water demands is projected to increase with climate change as droughts become more common and more severe. Other seasonal uses such as landscape irrigation cooling demands are also expected to increase as a result of climate change (DWR, 2008 and CNRA, 2009).

Water Supply and Quality

The MAC Region's water supplies consist of groundwater, local surface water, and recycled water. In general, impacts on urban users will be a function of behavioral response of individuals and organizations as well as hydrology. Currently, approximately 75% of total water use statewide occurs between April and September when lawns and crops are being irrigated (Hayhoe et al., 2004). Decreased summertime flows will likely result in increased groundwater pumping, where possible, and greater overdraft conditions, especially in the Eastern San Joaquin Subbasin due to increased groundwater use as a means of offsetting surface water shortages. Additionally, rising temperatures are projected to increase the frequency of heat waves, which could also lead to increased water use, further exacerbating low flow conditions (Hayhoe et al., 2004).

Changes in water availability and timing may also affect the value of water rights statewide as mid- and late-season natural stream flow become more variable (and therefore less valuable) and the value of rights to stored water (which has a higher degree of reliability) increase. Senior users without access to storage could face unprecedented water shortages due to reduced summertime flows (Hayhoe et al., 2004). These same changes will also affect the level of hydropower generation in the MAC Region, especially in the summer, when hydropower generation is needed most to meet peak demand (Moser et al., 2012).

Finally, climate change impacts may affect water quality in a multitude of ways.

- Water quality can be impacted by both extreme increases and decreases in precipitation. Increases in storm event severity may result in increased turbidity in surface water supplies while decreases in summertime precipitation may leave contaminants more concentrated in streamflows (DWR, 2008).
- Higher water temperatures may exacerbate reservoir water quality issues associated with reduced dissolved oxygen levels and increased algal blooms (DWR, 2008).

Water quality concerns not only impact drinking water supplies, but also environmental uses and wastewater treatment processes. The altered assimilative capacity of receiving waters may increase wastewater treatment requirements, and wastewater collection systems could be inundated in flooding events. More prevalent wildfires could result in aerial deposition and runoff of pollutants into water bodies, impacting surface water quality. Declining Sierra Nevada snowpack, earlier springtime runoff and reduced spring and summer stream flows will likely affect surface water supplies and shift reliance to groundwater resources, which are already overdrafted in many places.

Groundwater Supply and Quality

The MAC Region partially overlies the San Joaquin Valley Groundwater Basin, specifically the Cosumnes and Eastern San Joaquin Subbasins as shown in Figure 1-21. Groundwater quantity and quality vary significantly from well site to well site due to the fractured rock system that typifies the foothill geology. AWA uses groundwater to serve only La Mel Heights and Lake Camanche Village. CCWD is in the process of annexing the Wallace area, which relies on groundwater supplies. The larger communities included in Calaveras County are served by public water systems (e.g. CCWD), while the remainder of the County is served either by small public water systems (less than 200 service connections) or individual domestic wells.

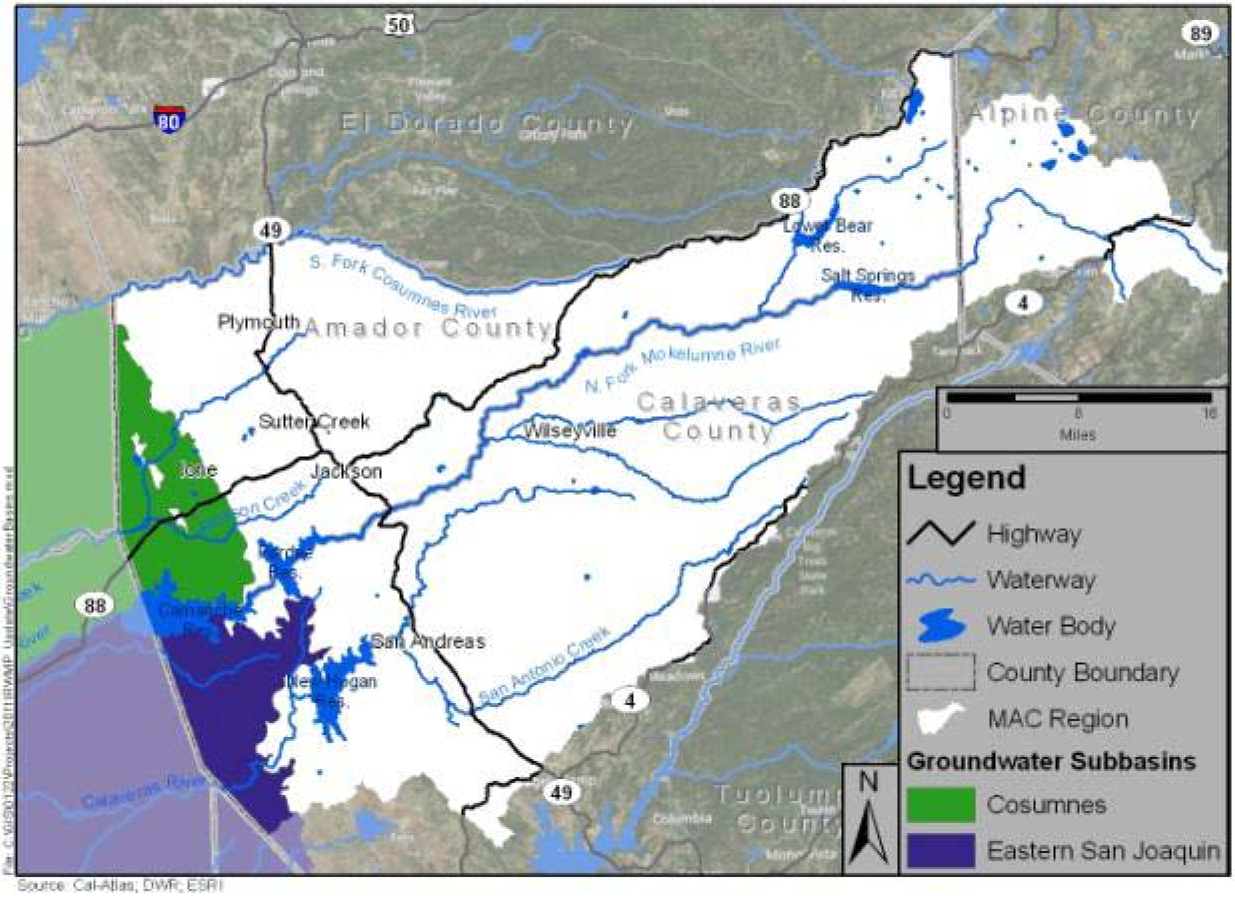


Figure 1-21: Groundwater Basins in the MAC Region

The Eastern San Joaquin Subbasin is known to be in a state of overdraft due to excessive pumping. Overpumping has caused depressions near Stockton and Lodi, outside of the MAC Region. Extended low flow conditions due to climate change and future variations in precipitation and streamflow will influence how and when the groundwater subbasins are recharged. It is also possible that groundwater pumping could increase in the areas of the MAC Region that currently use groundwater, further exacerbating water quality and quantity issues.

Surface Water Supply and Quality

The primary source of water in the MAC Region is surface water from the Mokelumne and Calaveras Rivers. Sierra Nevada snowpack serves as the primary source of water for the Mokelumne River. Many of the water systems in and outside the MAC Region rely on this supply as their primary source.

Table 1-20: Water Systems' Reliance on the Mokelumne River

Water System	Reliance on Mokelumne River
Amador Water System	Up to 15,000 AFY from Mokelumne River
Central Amador Water Project	Up to 1,150 AFY from Mokelumne River
JVID	Up to 3,800 AFY from Pardee Reservoir
CPUD	Up to 920 AFY from South Fork of Mokelumne River
EBMUD	Up to 364,072 AFY from the Mokelumne River
CCWD	Uses Bear Creek, tributary to the Mokelumne River as primary source of water
West Point, Wilseyville, Bummerville	Rely on Mokelumne River as backup source

Unlike the Mokelumne River, the primary source of supply to the Calaveras River is rainfall. Reduced snowpack, variations in precipitation, and the shift in the timing of spring snowmelt have the potential to significantly impact surface water supplies from both rivers.

As the occurrence of wildfires increases, additional sediment could also be deposited into water bodies and turbidity may become a greater concern. Sediment and pollutants collected from upstream could be concentrated downstream and in reservoirs, leading to water quality issues and the disturbance of critical habitats. In addition, earlier snowmelt and more intense precipitation events may increase source water turbidity. Shifts in the timing of runoff have already been observed; the fraction of total annual runoff occurring between April and July has decreased by 23% in the Sacramento Basin and by 19% in San Joaquin Basin over the past 100 years (CEC, 2008). Increased flooding may lead to sewage overflows, resulting in higher pathogen loading in the source waters. Increased water temperatures and shallower reservoirs may result in more prevalent eutrophic conditions in storage reservoirs, increasing the frequency and locations of cyanobacterial blooms. These potential changes could result in challenges for surface water treatment plants and require additional monitoring to quantify changes in source water quality and better control of finished water quality (CUWA, 2007).

Flood Management

Sea level rise is not a direct climate change impact to the MAC Region; therefore, there are no related vulnerabilities. However, in addition to increased coastal flooding resulting from sea-level rise, the severity of non-coastal flooding will also increase in the future due to climate change. Extreme precipitation events may become more common, increasing the likelihood of extreme weather events and floods. Rising snowlines will also increase the surface area in watersheds receiving precipitation as rain instead of snow (DWR, 2008), thereby increasing storm-related runoff. Sea level rise may indirectly affect the MAC Region through future required stream releases from upstream rivers (such as the Mokelumne and Calaveras Rivers) necessary to maintain salinity fronts in the Sacramento-San Joaquin Delta.

There are multiple reservoirs operated within the MAC Region for both water supply and flood control purposes. Camanche Reservoir is primarily operated for flood control and to meet downstream flow requirements and riparian needs. New Hogan Dam was constructed on the Calaveras River in 1963 for flood control, as well as municipal, industrial, and irrigation purposes. Flood control releases are controlled by the U.S. Army Corps of Engineers, with Stockton East Water District operating the reservoir at all other times. Flooding is a concern in the MAC Region; many cities and communities are included in FEMA designated 100-year and 500-year flood zones. Flooding can occur from heavy rainfall, rapid snowmelt, saturated soils, or a combination of these conditions. In some cases, flooding may due to an inadequate storm drainage system, unable to handle heavy, more intense storms during winter and springtime.

Ecosystem and Habitat

The MAC Region is a largely natural area containing two national forests and significant areas designated as rural or open space, providing habitat for numerous species and a wide variety of plant and animal life in many different environments including riparian, wetland, forest, and alpine habitats. Temperature-induced declines in alpine/subalpine forest are expected to occur, in addition to major shifts from evergreen conifer forest to mixed evergreen conifer forests and expansion of grasslands (Hayhoe et al., 2004). Increasing stress on ecosystems resulting from rising temperatures will reduce trees' capacity to resist pest attacks while increasing pest survival rates, accelerating their development and allowing them to expand their range. And these same increases in temperatures will also result in warmer freshwater temperatures which, along with changes in seasonal stream flows, are projected to cause sharp reductions in salmon populations and increased risks of extinction for some Central Valley subpopulations (Ackerman and Stanton, 2011).

Projected hotter and possibly drier future conditions will also increase the frequency and extent of wildfires, worsen pest outbreaks, and stress precarious sensitive populations. Wildfires will play a significant role in converting woodlands to grassland as decreases in moisture shift the competitive balance in favor of the more drought-tolerant grasses and increases in grass biomass provide more fine fuels to support more frequent fires. Increased wildfires also favor grasses, which re-establishes more rapidly than slower growing woody life forms after burning (Hayhoe et al., 2004)

Finally, variations in precipitation and the changes in springtime snowmelt will directly affect both surface water and groundwater quality. Warmer surface water affects the chemical composition of these waters (for example, decreasing levels of dissolved oxygen) in addition to directly impacting aquatic and riparian habitats. Decreased precipitation, and associated decreased groundwater percolation, will result in increased dissolved concentrations in groundwater.

Hydropower

Pacific Gas and Electric Company (PG&E) owns and operates the Mokelumne River Hydroelectric Project (FERC license no. 137), which consists of a series of storage and regulating reservoirs and associated tunnels and pipelines that supply water to four hydropower generating units located primarily on the North Fork of the Mokelumne River. The Mokelumne River Project has a generating capacity of 206 MW. In October 2011, FERC issued the Mokelumne River Project a 30-year license. EBMUD also generates electricity at its dams at Pardee and Camanche reservoirs. The Pardee Hydropower Powerhouse typically generates approximately 140 million KWh of energy during years of median runoff, and the Camanche Powerhouse generates approximately 45 million KWh annually. EBMUD sells this energy to the Sacramento Municipal Utility District (SMUD).

The primary source of water for hydropower generation in the MAC Region is snowmelt from the Sierra Nevada. Changing volumes of snowfall and snowpack in the Sierra Nevada and the changing seasonal melting patterns may require changes in reservoir operations. As the timing of snowmelt shifts in the spring, hydroelectric power generation may also shift to accommodate enhanced flood control operations. Additionally, increasing temperatures will also increase energy demands, especially during peak demand times (DWR, 2008). As previously described, the modeling completed as described in the *Hydrologic Response and Watershed Sensitivity to Climate Warming in California's Sierra Nevada* (Null et al., 2010), showed that runoff centroid timing (CT) on the Mokelumne River was 2 weeks, 4 weeks, and 6 weeks earlier given the respective 2^{o}C, 4^{o}C, and 6^{o}C increases in air temperature. Change in seasonal runoff timing may affect electrical generation capabilities, flood protection, water storage and deliveries.

Hydropower is often generated during high demand periods, which may be compromised if facilities are forced to spill due to higher magnitude flows or to accommodate early arrival of flows (Null et. al., 2010).

Other

Climate change will also affect the MAC Region in other ways, including impacting recreation and tourism industries (and therefore the Region's economy). Projections of decreased snowpack have the potential to affect the ski industry in Alpine County (part of the MAC Region) since the ski resorts are within the elevations impacted by reduced snowpack due to temperature increases. These temperature increases will also delay the beginning of ski season and impact the economic viability of the industry (Hayhoe et al., 2004).

Prioritized Vulnerabilities

The MAC Region's vulnerabilities to anticipated climate change impacts were prioritized by the RPC at its November 2012 meeting. Members considered regional understanding and sensitivities and identified regional goals and objectives. The following table shows the results of the RPC assessment of potential climate change impacts and regional vulnerabilities.

Table 1-21: RPC Assessment of Climate Change Vulnerabilities and Impacts

Climate Change Impact	Vulnerability				
	Water Demand	Water Supply and Quality	Flood Management	Ecosystem and Habitat	Hydropower
More frequent/severe droughts	✓	✓		✓	✓
shifts in timing of seasonal runoff	✓	✓	✓	✓	✓
Decreased snowpack in Sierra Nevada		✓		✓	✓
More severe/flashier storm events		✓	✓	✓	✓
Increased low flow periods	✓	✓		✓	✓
Increased air temperatures & ET rates	✓	✓		✓	
Reduction of alpine meadows		✓	✓	✓	
Increased water temperatures		✓		✓	✓
Longer growing season	✓				✓
Increased demands exacerbating groundwater overdraft	✓	✓		✓	✓
More frequent/severe wildfires	✓	✓		✓	✓
Changes in forest composition and cover	☐	✓	✓	✓	☐

Based on this assessment, the RPC prioritized climate change vulnerabilities in two tiers with three of the vulnerabilities being identified as highest priorities for the MAC Region, and the remaining two being high priorities. The prioritized vulnerabilities for the Region are as follows:

1. Highest Priorities: Water Supply and Quality, Ecosystem and Habitat, and Hydropower

2. High Priorities: Flood Management and Water Demand

While the RPC determined that all five of the vulnerability categories are important, the potential climate change impacts that will affect the MAC Region have a greater likelihood of affecting the Region's water supply, water quality, ecosystems, and hydropower production more so than flood management or water demand. Additionally, water supply and quality and the ecosystem are already at the forefront of water resources issues to address in the Region. Flooding and flood management is not currently a major issue in the region and there are existing reservoirs that can be operated to help manage flood flows in the future. The water purveyors and users in the Region are also already in the process of reducing water use through the implementation of water conservation measures and BMPs.

1.3.6. Adaptation and Mitigation

Global climate modeling carries a significant degree of uncertainty resulting from varying sensitivity to changes in atmospheric forcing (e.g. CO_2, aerosol compounds), unpredictable human responses, and incomplete knowledge about the underlying geophysical processes of global change. Even though current scenarios encompass the "best" and "worst" cases to the greatest degree possible based on current knowledge, significant uncertainty associated with future global GHG emission levels remains, especially as timescales approach the end of the century. Historical data for calibrating GCMs is not available worldwide, and is spatially biased towards developed nations.

Considering the great deal of uncertainty associated with climate change projections, the prudent approach to addressing climate change incorporates a combination of adaptation and mitigation strategies. Climate adaptation includes strategies (policies, programs or other actions) that seek to bolster community resilience in the face of unavoidable climate impacts (CNRA and CEMA, 2012), where mitigation strategies include best management practices (BMPs) or other measures that are taken to reduce GHG emissions.

Adaptation Strategies

The Prop 84 IRWM Guidelines require consideration of the *California Water Plan* (CWP) resource management strategies (RMS) in identifying projects and water management approaches for the region. RMS are being considered in the MAC IRWM planning process to meet the region's objectives and as part of the project review process.

A wide range of RMS will be required to achieve the MAC Region's goals and objectives. As such, a comprehensive range of RMS were evaluated for their ability to assist the region in achieving its goals and objectives. Application of various RMS diversifies water management approaches, and many of the RMS apply to climate change adaptation and mitigation.

There are eight categories of RMS considered for the MAC Plan Update:

1. *Reduce Water Demand*
2. *Improve Operational Efficiency and Transfers*
3. *Increase Water Supply*
4. *Improve Water Quality*
5. *Urban Runoff Management*
6. *Practice Resource Stewardship*
7. *Improve Flood Management*
8. *Other Strategies*

Within each RMS category is a variety of specific RMS that have been identified for the region (Table 1-21). For example, reducing water demand can be completed through agricultural water use efficiency and/or urban water use efficiency. As described in the *Climate Change Handbook for Regional Planning* (CDM, 2011), not all of the RMS directly apply to climate change adaptation or mitigation, but instead are directed at overall system resiliency. And any approach that improves a system's resilience to the uncertain conditions climate change could bring will provide the Region with the flexibility and adaptability to meet future water supply challenges.

The following table summarizes the ability of individual RMS to aid in climate change adaption. The application of RMS relevant to the MAC Region as climate change adaptation strategies are described in the following sections. Examples of performance metrics are identified for the RMS. These metrics can be used to measure the effectiveness of the adaptation strategy as they are implemented in response to climate change.

Table 1-22: Applicability of RMS to Climate Change Adaptation

Resource Management Strategies	Habitat Protection	Flood Control	Water Supply Reliability	Additional Water Supply	Water Demand Reduction	Sea Level Rise	Water Quality Protection	Hydropower
Reduce Water Demand								
Agricultural Water Use Efficiency	✓		✓	✓	✓			✓
Urban Water Use Efficiency	✓		✓	✓	✓			✓
Improve Operational Efficiency and Transfers								
Conveyance-Regional/Local	✓	✓	✓	✓			✓	
System Reoperation		✓	✓	✓				✓
Water Transfers			✓	✓				
Increase Water Supply								
Conjunctive Management and Groundwater Storage	✓	✓	✓	✓			✓	
Precipitation Enhancement	✓			✓				✓
Recycled Municipal Water	✓		✓	✓				
Surface Storage-Regional/Local	✓	✓	✓	✓			✓	✓
Improve Water Quality								
Drinking Water Treatment and Distribution			✓	✓			✓	
Groundwater Remediation/Aquifer Remediation			✓	✓			✓	
Matching Quality to Use	✓		✓	✓	✓		✓	
Pollution Prevention	✓		✓				✓	
Salt and Salinity Management	✓		✓				✓	
Urban Runoff Management	✓	✓	✓	✓			✓	
Practice Resource Stewardship								
Agricultural Lands Stewardship	✓				✓		✓	
Economic Incentives	✓		✓		✓	✓	✓	✓
Ecosystem Restoration	✓	✓	✓			✓	✓	✓
Forest Management	✓	✓	✓				✓	✓
Land Use Planning and Management	✓	✓	✓		✓	✓	✓	✓
Recharge Area Protection	✓	✓	✓	✓			✓	
Water-dependent Recreation	✓	✓					✓	
Watershed Management	✓	✓	✓	✓		✓	✓	✓
Improve Flood Management								
Flood Risk Management	✓	✓	✓	✓		✓	✓	✓

Reduce Water Demand

Reducing existing and future water demands can reduce pressure on limited water supplies and help the region adapt to the potential climate change impacts of less precipitation, shifting of springtime snowmelt, and overall water-related uncertainties. The Reduce Water Demand RMS includes both agricultural and urban water use efficiency. Opportunities for increased water conservation and water use efficiency measures for urban and agricultural water use are identified in multiple documents, including the *CWP Update*, the Agricultural Efficient Water Management Practices, the *California 20x2020 Water Conservation Plan* (20x2020 Plan), and by the California Urban Water Conservation Council. These recommendations could potentially be incorporated into the existing framework already developed by cities and water agencies within the MAC Region. Performance metrics that could be used to measure the effectiveness of Reduce Water Demand adaptation include average water demand reduction per year and peak water demand reduction per month (CDM, 2011).

Improve Operational Efficiency and Transfers

Water supply system operations need to be optimized in order to maximize efficiency, both in terms of water usage and energy usage. Improving operational efficiency and transfers can be achieved through the RMS: conveyance – regional/local, system reoperation, and water transfers.

- Existing infrastructure for regional and local conveyance must be maintained and improved as their useful lives are reached. Well-maintained conveyance infrastructure improves water supply reliability and enhances regional adaptability to climate change impacts. Addressing aging infrastructure, increasing existing capacity, and/or adding new conveyance facilities can improve existing conveyance systems and operational efficiency.
- System reoperation consists of modifying existing operation and management procedures for existing reservoirs and conveyance facilities to increase water related benefits from these facilities. Through system reoperation, the MAC Region may be able to adapt to less reliable water supplies and/or increased water demands by maintaining conveyance infrastructure, as well as adapting to potential climate change impacts on hydropower production, flooding, habitats, and water quality.
- Similar to system reoperation, water transfers can help the MAC Region improve water supply reliability and provide flexibility in the future when there are increased water demands and potentially less reliable water supplies.

An example of a performance metric to quantify this RMS, Improve Operational Efficiency and Transfers, includes amount of new supply created through regional water transfers (CDM, 2011).

Increase Water Supply

As water demands increase due to longer growing seasons, higher temperatures, and longer droughts, the future of existing water supply sources becomes less certain. The MAC Region will need to enhance existing water supplies and improve its flexibility in managing those supplies to meet demands. Increasing water supply can be accomplished through the implementation of conjunctive management of surface and ground water supplies, groundwater storage, recycled water use, and increased surface water storage, as appropriate to the different areas of the region. Diversifying the region's water supply portfolio and adding drought-resistant sources is an adaptation measure that will help address increased water demands and/or decreased supply reliability. Performance metrics for measuring the effectiveness of the Increase Water Supply RMS could include additional supply created, amount of potable water offset, and supply reliability (CDM, 2011).

Implementing conjunctive management and groundwater storage helps coordinate the use of both surface and groundwater resources to maximize the availability and reliability of water supplies. In the future, when timing and availability of supplies are less certain, conjunctive management could help the region to adapt to climate changes. Another adaptation strategy to Increase Water Supply is developing a project to provide additional local surface storage as a means of helping a water system adjust to altered streamflow timing resulting from earlier snowpack melting. Additional storage capacity could also help the MAC Region adapt to the anticipated increased precipitation variability. Increased surface storage could allow ecosystem and water managers to make real-time decisions that are not available otherwise. Added storage provides greater flexibility for capturing surface water runoff, managing supplies to meet seasonal water demands, helping manage floods from extreme storm events, and responding to extreme weather conditions such as droughts. Rehabilitation and possible enlargement of existing dams and infrastructure can potentially eliminate the need for new reservoir storage.

The California Recycled Water Policy, developed by the State Water Resource Control Board in 2009, includes a goal of offsetting as much potable water with recycled water for nonpotable uses as possible by the year 2030. Recycled water is a sustainable, climate-resilient local water resource that could significantly help the MAC Region meet its water management goals and objectives while also assisting in meeting the seasonal water demands of agriculture. Water recycling provides a local supply that may use less energy than other water supplies, helping to mitigate climate change impacts through associated GHG emissions. Recycled water is already used in the MAC Region to irrigate golf courses and some agricultural irrigation; agencies are interested in continuing to use recycled water and expanding its use for agricultural purposes and urban landscape irrigation.

Improve Water Quality

Improving drinking water treatment and distribution, groundwater remediation, matching water quality to use, pollution prevention, salt and salinity management, and urban runoff management can help improve water quality. These strategies may help the region adapt to drinking water- and ecosystem-related water quality impacts from climate change. They may also contribute to providing additional supplies; for example, stormwater capture and reuse would reduce pollution runoff to riparian and aquatic habits, but could also provide a seasonal source of irrigation water for urban landscaping or groundwater recharge. Water quality performance metrics for this RMS could include stream temperature, dissolved oxygen content, and pollutant concentrations (CDM, 2011).

Climate change impacts can pose a number of challenges for surface water treatment plants, including increased monitoring and treatment flexibility necessary to quantify and treat for source water quality changes in order to maintain finished water quality. Continued growth statewide will result in increased stress on the limited water resources available for domestic, agricultural, and industrial uses. Improving water treatment technologies and matching quality to end use can provide the flexibility required to meet uncertain future conditions.

Removing naturally-occurring and anthropogenic contaminants in current groundwater sources will provide additional water supply by increasing the use of groundwater in the MAC and neighboring regions. Local government and agencies with land use responsibility should limit potentially contaminating activities in areas where recharge takes place (recharge zone protection) and work together with entities currently undergoing long-term groundwater remediation to develop a sustainable, long-term water supply for beneficial reuse.

In recent years, as point sources of pollution have become regulated and controlled, “non-point source” (NPS) pollution has become a primary concern for water managers. NPS pollution is generated from land use activities associated with agricultural development, forestry practices, animal grazing, uncontrolled urban runoff from development activities, and discharges from marinas and recreational boating activities, and other land uses that contribute pollution to adjacent surface and groundwater sources.

Pollution prevention and management of water quality impairments should incorporate a watershed approach to protect water supply sources and help to ensure the long-term sustainability of those supplies.

Urban runoff management, including Low Impact Development (LID) encompasses a broad range of activities to manage both stormwater and dry weather runoff. Stormwater capture and reuse projects can reduce the burden on wastewater treatment plants and augment water supplies, helping a region adjust to climate change impacts on water quality and water supply (CDM, 2011). The MAC Region should investigate and implement LID techniques and opportunities, where appropriate, and integrate urban runoff management with other RMS.

Improve Flood Management

The MAC Region does not currently experience major flood issues, but with increased frequency and severity of storm events predicted for the future, the MAC Region will need to collaborate and accelerate flood protection projects in order to prepare for increased flooding risk due to climate changes. Flood management involves emergency planning, general planning activities, and policy changes. Improving flood management can help a region adapt to not only potential flooding but many other related climate change impacts, including ecosystem and water quality vulnerabilities. Performance metrics could include acres of meadows restored or volume of natural flood storage provided (CDM, 2011).

Practice Resource Stewardship

Resource stewardship includes overseeing and protecting land, wildlife, and water by way of conservation and preservation, ecosystem restoration and forest management, watershed management, flood attenuation, and water-dependent recreation. Restoring and preserving habitat and wetlands has multiple benefits, including promoting biodiversity and habitat enhancement, as well as improving flood management as the natural storage provided by riparian wetlands can serve as buffers that absorb peak flows and provide slow releases after storm events (DWR, 2008). Because the scope of resource stewardship includes all resources, these strategies can help adapt to climate change impacts in various ways, depending on project-specific details (CDM, 2011). For example:

- Climate changes are predicted to result in additional fragmentation and shrinking of California's ecosystems. Appropriate corrective actions should be designed to expand and reconnect them, preventing or reversing these effects. As water managers in the region identify adaptation strategies for water and flood management, they should consider strategies that will also benefit ecosystems.
- Improved and enhanced aquatic and riparian habitats can provide significant water resource benefits through promoting groundwater recharge, protecting and improving water quality, and contributing to flood protection.
- Proper forest management would improve water quality, help reduce wildfires, and improve ecosystem and habitat within the Region.
- Additional stream gages and precipitation stations in the Region could provide data needed to determine climate trends and evaluate hydroclimatic and geologic conditions. Water quality and sediment monitoring stations would allow quantification of the effects of climate change as well as forest management activities on surface water quality (CDM, 2011).

Appropriate corrective actions should be designed to expand and reconnect important ecosystems, preventing or reversing impacts from climate change. Water managers in the region should identify adaptation strategies for water and flood management, considering strategies that will also benefit ecosystems. For example, these strategies may include:

1. Establishing large biological reserve areas that connect or reconnect habitat patches.

2. Promoting multidisciplinary approaches to water and flood management.
3. Providing financial incentives for farmers or ranchers to grow and manage habitat.
4. Improving instream flow needs (CDM, 2011).

Improved and enhanced aquatic and riparian habitats can provide significant water resource benefits through promoting groundwater recharge, protecting and improving water quality, and contributing to flood protection.

The MAC Region contains significant upland forest areas that drain to the region's water supplies. While the Upper Mokelumne River Watershed Authority, as the Regional Water Management Group, is not responsible for managing these upland forested areas, protection of those lands is important to ensure high quality surface runoff supplies. Proper forest management would improve water quality, help reduce wildfires, and improve ecosystem and habitat within the Region. Additional stream gages and precipitation stations could help establish and confirm climate trends and evaluate hydroclimatic and geologic conditions. Water quality and sediment monitoring stations would allow quantification of the effects of climate change as well as forest management activities on surface water quality (CDM, 2011).

Other Strategies

Additional conservation and demand reduction measures, such as crop idling, irrigated land retirement, and rainfed agriculture could be implemented as adaptive management strategies under this RMS. Adaptation strategies in this category may require significant amounts of energy for implementation, and would need to be analyzed to determine the benefit versus additional GHG emissions. The RMS included in this category were not deemed applicable for the MAC region and were therefore, not included.

No Regret Strategies

No regret adaptation strategies are those that make sense for current hydrologic conditions, while also helping the region to adapt to anticipated climate change impacts. The following table presents the No Regrets adaptation strategies for the MAC Region. At present, the region is either already implementing these strategies or plans to implement them in the foreseeable future.

Table 1-23: No Regret Strategies in the MAC Region

Resource Management Strategies	No Regrets Strategy
Agricultural Water Use Efficiency	✓
Urban Water Use Efficiency	✓
Conveyance-Regional/Local	✓
System Reoperation	
Water Transfers	
Conjunctive Management and Groundwater Storage	✓
Precipitation Enhancement	
Recycled Municipal Water	✓
Surface Storage-Regional/Local	✓
Drinking Water Treatment and Distribution	✓
Groundwater Remediation/Aquifer Remediation	✓
Matching Quality to Use	✓
Pollution Prevention	✓
Salt and Salinity Management	✓
Urban Runoff Management	
Agricultural Lands Stewardship	✓
Economic Incentives	
Ecosystem Restoration	✓
Forest Management	✓
Land Use Planning and Management	✓
Recharge Area Protection	✓
Watershed Management	✓
Flood Risk Management	✓

Mitigation/GHG Reduction Strategies

Water distribution can require significant energy. In California, 19% of the state's electricity and 30% of its natural gas is used for water-related activities (DWR, 2010a). As the MAC Region solicits and prioritizes projects for inclusion in its IRWM Plan, it must consider GHG emissions from the projects and ways to potentially mitigate climate change.

As described in Section 1, increasing GHG concentrations contribute to warming trends and climate change impacts. Because the water industry is a significant GHG contributor, reducing GHGs generated in the conveyance, treatment, and distribution of water and wastewater poses a significant opportunity to help achieve the GHG emission goals set by AB32.

The variation in temperature and precipitation projections from different emissions scenarios simulated using the GCMs illustrates the importance of implementing adaptation measures now to address climate impacts already taking place. GHG emission reductions must be achieved through cooperation at the global, national, regional, and local levels to prevent or mitigate continued climate change impacts later in the century. Major components of climate change mitigation strategies include:

1. Improve Energy Efficiency
2. Reduce Emissions
3. Carbon Sequestration

Almost all resource management strategies identified by the *2009 CWP Update* can potentially reduce GHG emissions and mitigate climate change impacts. A list of applicable strategies is included in Table 1-23.

The following briefly summarizes how the applicable RMS could contribute to GHG emissions mitigation in the MAC Region.

- Reduce Water Demand – implementing urban and agricultural water use efficiency measures will help save water and energy by reducing the volume of water treated and distributed (pumped) throughout regional water systems.
- Improve Operational Efficiency and Transfers – optimizing water system operations will maximize efficiency and potentially reduce energy use. Reducing system losses will also reduce emissions by reducing the volume of water treated and distributed (pumped) throughout regional water systems.
- Increase Water Supply – depending on the method used to increase water supply, there may be a net increase or decrease in GHG emissions. Increasing storage could have GHG emissions associated with construction, but relatively low operational emissions.
- Improve Water Quality – GHG emissions depend on the specific project implemented to improve water quality. Matching quality to use generally has lower emissions than using potable water for the specified nonpotable uses by limiting water treatment. Additionally, protecting water sources from future water quality degradation may offset the future need for water treatment.
- Improve Flood Management – where flood management encourages vegetation growth (e.g. ecosystem or floodplain restoration), carbon sequestration may help reduce net carbon emissions.
- Practice Resource Stewardship – implementing ecosystem restoration or forest management can contribute to carbon sequestration and potentially reduce net emissions.

1.3.7. Plan for Further Data Gathering

Identifying and implementing appropriate adaptation strategies requires having the data necessary to (1) understand the magnitude of climate change impacts and associated vulnerabilities and (2) plan for strategy implementation in a timely manner. To aid in this understanding, the MAC Region has developed a data gathering and analysis approach to collecting and assimilating data related to the prioritized climate change vulnerabilities.

As an umbrella document, the MAC Plan Update is intended to coalesce and build upon available planning information and studies, not supersede them. Currently, significant data collection efforts are underway at the state, national, and international levels by agencies including DWR, the California Air Resources Board (CARB), the US Environmental Protection Agency (EPA), and the International Panel on Climate Change (IPCC), among others. In order to ensure that the MAC Plan is responsive to projected climate change impacts and prioritized vulnerabilities, it will be critical to assimilate the data and information being collected through these avenues into future Plan updates. Further, a variety of project-specific data and information will be collected as part of the project performance and monitoring program (described in Section 5.1). This data could contribute additional information on climate change information on the regional level that could be used to augment information developed at the state and national levels.

Table 1-24: Applicability of CWP Resource Management Strategies to GHG Mitigation

Resource Management Strategies	Greenhouse Gas Mitigation		
	Energy Efficiency	**Emissions Reduction**	**Carbon Sequestration**
Reduce Water Demand			
Agricultural Water Use Efficiency	✓	✓	
Urban Water Use Efficiency	✓	✓	
Improve Operational Efficiency and Transfers			
Conveyance-Regional/Local	✓	✓	
System Reoperation	✓	✓	
Water Transfers	*	*	
Increase Water Supply			
Conjunctive Management and Groundwater Storage	*	*	
Desalination	-	-	-
Precipitation Enhancement	✓		
Recycled Municipal Water	*	*	
Surface Storage-Regional/Local	*	✓	
Improve Water Quality			
Drinking Water Treatment and Distribution	✓	✓	
Groundwater Remediation/Aquifer Remediation	*	*	
Matching Quality to Use	*	*	
Pollution Prevention		✓	
Salt and Salinity Management		✓	
Urban Runoff Management	✓	✓	
Improve Flood Management			
Flood Risk Management			✓
Practice Resource Stewardship			
Agricultural Lands Stewardship			✓
Economic Incentives	✓	✓	✓
Ecosystem Restoration			✓
Forest Management			✓
Land Use Planning and Management	✓	✓	✓
Recharge Area Protection			✓
Water-dependent Recreation			✓
Watershed Management	✓	✓	✓

Source: CDM, 2011.

Key:

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

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

* indicates that this may provide either beneficial or adverse effects

In conjunction with future MAC IRWM Plan updates, the available body of climate change information, data, and literature will be evaluated and incorporated into the vulnerabilities analysis and throughout the Plan, as appropriate. In addition, the data collection tables completed in support of the Plan-level and project-level monitoring will be revised, as appropriate, to include additional climate change parameters.

At a minimum the following data collection and analysis actions will be implemented as part of future plan updates to ensure that the plan adequately addresses prioritized climate change vulnerabilities:

- Review statewide available data at the following sites:
  - DWR IRWM Climate Change Document Clearinghouse –
  - http://www.water.ca.gov/climatechange/docs/IRWM-ClimateChangeClearinghouse.pdf
  - DWR's Climate Change Website – http://www.water.ca.gov/climatechange
  - Climate Change Handbook – http://www.water.ca.gov/climatechange/CCHandbook.cfm
  - State of California Climate Change Portal – http://www.climatechange.ca.gov
  - CARB website – http://www.arb.ca.gov/cc/cc.htm
  - The California CAT website – http://climatechange.ca.gov/climate_action_team/index.html
  - CEQA Greenhouse Gas Analysis Guidance for DWR Grantees –
  - http://www.water.ca.gov/climatechange/docs/Guidance%20For%20Grantees-%20Calculating%20GHGs%20for%20CEQA2011.pdf
  - Association of Environmental Professionals. 2007. *Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents*. http://www.counties.org/images/public/Advocacy/ag_natres/AEP_Global_Climate_Change_June_29_Final%5B1%5D.pdf
  - California Climate Action Registry. (2009). *General Reporting Protocol Version 3.1*. http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf
  - California Climate Adaptation Planning Guide – http://resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html
  - Center for Biological Diversity. 2007. The California Environmental Quality Act on the Front Lines of California's Fight Against Global Warming. http://www.biologicaldiversity.org/publications/papers/CBD-CEQA-white-paper.pdf
- Review national and international data at the following sites:
  - U.S. EPA. 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2007. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html
  - World Resources Institute and World Business Council for Sustainable Development. N.d. *The Greenhouse Gas Protocol for Project Accounting*. http://www.wri.org/publication/greenhouse-gas-protocol-ghg-protocol-project-accounting
- Update plan performance monitoring and project-specific monitoring data collection tables to include climate change parameters as appropriate.

1.4. Water Resource Issues and Major Conflicts

The following list of water resource conflicts in the MAC region was compiled from two sources. The MAC region RPC met in January 2009 and identified a number of regional water resource conflicts and issues through a facilitated discussion. Additional issues and conflicts were obtained from the Upper Mokelumne River Watershed Assessment and Planning Project (UMRWAP). The potential conflicts and issues were organized under the following seven topic headings.

1. Land Use and Water Use Conflicts
2. Environmental Protection
3. Water Quality Conflicts

4. Supply Management
5. Forest Management
6. Fire Management
7. Economic Impacts

Specific conflicts in each area are summarized in the following sections. Conflicts identified through the UMRWAP are denoted as such.

1.4.1. Land Use and Water Use Conflicts

- Amador County General Plan housing element resulting in more development in areas with no water/wastewater infrastructure
- Inadequate supply and infrastructure to meet growth projected by the general plans of Amador County and its cities
- Problems with providing infrastructure in dispersed, low density areas
- Watershed protection versus community economic needs
- Groundwater overdraft versus development approvals
- Insufficient groundwater quantity and quality to accommodate growth
- Projected population increases expediting the transport of contaminants to water bodies (UMRWAP)
- Inconsistency and disagreement over the basis of the water demand projections presented in the UWMPs

1.4.2. Environmental Protection

- Obtaining Wild and Scenic River status versus preserving opportunity to develop additional surface water storage
- PG&E pumped storage project on North Fork versus preserving or restoring river natural systems
- Third party impacts from reuse and conservation (reduced return flows)
- Protecting and improving fish passage on lower Mokelumne and Calaveras Rivers versus river-sourced water supply development needs and opportunities
- Management of federal lands resulting in environmental impacts
- Invasive species

1.4.3. Water Quality Conflicts

- Promoting and improving water-related recreation opportunities versus recreational water quality impacts
- Groundwater overdraft in the Eastern San Joaquin Groundwater Basin contributing to deteriorating groundwater quality levels in the portion of the basin underlying Calaveras County
- Wastewater discharge water quality impacts
- Failing septic system contaminant leakage to surface water and groundwater versus body contact recreation and drinking water (UMRWAP)
- Wastewater treatment levels and technology versus environment and benefits
- Improper disposal of household wastes (UMRWAP)
- Wastewater treatment plant overflows during high precipitation events (UMRWAP)
- Inactive mines without restoration causing leaching of soils with high mineral content and surface runoff of contaminants to water bodies (UMRWAP)
- Increased impervious surfaces exacerbating flooding and contributing contaminants to surface waters versus designing streets and compact development with techniques to reduce peak flows, minimize runoff, and remove contaminants during flow (UMRWAP)
- Roads and road maintenance practices that contribute to erosion, peak runoff, and transport of sediments and contaminants in runoff to surface waters (UMRWAP)

1.4.4. Supply Management

- New water supply versus recycled water versus conservation of supplies
- Stormwater management and rights to use this water
- Climate change impacts
- Water rights concerns
- Supplies not matched to use (e.g., industrial users receiving potable supplies)
- White water recreation versus flat water recreation
- Meadows require rehabilitation to increase water sequestration and slow water release throughout dry season

1.4.5. Forest Management

- Timber harvesting disturbance of vegetation and soils which contributes loadings to surface waters (UMRWAP)
- Increased vegetation densities outside the natural range of variability

1.4.6. Fire Management

- Vegetation and soil disturbances caused by wildfires, which contributing sediment loadings to surface waters (UMRWAP)
- Fire response to protect landowner and water quality objectives versus managing naturally-occurring fires (UMRWAP)
- Biomass removal of excess fuels in forested landscapes
- Costs of timber management

1.4.7. Economic Impacts

- Costs of projects and financing
- Aging existing water and wastewater infrastructure
- Drinking water regulations failing to realistically reflect human health protection needs (treatment levels too onerous) causing added infrastructure needs to meet regulations
- Local economic opportunities versus out of region resources
- Cost of vegetation treatments and biomass removal

2. Governance



2. Governance

Integrated Regional Water Management (IRWM) Plans must:

- Document a governance structure that ensures the IRWM Plan will be updated and implemented
- Describe how the RWMG meets the definition of California Water Code (CWC) §10539
- List RWMG members and individual project proponents who adopted the Plan
- Describe the IRWM governance structure
- Explain how the chosen form of governance addresses and ensures the following:
  - Public outreach and involvement processes
  - Effective decision making
  - Balanced access and opportunity for participation in the IRWM process
  - Effective communication – both internal and external to the IRWM region
  - Long-term implementation of the IRWM Plan
  - Coordination with neighboring IRWM efforts and State and federal agencies
  - The collaborative process(es) used to establish plan objectives
  - How interim changes and formal changes to the IRWM Plan will be performed
  - Updating or amending the IRWM Plan

2.1. UMRWA - Regional Water Management Group

In 2005, a group of water-related public agencies in Amador and Calaveras Counties signed a Memorandum of Understanding committing to the preparation of the first MAC IRWMP. Signatories of the 2005 memorandum included Amador Water Agency (AWA), East Bay Municipal Utility District (EBMUD), Calaveras County Water District (CCWD), Amador County, City of Jackson, City of Sutter Creek, City of Plymouth, and the Amador Regional Sanitation Authority (ARSA). This initial regional plan, which was adopted in December 2006, was based on guidelines and standards associated with Proposition 50. With the passage of Propositions 84 and 1E, and subsequent revisions to the Integrated Regional Planning Act resulting from SBxx1, new IRWMP guidelines and standards have been established. Concurrently, the expansion of interest in regional water resources planning in Amador and Calaveras County has led to the evolution of the MAC region planning process. Specifically, the Upper Mokelumne River Watershed Authority (UMRWA or Authority), a regional water management group (RWMG), has assumed a leadership role for updating and administering the MAC Plan.

Established in the year 2000 as a joint powers agency, UMRWA is a 'regional water management group' as defined by California Water Code Section 10537. UMRWA was selected as the lead agency for the RWMG due to its history in promoting and developing stakeholder-supported regional solutions to water resource problems. In turn, the UMRWA Board of Directors has established an Integrated Regional Water Management Planning program and has provided funding to undertake the first phase of a multi-phase process to update the 2006 MAC Plan. UMRWA is comprised of six water agencies and the counties of Amador, Calaveras and Alpine. The six water agencies are Amador Water Agency (AWA), Calaveras County Water District (CCWD), Calaveras Public Utility District (CPUD), East Bay Municipal Utility District (EBMUD), Jackson Valley Irrigation District (JVID) and Alpine County Water Agency (ACWA).

The Authority has been engaged in a wide variety of water resource matters since its inception in 2000. At the time it was formed, the Authority's attention was focused on Pacific Gas and Electric Company's (PG&E's) anticipated divestiture of its hydropower assets (pursuant to California's energy deregulation program) and the Authority's acquisition of PG&E's Mokelumne River Project. When the federal court approved PG&E's bankruptcy reorganization plan, Authority member concerns regarding the divestiture of the Mokelumne River project were generally abated and Authority acquisition efforts halted. With acquisition of PG&E's Mokelumne Project no longer an objective, the Authority in 2005 refocused its attention on water quality issues, potential watershed projects and cooperative water supply planning efforts between the Authority's member agencies.

As a Joint Powers Agency, UMRWA is comprised of local public agencies with water resource management responsibilities in the region. The individual member agencies that comprise the Authority, along with their statutory basis, water management authorities, and intentions regarding adoption of the MAC Plan, are presented in Table 2-1.

Table 2-1: UMRWA JPA Member Agencies

Member Agency	Statutory Basis	Water Management Authority	Expect MAC Plan Update Adoption
Alpine County	A political subdivision of the State of California	Storm water, flood control, watershed protection, environmental health	Yes
Alpine County Water Agency	A water agency formed pursuant to a special act of the California Legislature	Water, wastewater	Yes
Amador County	A political subdivision of the State of California	Storm water, flood control, watershed protection, environmental health	Yes
Amador Water Agency	A water agency formed pursuant to a special act of the California Legislature	Water, wastewater	Yes
Calaveras County	A political subdivision of the State of California	Storm water, flood control, watershed protection, environmental health	Yes
Calaveras County Water District	A California water district	Water, wastewater, hydropower	Yes
Calaveras Public Utility District	A California public utility district	Water, wastewater	Yes
East Bay Municipal Utility District	A California municipal utility district	Water, wastewater, hydropower	Yes
Jackson Valley Irrigation District	A California irrigation district	Water, wastewater, hydropower	Yes

2.2. Governance Structure

UMRWA is the regional water management group for the MAC region. UMRWA is governed by a Board of Directors consisting of eight Directors, each serving in his or her individual capacity as Director of the Board. Directors are appointed by the governing bodies of each of the Authority's member agencies, with Alpine County and Alpine County Water Agency together appointing one Director. Each member agency may also appoint one or more alternate Directors. Each Director and alternate Director serves at the pleasure of the governing body which appointed them.

The Authority Board of Directors (Board) conducts regularly scheduled meetings, with at least one regular meeting each calendar quarter. All meetings are called, noticed and conducted pursuant to the Ralph M. Brown Act. Five directors constitute a quorum for transacting business, and affirmative votes by five Directors is required for action. The minutes of all Board meetings are recorded by the Authority Secretary. The Board selects the Chairperson and Vice-Chairperson. An Executive Officer, appointed by the Board and serving at its pleasure, administers the Authority's affairs. Amador County Counsel serves as Authority Counsel. EBMUD Finance Director serves as Authority Treasurer and Controller.

Upon assuming leadership of the MAC region planning process, the UMRWA Board of Directors approved the Authority's Integrated Regional Water Management Planning Program in May 2008 and funded phase 1 of the MAC Plan Update in July 2008. When establishing the program, the Board set the following goal: *Develop an updated MAC Plan which addresses a broad range of water-related and environmental stewardship needs through effective stakeholder participation, and is comprehensive and competitive with other plans*. The Board of Directors also established a three-tiered governance structure to guide the regional water resource planning and management process. This structure is intended to best meet the needs of a variety of MAC region stakeholders while achieving an updated MAC Plan which meets the Board's goals. Implementation of a three-tiered structure involving the Regional Participants Committee (RPC), the Board Advisory Committee, and the Board (all summarized in the following sections) is expected to: (1) create a fair and open plan update process, (2) ensure that the special funding provided by member agencies is efficiently spent, (3) provide a systematic decision-making process with the Governing Board being the final arbiter of disputes, and (4) yield a useful and successful updated MAC Plan. This structure is depicted below.

Figure 2-1: MAC IRWMP Region Governance Structure

Besides the UMWRA member agencies, other anticipated participants in the MAC region IRWM planning process, including other public agencies, private corporations, disadvantaged communities (DACs) and non-governmental organizations (NGOs), are identified and listed in Table 2-2. The third column in the table indicates the participant's working relationship in the MAC regional planning process as either RPC member or stakeholder. The RPC members are presently participating in the planning process. Stakeholders are those organizations that have not participated despite being invited. Many of these stakeholders are expected to participate in the planning process in the future, either through the RPC or through the public outreach process. The committees are further described in the following sections.

Table 2-2: Other Regional Planning Participants

Participant Categories	Organizations/Stakeholders	Working Relationship w/MAC Plan
Wastewater agencies	Amador Regional Sanitation Authority	Stakeholder
Cities and special districts	Amador City	Stakeholder
	City of Ione	RPC member*
	City of Jackson	RPC member
	City of Plymouth	RPC member
	City of Sutter Creek	Stakeholder
	Mokelumne Hill Sanitation District	Stakeholder*
	Wallace Community Services District	Stakeholder
	Golden Vale Subdivision	RPC member*
Electrical corporation	Pacific Gas and Electric	Stakeholder
Stewardship organizations	Amador Fly Fishers	Stakeholder
	Foothill Conservancy	RPC member
	Alpine Watershed Group	Stakeholder
	Upper Mokelumne Watershed Council	RPC member
	Trout Unlimited, Sac-Sierra Chapter	Stakeholder*
Industry organizations	Sierra Pacific Industries	Stakeholder*
Disadvantaged communities	City of Jackson	RPC Member
	City of Plymouth	RPC member
	Mokelumne Hill	Stakeholder
	West Point	Stakeholder
Federal agencies	U.S. Forest Service	RPC member

* indicates the entity was not a member of the RPC for the entire development of the MAC IRWM planning process and was therefore a stakeholder and an RPC member.

2.2.1. Regional Participants Committee (RPC)

The RPC is a diverse committee organized for the purpose of bringing stakeholder interests to the forefront during the regional planning process and the development of the MAC IRWMP Update. RPC participation provides for balanced access and opportunity for participation in the IRWM planning process. Members of the RPC are expected to represent the views of their agency, community organization or interest group, commit time to take part in the process, and work collaboratively with other RPC members and project staff. The table below lists the organizations represented on the committee.

Table 2-3: Regional Participants Committee

Sector	Agency/Organization
Cities and Special Districts	Amador Water Agency Calaveras County Water District Calaveras Public Utility District East Bay Municipal Utility District Jackson Valley Irrigation District City of Ione
Community/Environmental Organizations	Foothill Conservancy Upper Mokelumne River Watershed Council
Disadvantaged Communities	City of Jackson City of Plymouth
Interested Residents	Retired Public Works Director
Federal agencies	U.S. Forest Service

For virtually any stakeholder process to run smoothly and be successful, it is helpful for those involved to agree at the outset on the purpose of the process and the procedures by which the group will govern its discussions and decision-making. For this RPC process, a set of governing procedures has been established by the RPC. The key aspects of the *Governing Procedures Guidelines* follow.

- The goal of this planning process is to have RPC members engaged in discussion and reach consensus on MAC Plan content and recommendations. Straw votes may be taken from time to time to gauge the level of agreement on specific issues. Efforts should be made to accommodate the concerns of all parties.
- The RPC will serve as the MAC Plan's primary advisory body. In that capacity, the RPC is expected to provide advice, support and constructive criticism. Project staff will incorporate or otherwise reflect the comments and recommendations of the committee members into MAC Plan work products.
- With the RPC's consent, new committee members may be added to the RPC after the first meeting is held.
- Every member will check back with their respective organization or constituency and will keep them aware of the ongoing RPC process and actions. Input from senior staff and/or governing boards of the RPC members will be communicated back to the RPC at its next meeting. Any dissension from the respective organizations' decision-making bodies that could affect acceptance of RPC recommendations will be clearly communicated at each meeting so a solution can be sought.
- Outstanding issues or concerns of RPC members will be brought to the RPC first. Members will not communicate their concerns and issues outside of the committee without first bringing them to the RPC.
- Every member is responsible for communicating their position on issues under consideration. It is incumbent upon each member to state the interests of the organization or group they represent. Voicing these interests is essential to enable meaningful dialogue and full consideration of issues by the RPC. If a RPC member does not attend a RPC meeting or communicate their viewpoint on an issue, it is assumed that they agree with decisions and recommendations made by the RPC.

The decision-making process to be followed by RPC has been established by the committee itself. This process is described as follows:

- The RPC decision process has been established to have RPC members contribute their knowledge and opinions to the overall project. The decision-making goal is to have all RPC members agree on the item at hand, with no member objecting to a decision, action or recommendation. Members should use "can they live with it" as their standard.
- In any instance in which all members don't agree on the decision or action at hand, then the person or persons who disagree must put forward a reasonable alternative. If, after due consideration, agreement on the matter at hand cannot be reached, the RPC will determine how to resolve the impasse.

For the purposes of updating the 2006 MAC IRWMP, the RPC met fourteen times beginning in January 2009 and ending in January 2013. The meeting notes for all of the RPC meetings are included in Appendix B.

2.2.2. Board Advisory Committee

The Board Advisory Committee has been established by the UMRWA Board of Directors to perform a prescribed set of functions related to the regional planning process and the development of the updated MAC Plan. Meetings of the Board Advisory Committee are held quarterly by conference call and are open meetings. Members include Amador Water Agency (AWA), Calaveras County Water District (CCWD), and East Bay Municipal Utilities District (EBMUD). Steering Committee members are expected to:

- Make decisions by unanimous agreement of all committee member agencies.
- Respond to and resolve questions that may arise at RPC meetings.
- Present unresolved RPC matters to the Board of Directors for resolution.
- Advise the Board on all matters related to the MAC Plan update.
- Recommend the updated Plan to the Board for approval.

2.2.3. UMWRA Board of Directors

The UMRWA Board of Directors is the policy board that governs the Authority and the business that it transacts. Among its duties are the approval of the regional planning process, resolution of disputes the Board Advisory Committee is unable to satisfactorily resolve, authorization to apply for grants, approval of the Authority budget, hiring of consultants and approval of contracts. The Board will also be the first public body to adopt the updated MAC Plan, and will in turn solicit the approval of other agencies and organizations in the MAC region.

2.2.4. Public Participation

The general public is provided opportunities to participate in the MAC IRWM planning process. The MAC region strives to open avenues of communication with the general public and offers opportunities to provide feedback on the Plan Update and water-related projects. Information regarding the MAC IRWM planning process and Plan Update is communicated to the general public through direct mailings, local media and a MAC Plan website. General public will also be invited to attend the first RPC meeting and last RPC meeting. The first meeting will provide an introduction to the IRWM planning process while the last meeting will allow public comment on the Draft Plan Update.

2.2.5. Benefits of Governance

The MAC governance Structure, described in this section, provides the following benefits to the Region's IRWM Program:

- Provides a structure for implementing public outreach and involvement: The Governance Structure and public outreach approach have been vetted by participating agencies and members of the Board, RPC, Steering Committee and general stakeholders. A *Community Outreach Plan* was developed and endorsed by the RPC and guides public involvement through the MAC planning process and facilitates relationship building by promoting the active participation of stakeholders.

- Facilitates effective decision-making: By implementing a three-tiered structure with clearly defined participants and roles, decision-making is streamlined, transparent and fair.
- Encourages balanced access and opportunity for participation in the IRWM process: The wide participation by stakeholders and RPC members from all relevant areas of water resources management in the region ensures that stakeholders have balanced access to the process. In addition, holding public, open meetings as well a stakeholder outreach process provides ample opportunity for participation in the IRWM planning process.
- Allows effective communication – both internal and external to the IRWM region: The RPC serves as an effective forum for communication to stakeholders internal and external to the Region, as well as neighboring IRWM regions.
- Manages long term implementation of the IRWM Plan: While individual project proponents are responsible for implementing the projects identified in the IRWM Plan to the extent feasible, the RWMG is responsible for compiling data and information on benefits, impacts, and plan performance over time through the IRWM program, to the extent funding is available to allow these activities to occur.
- Coordinates with neighboring IRWM efforts and State and federal agencies: Through the IRWM Plan updates, the Authority interfaces with neighboring IRWM regions, as well as State and federal agencies. In addition, having a formal role for stakeholders who are not official RPC members provides a vehicle for participation by these entities.
- Includes a collaborative process to establish plan objectives: As described above, the RPC makes decisions according to the tentatively adopted *RPC Governing Procedures Guidebook*. The decision-making goal is to have all RPC members agree on the item at hand, with no member objecting to a decision, action or recommendation.
- Provides a process for incorporating interim changes and formal changes to the IRWM Plan: The governance structure establishes clear roles and responsibilities. In the event that interim and / or formal changes are needed, the Board would direct the RPC to oversee completion and incorporation of changes.
- Identifies responsibilities for updating or amending the IRWM Plan: Each group identified in the governance structure has specific responsibility with respect to IRWM Plan updates. The RPC is tasked with overseeing the consultant updating the Plan; the Steering Committee is charged with advising the Board on all matters related to the Plan Update, and the Board is responsible for ultimately approving the Plan Update.

2.3. Stakeholder Involvement

2.3.1. Community Outreach Plan

A primary element of the MAC regional planning process is community outreach. A *Community Outreach Plan* was developed and endorsed by the RPC. This plan guides public involvement throughout the MAC regional planning process and facilitates relationship-building by promoting the active participation of local stakeholders. The key outreach goal of the Plan is: "To ensure sufficient representation and active participation of community interests to achieve a technically and politically viable update to the existing Plan".

To achieve that goal, a three-tiered approach to stakeholder participation and general community outreach has been established. These three tiers are described below.

Tier One was the formation of a committee to represent the interests of stakeholders within the MAC region. This Regional Participants Committee, or RPC, serves as the venue for bringing stakeholder interests to the MAC Plan update discussion. It has a central and guiding role in the MAC regional planning process. RPC participants were solicited through letters sent to individuals and organizations with known stakeholder interests (e.g. participants in the drafting of the 2006 MAC IRWMP), by notices published in local papers, and by announcement during the October 2008 Community Meeting which targeted the general public (see Tier 2 discussion, below). A balanced and diverse representation of community stakeholder interests has been achieved, including special outreach efforts to secure the input of geographically-distant Alpine County interests and Disadvantaged Communities throughout the region. The RPC is described in more detail in Chapter 2.2.1.

Tier Two ensures that the general public living within the MAC region has an opportunity to be involved in the project, learn about project developments and provide input into RPC work products. Communication with the general public is accomplished through four methods: individual RPC member outreach to community members, coworkers, and professional associations; local media involvement to inform the general public of progress being made in developing the updated MAC Plan; a MAC Plan website to provide easy access to IRWM materials and updates; and community workshops to provide a forum for additional community input and engagement. Community workshops are the primary format for informing the general public about MAC Plan Update activities and to solicit comments and answer questions on MAC Plan work products. Workshops are held to coincide with the drafting of key project work products. Community workshops are hosted at suitable facilities that are centrally-located. The Senior Community Center and the Amador County Board of Supervisors chambers, both of which are located in Jackson, have often been used for meetings of this nature and are likely locations for future meetings.

Tier Three is designed to ensure that the interests of Disadvantaged Communities and Native American Tribes in the MAC region are represented and accounted for in the MAC Plan update process. By soliciting and encouraging participation in the MAC Plan update process by individuals who understand the issues facing disadvantaged communities (DACs), we can help to ensure that the needs of low-income communities are considered in plan development, and that DACs do not experience disproportionate adverse impacts associated with IRWM plan implementation. Representation by DACs is shown in Table 2-4. Objectives of Tier 3 include the following.

- Solicit involvement by individual representatives of DACs and tribes within the MAC region and encourage participation by those representatives as members of the RPC.
- Encourage RPC members to specifically advocate and represent the interests of those DACs and tribes that do not have designated community representatives on the RPC, but that lie within the RPC member’s jurisdiction or area of special interest.
- Inform representatives and residents of DACs and tribes of the IRWM program via flyers and newspaper notices about opportunities to get involved with the MAC Plan update process and participate in development, integration, and prioritization of projects.

Table 2-4: Disadvantaged Community Representation

Disadvantaged Community	Supporting Public Agency	Agency/Organization
Jackson	City of Jackson	Mike Daly
Plymouth	City of Plymouth	Jeffry Gardner
Mokelumne Hill	Mokelumne Hill Sanitation District	
Rail Road Flat	TBD	---
San Andreas	Calaveras Public Utility District	Donna Leatherman
West Point	Calaveras County Water District	Ed Pattison

2.3.2. Stakeholder Input in IRWMP Update

Stakeholders will be integral to all aspects of the IRWM planning process, including the IRWMP Update. Table 2-5 presents the planned RPC meetings and the associated topics to be covered at each. The first and last RPC meetings will also be community workshops in which general public can attend to provide feedback. During the second RPC meeting, stakeholders will provide valuable and necessary input about the Plan Objectives and Resource Management Strategies.

Table 2-5: Scheduled RPC Meetings

RPC Meeting No.	Meeting Topic/Purpose	Tentative Meeting Date
1	Plan Update process, schedule and goals Summary of work to date: governance, regional description, coordination, stakeholder involvement, relation to local water planning, regional climate change impacts, etc.	October 12, 2011
2	Objectives and strategies; project solicitation process	December 14, 2011
3	Projects submitted, integrated and prioritized	February 8, 2012
4	Revisit projects integrated and prioritized	March 21, 2012
5	Impacts, benefits and financing	May 9, 2012
6	Revisit project details	June 27, 2012
7	Implementation plan: schedule, financing, environmental, integration	August 22, 2012
8	Monitoring plan to track MAC Plan performance	September 26, 2012
9	Climate change; relation to local land use planning	November 7, 2012
10	Draft plan review and endorsement	January 23, 2013

2.3.3. Coordination with Stakeholders

Information regarding the MAC IRWM planning process is communicated to the RPC by email, postings on the MAC Plan website and direct mailings. Information is communicated to the general public through direct mailings, local media and a dedicated MAC Plan section of the UMRWA website. Direct mailings are facilitated by a community and stakeholder database. This database has been developed based on project databases created previously for UMWRA's Upper Mokelumne River Watershed Assessment and Planning Project and the 2006 MAC IRWMP. These two databases were initially combined into a single database for the MAC Plan Update, with more names subsequently added by agency staff and participants at the first public workshop, held in October 2008. This community database contains the names and key contact information of interested public and potential stakeholders, as well as media contacts. The community database primarily serves as a mailing list for direct mail pieces that are developed concerning the regional planning process. As new contacts are made, either through the Regional Participants Committee (RPC), community meetings, or other venues, the community database is augmented.

Direct mailings to community members listed in the database are used as a means for announcing scheduled community workshops. These announcements describe the MAC Plan and its purpose and the subject matter of the scheduled workshop, and solicit public input on draft or completed work products.

The local media provide a credible and economical approach to achieving widespread dissemination of key project information. Studies show that information presented to the public through a third party, such as the media, is more readily believed by the public, as opposed to advertising or other methods of information coming directly from the source. Local newspapers, such as the Record Courier, Calaveras Enterprise, and the Amador Ledger Dispatch, are contacted and provided with descriptions of upcoming workshops and related information for publication.

In an effort to continue to make all relevant information available to a vast breadth of stakeholders, a MAC Plan section of the UMRWA website has been developed for the MAC regional planning process. This website provides information about the overall DWR IRWM program, and specifically the 2006 MAC IRWMP and update (i.e. who they can contact regarding interest in the process). Useful links to other websites are provided and documents may be downloaded. In addition to those interested obtaining information from the website, there will be a link allowing viewers to leave anonymous comments and/or suggestions, thereby further contributing to the process.

Additionally, as projects are developed, solicited and prioritized, coordination will take place among the project proponents and others in order to maximize benefits, reduce redundancies and identify and implement potential efficiencies.

2.4. Integration

The MAC region allows for maximizing opportunities for integration of water management activities and the IRWMP Update integrates water management programs and projects. Project integration is discussed in detail in Section 4.1.4.

The governance structure, previously described, fosters integration by allowing a diverse group of stakeholders and interested parties to participate at all levels of the IRWM planning process. Cities, water agencies/district, irrigation districts, wastewater agencies, 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, and specifically in the MAC Plan Update, 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 Plan Update can be prepared. Resource integration has occurred through the creation of UMRWA by combining 6 water agencies and two counties into one Joint Powers Authority, providing a focus and lead voice to the IRWM planning process in the MAC region.

2.5. Coordination with Other IRWM Regions and State and Federal Agencies

For details as to how the MAC Region coordinates with overlapping and surrounding regions, please refer to Chapter 1.1.2.

Should State or federal funding be acquired for IRWMP implementation, UMWRA, as the official RWMG will coordinate with the appropriate agencies. On-going coordination would be required during project implementation and after as the projects are monitored and data is collected.

Separately, projects that are implemented will require certain State and federal approvals such as permits and/or environmental documentations. Projects would be compliant with the California Environmental Quality Act (CEQA) and the National Environmental Protection Act (NEPA), as necessary. Completion of CEQA/NEPA documentation would require coordination with various State and federal agencies.

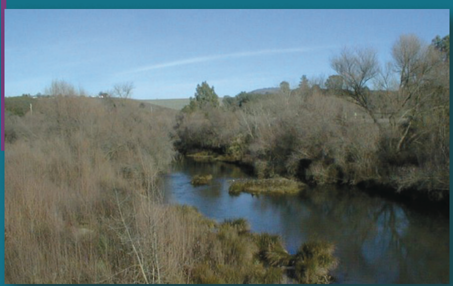
In order to remain current on climate change activities occurring at the State and national levels, the RWMG should stay involved in California Natural Resources Agency's California Adaptation Strategy process to help shape the document through their participation. In addition, agencies that are part of the MAC IRWM effort are encouraged consider joining The Climate Registry, http://www.theclimateregistry.org/ .

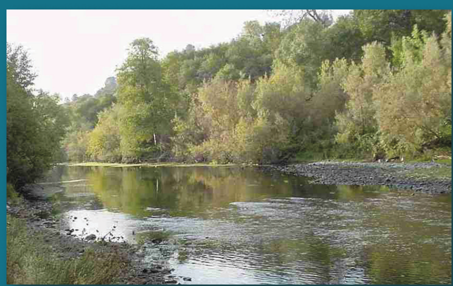
2.6. Plan Adoption and Future Updates

Upon completion of this MAC Plan Update, each UMRWA member agency will adopt it and any other agency that wishes to do so can also. Regardless of grant funding, the MAC Plan is a living document and will continue to be updated in the future. The following are examples of when the MAC Plan may be updated in the future.

- To comply with updated IRWM Guidelines, per DWR.
- To update the project list and project evaluation.
- To incorporate results of plan performance monitoring and/or project monitoring.

3. Policies, Goals, Objectives, and Strategies





3. Policies, Goals, Objectives, and Strategies

Integrated Regional Water Management (IRWM) Plans must:

- Document plan objectives and describe the process used to develop the objectives.
  - The objectives must address major water-related issues and conflicts within the region and they must be measureable so they can be monitored.
  - The objectives may be prioritized. If they are, the IRWMP must contain an explanation of or reason for the prioritization.
- Present the range of Resource Management Strategies (RMS) considered to meet the IRWMP objectives previously discussed and identify which RMS were incorporated into the IRWMP.

3.1. Policies, Goals and Objectives

The policies, goals and objectives of the MAC region were formed through a collaborative stakeholder process. These policies, goals and objectives form the backbone of the MAC Plan and provide the rationale for IRWM decision-making. This chapter discusses the MAC region's hierarchy of water resource policies, goals and objectives and the process used to develop them.

Development of regional policies, goals and objectives is an essential step in the IRWM planning process. Broad based water resource policies sit at the top of the hierarchy employed in this plan. The region's goals, which are next in the hierarchy, are statements of intended outcomes which serve to broadly outline the IRWMP direction. The region's objectives are actions that support fulfillment of the goals. Performance measures represent the final level in the hierarchy and are used to track the progress that is being made to achieve the objectives. Goals and objectives were initially established for the MAC region as part of the process leading to the development of the 2006 IRWMP. Those initial goals and objectives have been revisited and revised in conjunction with the MAC Plan updating process described below.

3.1.1. Process for Setting Policies, Goals and Objectives

A consensus-based approach was used to develop the MAC region's goals and objectives. During development of the 2006 IRWMP, all of the regional participants were invited to submit goals and objectives, regardless of whether or not they were signatories to the Plan MOU. The ideas submitted by the Regional Participants Committee (RPC) were reflective of the needs of the regional conflicts, issues, and priorities. These goals and objectives were then refined by the group over several months, resulting in a collaboratively-developed set of regional goals and objectives that were included in the 2006 IRWMP.

For each overall goal, several regional specific goals were identified, and measurable objectives were established for each specific goal. While the MAC region has made progress towards achieving these goals, the region's overall goals continue to evolve. As part of the MAC Plan update process, these regional goals and objectives were reviewed and revised to reflect current water resources management conditions in the region. In doing so, the RPC, representing a broad set of stakeholder interests, was the primary venue for developing and vetting the water resource policies, goals and objectives contained in this updated IRWM Plan.

As part of the MAC Plan update the RPC elected to also consider the Statewide Priorities as described in the Propositions 84 & 1E Guidelines (DWR, 2010) in the development of policies, goals and objectives.

Considering these priorities now will align the region's planning efforts with those of the State and help facilitate coordination with and integration into larger regions and projects. In addition, the RPC considered objectives detailed in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (also referred to as the Basin Plan), the 20x2020 water efficiency goals, and the requirements of CWC §10540(c).

After reevaluation of the MAC region's present day needs and conflicts (as described in Section 1.4), and consideration of the other factors discussed, the goals and objectives developed as part of the 2006 IRWMP were reviewed and consolidated under four new regional water resource policies.

Policy 1: Maintain and Improve Water Quality

Policy 2: Improve Water Supply Reliability and Ensure Long-term Balance of Supply and Demand

Policy 3: Practice Resource Stewardship

Policy 4: Focus on Areas of Common Ground and Avoid Prolonged Conflict

For each policy multiple goals and objectives were established. The goals (i.e. intended outcomes) and objectives (i.e. actions to achieve the goals) associated with each of the four policies are presented below. To measure the extent to which the region's objectives are being achieved, and thus to track progress in meeting the region's goals, performance measures are also specified and discussed in detail in Section 3.1.2, Measuring Objectives.

POLICY 1: MAINTAIN AND IMPROVE WATER QUALITY

- *Goal:* Reduce sources of contaminants.
  - *Objectives*:
    - Reduce abandoned mine flows and sediments.
    - Reduce leakage from septic systems.
    - Increase bulky waste pickup programs, avoid illegal dumping, and increase collection of illegally dumped trash.
    - Identify informal recreation and camping sites with recurring waste issues and initiate remedial actions.
    - Manage fire fuels to reduce wildfire impacts.
    - Increase public awareness of how contaminated water resources affect quality of life.
    - Track increase of small county-monitored water systems.

- *Goal:* Manage stormwater flows and transport of sediment and contaminants.
  - *Objectives:*
    - Reduce stormwater runoff from peak storm events.
    - Promote development of community-based flood protection strategies.
    - Reduce water quality impacts from vehicle uses and road maintenance practices.
    - Minimize water quality impacts from livestock grazing.

POLICY 2: IMPROVE WATER SUPPLY RELIABILITY AND ENSURE LONG-TERM BALANCE OF SUPPLY AND DEMAND

- *Goal:* Ensure sufficient firm yield water supply.
  - *Objectives:*
    - Promote comprehensive water supply planning including climate change.
    - Encourage diverse water supply portfolios to meet agency demands.
    - Plan and develop water supply projects that optimize water right entitlements and county of origin protections.
    - Ensure that demand projections are supportable and realistic.
    - Balance long-term regional supply and demand in water supply plans.

- *Goal:* Maintain and improve water infrastructure reliability.
  - *Objectives:*
    - Implement leak detection and repair and replacement programs.
    - Develop regional water treatment and transmission projects.
    - Construct water system interties where appropriate.

- *Goal:* Promote water conservation, recycling and reuse for urban and agricultural uses.
  - *Objectives:*
    - Establish and implement water conservation programs based on best management practices.
    - Maximize use of recycled water from wastewater treatment plants.
    - Move toward a reduction in demands through water-neutral development.

- *Goal*: Develop appropriate drought mitigation measures.
  - *Objectives:*
    - Promote preparation and adoption of drought contingency plans.

POLICY 3: PRACTICE RESOURCE STEWARDSHIP

- *Goal:* Protect, conserve, enhance, and restore the region's natural resources.
  - *Objectives:*
    - Integrate natural resource conservation into water resource planning projects and programs.
    - Promote water resource projects that achieve an equitable balance between conflicting interests while minimizing harm to natural resources and incorporating natural resource protection, mitigation, and restoration.
    - Identify opportunities to protect, enhance or restore aquatic and terrestrial habitats in the Mokelumne and Calaveras river watersheds.

- *Goal:* Maintain or improve watershed ecosystem health and function.
  - *Objectives:*
    - Avoid, minimize or mitigate adverse effects on or improve or restore watershed and ecological processes, systems, structures, and resources when implementing projects.

- *Goal:* Minimize adverse effects cultural resources.
  - *Objectives:*
    - Avoid, minimize or mitigate adverse effects on cultural resources when implementing projects.

- *Goal:* Identify opportunities for public access, open spaces, and other appropriate recreational benefits and avoid harm to existing or planned recreational uses.
  - *Objectives:*
    - Promote inclusion of public access, non-motorized trails, open space and other suitable and feasible recreational features in new and existing water resource projects and associated lands while avoiding harm to existing or planned recreational uses.

POLICY 4: FOCUS ON AREAS OF COMMON GROUND AND AVOID PROLONGED CONFLICT

- *Goal:* Prioritize projects that have the best likelihood of being completed in the planning horizon.
  - *Objectives:*
    - Identify high controversy projects and work towards common ground solutions.

3.1.2. Measuring Objectives

To track the extent to which the MAC Region's objectives are being achieved, a series of performance measures have been established. These performance measures and their associated water resource goals and objectives are presented below in Table 3-1, Table 3-2, Table 3-3 and Table 3-4.

Table 3-1: Policy 1 - Maintain and Improve Water Quality Goals, Objectives and Performance Measures

Goal: Reduce sources of contaminants.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Reduce abandoned mine flows and sediments.	Number of mines known to cause water quality issues for which remedial actions are implemented. Abandoned mines are defined as those in the Office of Mine Reclamation database plus other locally known mines.	U.S. Forest Service (USFS), Bureau of Land Management (BLM), California Department of Conservation, California Department of Toxic Substances Control
Reduce leakage from septic systems.	Number of problem septic systems identified; number of problem septic systems corrected; number of problem septic systems eliminated	County Environmental Health
Increase bulky waste pickup programs, avoid illegal dumping, and increase collection of illegally dumped trash.	Number of new bulky waste pickup dates; estimated tons of illegal waste picked up; number of campaigns or other measures undertaken to stop illegal dumping.	BLM, USFS, County Solid Waste Management Departments, Sierra Pacific Industries, PG&E
Identify informal recreation and camping sites with recurring waste issues and initiate remedial actions.	Number of identified problem sites; number of identified sites for which remedial actions are initiated.	USFS, BLM, Counties, EBMUD

Manage fire fuels to reduce wildfire impacts.	Number of acres on which fire fuel reduction measures are implemented.	USFS; CAL FIRE, Sierra Pacific Industries, Amador-Calaveras Consensus Group, Amador Fire Safe Council, Calaveras Foothills Fire Safe Council
Increase public awareness of how contaminated water resources affect quality of life and public health.	Number of school classrooms, articles in local newspapers and water agency newsletters, and other programs that receive water quality-related curriculum.	CSRCD; UMRWA , CAMRA, AWA, CCWD
Track increase of small county-monitored water systems.	Number of small water supply systems monitored annually by the counties.	County Environmental Health Departments
Goal: Manage stormwater flows and transport 0f sediments and contaminants.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Reduce stormwater runoff from peak storm events.	Number of local jurisdictions adopting low impact design (LID) measures; number of public education actions taken to encourage the reduction of stormwater runoff (e.g., newspaper articles, water agency newsletters, NGO newsletters)	City and county land use agencies, AWA, CCWD, JVID, Stewardship Through Education
Promote development of community-based flood protection strategies.	Number of acres affected by adopted protection strategies; presence of floodplain development avoidance measures in city and county general plans.	City and county land use agencies
Reduce water quality impacts from vehicle uses and road maintenance practices.	Number of public works agencies implementing road design and maintenance BMPs; actions to address water quality impacts of concentrated OHV sites.	CalTrans; County PW Departments; USFS, BLM
Minimize water quality impacts from livestock grazing.	Number of grazing permits requiring off-stream watering; livestock management actions taken to prevent meadow compaction, overgrazing, etc.	BLM, EBMUD, USFS, Cattlemen's Association

Table 3-2: Policy 2 - Improve Water Supply Reliability Goals, Objectives and Performance Measures

Goal: Ensure sufficient firm yield water supply.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Promote comprehensive water supply planning including climate change.	Number of local water supply plans that consider climate change and incorporate best available climate science into their planning process.	AWA, CCWD, CPUD, JVID, EBMUD

Encourage diverse water supply portfolios to meet agency demands.	Number of water agency plans which consider multiple supplies and conjunctive use operations, including for example but not limited to, demand management, water reuse, and water neutral development .	AWA, CCWD, CPUD, JVID, EBMUD
Plan and develop water supply projects that optimize water right entitlements and county of origin protections.	Number of supply projects in planning that optimize entitlements and protections.	AWA, CCWD, CPUD, JVID, EBMUD
Ensure that demand projections are supportable and realistic.	Number of water demand projections that use the best available land use, demographic, and other data.	Cities, counties, water purveyors, RPC members, LAFCO
Balance long-term regional supply and demand in water supply plans.	Number and/or percent of water agency plans that seek to balance supply and demand in their long range planning processes.	AWA, CCWD, CPUD, JVID, EBMUD, LAFCO
Goal: Maintain and improve water infrastructure reliability.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Implement leak detection and repair and replacement programs.	Number of water agencies with established leak detection and repair programs.	AWA, CCWD, CPUD, JVID, EBMUD
Develop regional water treatment and transmission projects.	Number of regional treatment and transmission projects constructed.	AWA, CCWD, CPUD, JVID, EBMUD
Construct water system interties where appropriate.	Number of newly constructed interties between qualified systems.	AWA, CCWD, CPUD, JVID, EBMUD
Goal: Promote water conservation, recycling, and reuse for urban and agricultural uses.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Establish and implement water conservation and efficiency programs based on best management practices.	Percent of agencies meeting SB X7-7's 20 percent reduction in per capita by 2020. If reduction target is not being met, percent of measures that are being implemented.	AWA, CCWD, CPUD, JVID, EBMUD's local use, County agriculture departments, Foothill Conservancy, Calaveras Planning Coalition
Maximize use of recycled water from wastewater treatment plants.	Number of wastewater treatment plants producing and delivering recycled water; number of efforts to promote increased use of recycled water; percent of wastewater reclaimed.	AWA, CCWD, ARSA, EBMUD , Mokelumne Hill, San Andreas Sanitary District, Valley Springs Community, and the cities of Ione, Jackson, and Plymouth

Move toward a reduction in demands through water-neutral development.	Number of new water-neutral commercial, industrial, or residential development projects; number of land use agencies that are working towards developing water neutral results within the watershed .	County and city land use agencies
Goal: Develop appropriate drought mitigation measures.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Promote preparation and adoption of drought contingency plans.	Number of water agencies with adopted drought contingency plans.	AWA, CCWD, CPUD, JVID, EBMUD

Table 3-3: Policy 3 – Practice Resource Stewardship Goals, Objectives and Performance Measures

Goal: Protect, conserve, enhance, and restore the region's natural resources.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Integrate natural resource conservation into water resource planning projects and programs.	Number of agencies with policies requiring incorporation of principles and standards for resource conservation in project planning; number of projects that have implemented an optional natural resource conservation component.	Cities, Counties, AWA, CCWD, CPUD, JVID, EBMUD
Promote water resource projects that achieve an equitable balance between conflicting interests while minimizing harm to natural resources and incorporating natural resource protection, mitigation, and restoration.	Percent or ratio of fully mitigated impact by projects.	AWA, CCWD, CPUD, JVID, EBMUD, cities and counties, community organizations
Identify opportunities to protect, enhance, or restore aquatic and terrestrial habitats in the Mokelumne and Calaveras river watersheds.	Number of projects and/or land area identified that target habitat improvements in Mokelumne and Calaveras river watersheds.	Cities, counties, AWA, CCWD, CPUD, JVID, EBMUD
Goal: Maintain or improve watershed ecosystem health and function.		
Objectives	Performance Measures	Monitoring/Reporting Agency

Avoid, minimize, or mitigate adverse effects on or improve or restore watershed and ecological processes, systems, structures, and resources when implementing projects.	Number of projects and/or land area that avoid, minimize, or mitigate adverse impacts; number of projects and or land area that improve or restore watershed ecosystem function.	Cities, Counties, AWA, CCWD, CPUD, JVID, EBMUD, USFS, BLM
Goal: Minimize adverse effects on cultural resources.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Avoid, minimize, or mitigate adverse effects on cultural resources when implementing projects.	Number of projects which avoid, minimize, or mitigate adverse cultural resource impacts and/or enhance cultural resources.	Cities, counties, AWA, CCWD, CPUD, JVID, EBMUD
Goal: Identify opportunities for public access, open spaces, and other appropriate recreational benefits and avoid harm to existing or planned recreational uses		
Objectives	Performance Measures	Monitoring/Reporting Agency
Promote inclusion of public access, non-motorized trails, open space, and other suitable and feasible recreational features in new and existing water resource projects and associated lands while avoiding harm to existing or planned recreational uses.	Number of projects which include feasible open space and recreational features.	Cities, counties, AWA, CCWD, CPUD, JVID, EBMUD, Calaveras Parks and Recreation Commission, Amador County Recreation Agency, California Department of Boating and Waterways, Coast to Crest Trail Council

Table 3-4: Policy 4 – Focus on Areas of Common Ground and Avoid Prolonged Conflict

Goal: Prioritize projects that have the best likelihood of being completed in the planning horizon.		
Objectives	Performance Measures	Monitoring/Reporting Agency
Identify high controversy projects and work towards common ground solutions.	Percent of projects that have parties working on common ground solutions	AWA, CCWD, CPUD, JVID, EBMUD, resource agencies

3.1.3. Prioritizing Objectives

The RPC chose not to prioritize the MAC Plan objectives because all are equally important and implementation of projects that contribute to any of the objectives would benefit the Region.

3.2. Resource Management Strategies

A resource management strategy (RMS), as defined in the *California Water Plan 2009 Update* (DWR 2009), is a project, program, or policy that helps local agencies and governments manage their water and related resources. A wide range of RMS will be required to achieve the MAC Region's goals and objectives, identified in Section 3.1. A comprehensive range of RMS, including all of the RMS covered in the *California Water Plan 2009 Update* (DWR 2009), were evaluated for their ability to assist the region in achieving its goals and objectives. Those RMS which are feasible to implement and will assist the Region in achieving its goals and objectives were incorporated into the MAC Plan Update. Those RMS that will not assist the region in achieving its goals and objectives, or are not feasible to implement, have been eliminated from further consideration. As part of the MAC Plan Update, each RMS in the *California Water Plan Update 2009* was considered. The following sections document the RMS which have been evaluated and incorporated into the IRWM Plan.

3.2.1. Strategies Evaluated

The MAC IRWM Plan considered each RMS listed in the *California Water Plan Update 2009* for its ability to assist the region in achieving its goals and objectives. The *California Water Plan Update 2009* identified seven categories of RMS applicable to water management in California.

Table 3-4 presents the seven categories of RMS considered for the MAC IRWM Plan. These strategies include all the resource management approaches identified by the *California Water Plan Update 2009*. A variety of approaches to water management must be considered to fully address the regional goals and objectives. Though all the RMS identified by the *California Water Plan Update 2009* were considered, not all are appropriate for meeting the Region's goals and objectives.

Table 3-5 presents the RMS and how they contribute to meeting each of the IRWM Plan regional objectives. Most objectives have multiple strategies that can be integrated to form a successful project to fulfill one or multiple regional goals. Table 3-5 illustrates which strategies can be integrated to achieve a specific objective. Additional information on the applicability of each RMS is provided below.

Agricultural Water Use Efficiency

Agricultural water use efficiency can achieve reductions in the amount of water used for agricultural irrigation. This strategy could increase the MAC region's net water savings, improve water quality, provide environmental benefits, improve flow and timing, and increase energy efficiency.

Several strategies recommended by the *California Water Plan Update 2009* to achieve agricultural water savings and benefits include:

- improving irrigation system technology and management of water, both on-farm and at the irrigation district level to minimize water losses;
- adjusting irrigation schedules to decrease the amount of water applied;
- installing remote monitoring to allow districts to measure flow, water depth, and improve water management and controls; and
- developing community educational conservation activities to foster water use efficiency.

Although the extent of agricultural water uses in the Region is limited, agricultural water use efficiency will be an important component of the MAC region's future water resources portfolio. This RMS is consistent with the overall regional goal to Improve Water Supply Reliability and has been included in the IRWM Plan.

Table 3-5: RMS from the CWP Update 2009

Reduce Water Demand	Agricultural Water Use Efficiency Urban Water Use Efficiency
Improve Operational Efficiency and Transfers	Conveyance – Delta Conveyance – Regional/local System Reoperation Water Transfers
Increase Water Supply	Conjunctive Management & Groundwater Storage Desalination Precipitation Enhancement Recycled Municipal Water Surface Storage – CALFED Surface Storage – Regional/local
Improve Water Quality	Drinking Water Treatment and Distribution Groundwater Remediation / Aquifer Remediation Matching Quality to Use Pollution Prevention Salt & Salinity Management Urban Runoff Management
Improve Flood Management	Flood Risk Management
Practice Resources Stewardship	Agricultural Lands Stewardship Economic Incentives (Loans, Grants, Water Pricing) Ecosystem Restoration Forest Management Recharge Area Protection Water-Dependent Recreation Watershed Management
Other Strategies	Crop Idling for Water Transfers Dewvaporation or Atmospheric Pressure Desalination Fog Collection Irrigated Land Retirement Rainfed Agriculture Waterbag Transport / Storage Technology

Urban Water Use Efficiency

Urban water use efficiency strategies can assist in managing increasing water needs of growing populations in the MAC region. Urban water use efficiency strategies can reduce water demand through technological and behavioral improvements by decreasing indoor and outdoor residential, commercial, institutional, and industrial water use. Several approaches recommended by the *California Water Plan Update 2009* to increase urban water use efficiency include:

- implementing programs such as Best Management Practices (BMPs);
- reviewing the Urban Water Management Plan to ensure 20 percent water use reductions are achieved by 2020;
- installing water efficient landscapes;
- encouraging gray water and rain water capture to increase water conservation and improve water quality;
- increasing public outreach and encouraging community involvement; and
- funding incentive programs for small districts and economically DACs.

This RMS is consistent with the overall regional goal to Improve Water Supply Reliability and has been included in the IRWM Plan.

Table 3-6: Resource Management Strategies - Applicability, Feasibility, and Contribution to IRWM Plan Goals

Resource Management Strategy	Regional Goals										
	Strategy is Applicable and Feasible	Reduce sources of contaminants.	Manage stormwater flows and transport of sediments and contaminants	Ensure sufficient firm yield of water supply.	Maintain and improve infrastructure reliability.	Promote water conservation, recycling and reuse for urban and agricultural uses.	Develop appropriate drought mitigation measures.	Protect, conserve, enhance, and restore the region's natural resources	Maintain or improve watershed ecosystem health and function	Maintain or improve watershed ecosystem health and function	Identify opportunities for public access, open spaces, and other appropriate recreational benefits and avoid harm to existing or	Prioritize projects that have the best likelihood of being completed in the planning horizon
Agricultural Water Use Efficiency	●	●		●			●		●	●		●
Urban Water Use Efficiency	●	●		●			●		●	●		●
Conveyance – Delta												
Conveyance – Regional/local	●			●	●	●	●					●
System Reoperation	●			●	●	●	●					●
Water Transfers	●			●	●	●	●					●
Conjunctive Management & Groundwater Storage	●			●		●	●					●
Desalination												
Precipitation Enhancement	●			●		●	●					●
Recycled Municipal Water	●	●		●		●	●					●
Surface Storage – CALFED												
Surface Storage – Regional/local	●			●		●	●					●
Drinking Water Treatment and Distribution	●		●	●		●	●					●
Groundwater Remediation/Aquifer Remediation	●											●
Matching Quality to Use	●			●		●	●					●
Pollution Prevention	●	●	●									●
Salt and Salinity Management	●	●	●									●
Urban Runoff Management	●	●	●	●		●	●					●
Flood Risk Management	●	●	●				●					●
Agricultural Lands Stewardship	●	●	●									●
Economic Incentives (Loans, Grants and Water Pricing)	●	●	●	●	●	●	●	●	●	●	●	●
Ecosystem Restoration	●	●	●				●	●	●	●	●	●
Forest Management	●	●	●				●	●	●	●	●	●
Recharge Area Protection	●	●	●	●		●	●	●	●	●		●
Water-Dependent Recreation	●		●								●	●
Watershed Management	●	●	●				●	●	●	●	●	●
Crop Idling for Water Transfers						●	●					
Dewvaporation or Atmospheric Pressure Desalination												
Fog Collection												
Irrigated Land Retirement		●	●	●		●	●	●			●	☐
Rainfed Agriculture				●		●	●					
Waterbag Transport/Storage Technology												

Conveyance – Delta

Water suppliers in the MAC Region do not depend on Delta conveyance for water supply. As such, this RMS has been excluded from further consideration.

Conveyance – Regional/local

Several strategies identified by the *California Water Plan Update 2009* for improving regional/local conveyance of water supplies include:

- improving aging infrastructure, increasing existing capacities, and/or constructing new conveyance facilities;
- replacing or improving canal structures to improve an irrigation district's ability to manage and control water in the district and reduce spillage; and
- constructing alternative water conveyance pipelines to improve water supply reliability.

The MAC region has identified improved interregional connectivity as a strategy to assist in achieving the overall goal to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

System Reoperation

System reoperation strategies change existing operation and management procedures for existing reservoirs and conveyance facilities to increase water related benefits from these facilities. Some of the potential benefits of system reoperation strategies include: increasing water supply reliability, additional flexibility to respond to extreme hydrologic events, and improving the efficiency of existing water uses.

Several system reoperation strategies identified by the *California Water Plan Update 2009* include:

- establishing a baseline hydrology and enhanced description of present water management system components;
- considering possible climate change effects in reoperation projects; and
- collaborating between federal, state, and local agencies on system reoperation studies.

System reoperation could assist the MAC region in achieving the overall goal to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Water Transfers

Water Transfers are defined in the California Water Plan as temporary or long-term change in the point of diversion, place of use, or purpose of use due to transfer or exchange of water or water rights in response to water scarcity. Benefits to establishing water transfers include improving economic stability and environmental conditions for receiving areas. Compensation for water transfers can fund beneficial projects/activities for the IRWM region, reduce water rates, and/or improve facilities.

Several water transfer strategies identified by the *California Water Plan Update 2009* include:

- developing and implementing groundwater management plans, monitoring programs;
- allowing community participant for identifying and responding to conflicts caused by transfer;
- refining current methods of identifying and quantifying water savings for transfers using crop idling, crop shifting, and water use efficiency measures; and
- improving coordination and cooperation among the local, state, and federal agencies to facilitate sustainable transfers.

Water transfers could assist the MAC region in achieving the overall goal to Improve Water Supply Reliability in dry years. As such, this RMS has been included for further consideration.

Conjunctive Management & Groundwater Storage

Conjunctive Management and Groundwater Storage refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. This strategy could assist in improving water supply reliability and sustainability, reducing groundwater overdraft and land subsidence, protecting water quality, and improving environmental conditions. Conjunctive management and groundwater storage strategies identified by the *California Water Plan Update 2009* include:

- implementation of monitoring, assessment, and maintenance of baseline groundwater levels;
- encouraging local water management agencies to coordinate with tribes and other agencies involved in activities that might affect long term sustainability of water supply and water quality; and
- local groundwater monitoring and management activities and feasibility studies to increase the coordinated use of groundwater and surface water.

Conjunctive Management and Groundwater Storage could assist the MAC region in achieving the overall goal to Improve Water Supply Reliability in dry years. As such, this RMS has been included for further consideration.

Desalination

Because the MAC region is not located near any brackish or saline water supplies, this strategy is not feasible and has been excluded from further evaluation.

Precipitation Enhancement

Precipitation enhancement artificially stimulates clouds to produce more rainfall or snowfall than would naturally occur, potentially increasing water supply. Recommendations identified by the *California Water Plan Update 2009* for implementing precipitation enhancement projects include:

- seeking State support for development and funding of new projects;
- collecting data and evaluations of existing California precipitation enhancement projects to perform research on the effectiveness of the technology; and
- investigating the potential of augmenting Colorado River Water supply through cloud seeding.

Precipitation enhancement has been implemented in the MAC region in the past, with uncertain benefits. However, assuming precipitation enhancement is effective in increasing precipitation, it could assist the region in achieving the overall goal to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Recycled Municipal Water

Use of recycled municipal water provides a drought-resistant water supply that offsets the use of potable supplies for non-potable demands. Water recycling has been implemented throughout the MAC region, and increased recycled water use is projected in future years. Recycled municipal water strategies identified by the *California Water Plan Update 2009* and *Water Recycling 2030: Recommendations of California's Recycled Water Task Force* include:

- increasing funding availability for water reuse/recycling facilities and infrastructure;
- creating education curriculum for public schools and institutions of higher learning to educate on recycled water;
- engaging the public in an active dialogue and encouraging participation in the planning process of water recycling projects,
- providing resources (i.e. funding) to agencies that will perform comprehensive analysis of existing water recycling projects to estimate costs, benefits, and water deliveries; and

- assessing water recycling technology to determine least costly and environmentally appropriate technology based on location and need.

Recycled municipal water has been and will continue to be a key strategy for achieving the overall goal to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Surface Storage – CALFED

The MAC region does not benefit from surface storage in the Delta. As such, this RMS will not benefit the region and has been screened from further consideration.

Surface Storage – Regional/local

This RMS focuses on regional and local surface storage alternatives to expand surface storage capacity. Benefits of expanding regional/local surface storage include: improved flood management, ecosystem management, emergency water supply, river and lake recreation, capture of surface water runoff, and water supply reliability against catastrophic events and droughts. Regional/local surface storage strategies identified by the *California Water Plan Update 2009* include:

- developing a comprehensive methodology for analyzing project benefits and costs by local agencies;
- continued studies, research, and dialogue to identify a common set of tools for determining cost and benefits of surface storage projects;
- adaptively managing operations of existing surface storage facilities;
- rehabilitating and/or enlarging existing surface storage infrastructure; and
- developing water purchasing agreements to buy water from other agencies that own storage reservoirs with substantial water supplies.

Regional/local surface storage could assist the region in achieving the overall goals to Maintain and Improve Water Quality through reduced flood impacts, and Improve Water Supply Reliability through enhanced storage. As such, this RMS has been included for further consideration.

Drinking Water Treatment and Distribution

The MAC region provides high-quality drinking water that meets all State and Federal water quality regulations. However, aging infrastructure must be continually rehabilitated and/or replaced to continue to provide high quality drinking water supplies. Several drinking water treatment and distribution strategies identified by the *California Water Plan Update 2009* include:

- Working closely with CDPH to quantify the total needs for water system infrastructure improvement and replacement;
- regionalizing and consolidating public water systems;
- developing incentives to allow water systems to reduce waste of limited water resources;
- researching and developing of new treatment technologies;
- providing additional funding for water supply, water treatment, and infrastructure projects to ensure safe and reliable supply of drinking water for individuals and communities;
- public water systems joining the California WARN program which provides mutual aid and assistance more quickly than through SEMS; and
- creating source control and reduction programs to address pharmaceuticals and personal care products.

Drinking water treatment and distribution projects are critical to providing high quality drinking water to the region's residents. As such, this RMS has been included for further consideration.

Groundwater Remediation/Aquifer Remediation

Several groundwater remediation/aquifer remediation strategies identified by the *California Water Plan Update 2009* include:

- limiting potentially contaminating activities in recharge areas;
- identifying historic commercial and industrial sites with contaminated discharges and responsible parties to remediate sites;
- implementing source water protection measures; and
- establishing and supporting funding for detecting emerging contaminants by commercial laboratories and installing wellhead treatment systems.

Groundwater sources in the MAC region are of high quality. However, as development pressures increase in the future, protection of groundwater recharge areas and groundwater quality will become more and more important to preserving these high quality water supplies. As such, this RMS has been included for further consideration.

Matching Quality to Use

Matching water quality to use involves utilizing water for suitable end uses based on water quality. This includes reserving high quality potable supplies for potable use, while using lower quality recycled water supplies for non-potable use. As a result, this RMS is directly related to the following RMS: Pollution Prevention, Recycled Municipal Water, Salt and Salinity Management, and Groundwater/Aquifer Remediation. Several strategies for matching water quality to use identified by the *California Water Plan Update 2009* include:

- managing water supplies to optimize and match water quality to the highest possible use and to the appropriate technology;
- encouraging upstream users to minimize the impacts of non-point urban and agricultural runoff and treated wastewater discharges;
- supporting the development of salt management plans;
- reviewing projects to determine the potential impacts from wastewater elimination into local streams; and
- supporting research into solutions to the potential conflicts between ecosystem restoration projects and the quality of water for drinking water purposes.

This RMS may assist the region in achieving its goals to Maintain and Improve Water Quality and to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Pollution Prevention

Pollution prevention assists in maintaining and improving source water quality. Benefits of pollution prevention include reduced water treatment requirements, enhanced habitat and natural resource conditions, and improved water supply reliability resulting from decreased variability. Pollution prevention strategies identified by the *California Water Plan Update 2009* include:

- developing proper land management practices that prevent sediment and pollutants from entering source waters;
- establishing drinking water source and wellhead protection programs to protect drinking water sources and groundwater recharge areas from contamination;
- identifying communities relying on groundwater contaminated by anthropogenic sources for drinking water and take appropriate regulatory action; and
- addressing improperly destroyed, sealed and abandoned wells that can serve as potential pathways for groundwater contaminants.

Pollution prevention is a critical component of the region's overall goal to Maintain and Improve Water Quality. In addition, this RMS will assist in achieving the overall goal to Practice Resource Stewardship. By reducing water quality variability, this RMS may further assist in addressing the overall goal to Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Salt and Salinity Management

Salinity management assists in protecting water resources from accumulation of salts which can impair water quality. Several salt and salinity management strategies identified by the *California Water Plan Update 2009* include:

- developing a regional salinity management plan, and interim and long-term salt storage, salt collection, and salt disposal management projects;
- monitoring to identify salinity sources, quantifying the level of threat, prioritizing necessary mitigation action, and working collaboratively with entities and authorities to take appropriate action;
- reviewing existing policies to address salt management needs and ensure consistency with long-term sustainability;
- collaborating with other interest groups to optimize resources and effectiveness;
- identifying environmentally acceptable and economically feasible methods for managing salt; and
- providing funding for research and projects and prioritizing funding based on greatest needs.

While salinity management is not an issue for the MAC region in the near term, enacting sound management practices can assist in protecting water resources in the long-term, contributing to the overall goal to Maintain and Improve Water Quality. As such, this RMS has been included for further consideration.

Urban Runoff Management

Urban runoff management strategies seek to manage both stormwater and dry weather runoff to minimize soil erosion and sedimentation problems, reduce surface water pollution, protect natural resources, protect and augment groundwater supplies, and improve flood protection. Urban runoff management strategies identified by the *California Water Plan Update 2009* include:

- coordinating efforts with agencies, stakeholders, and the public to decide how urban runoff management should be integrated into work plans;
- encouraging public outreach and education concerning funding and implementation of urban runoff measures;
- designing recharge basins to minimize physical, chemical, or biological clogging;
- working with community to identify opportunities to address urban runoff management;
- providing incentives for the installation of low impact development features on new and existing developments; and
- emphasizing source control measures and strong public education/outreach efforts as being the most effective way to manage urban runoff in this highly arid region.

Successful implementation of this RMS could assist the MAC region in achieving all four of its overall policies. As such, this RMS has been included for further consideration.

Flood Risk Management

The MAC region does not currently experience significant flooding impacts. However, flood waters can create erosion problems, which directly impact water quality. In addition, degraded flood waters can transport pollutants to receiving waters. Several flood risk management strategies identified by the *California Water Plan Update 2009* include:

- Structural approaches that can consist of:
  - Setting back levees
  - Modifying channels to include lining (i.e. concrete, rip rap) to improve conveyance of floodflows
  - High flow diversions into adjacent lands to temporarily store flows
  - Improved coordination of flood operations

- Maintaining facilities to secure the long-term preservation of flood management facilities
- Land use management approaches that consist of:
  - Floodplain function restoration to preserve and/or restore the natural ability of undeveloped floodplains to absorb, hold, and release floodwaters
  - Floodplain regulation
  - Development and redevelopment policies
  - Housing and building codes
- Disaster Preparedness, Response, and Recovery for flood risk management approaches such as:
  - Information and education
  - Disaster preparedness
  - Post-flood recovery

Flood risk management may assist the region in achieving its goals to Maintain and Improve Water Quality and to Practice Resource Stewardship. As such, this RMS has been included for further consideration.

Agricultural Lands Stewardship

Agricultural lands stewardship involves conserving and improving land for conservation purposes as well as protecting open spaces and rural communities. This can assist in protecting environmentally sensitive lands, recharging groundwater, improving water quality, providing water for wetland protection and restoration, and increasing carbon sequestration within soil. Agricultural land stewardship strategies identified by the *California Water Plan Update 2009* include:

- stabilizing streambanks to slow bank erosion and filter drainage water from the fields;
- installing windbreaks (i.e. trees and/or shrubs) along field boundaries to help control soil erosion, conserve soil moisture, improve crop protection among many other benefits;
- performing conservation tillage to increase water infiltration and soil water conservation and reduce erosion and water runoff; and
- encouraging irrigation tailwater recovery to help capture and reuse irrigation runoff water to benefit water conservation and off-site water quality.

Agricultural lands stewardship can assist the MAC region in achieving its goals to Maintain and Improve Water Quality and Practice Resource Stewardship. As such, this RMS has been included for further consideration.

Economic Incentives (Loans, Grants and Water Pricing)

Economic incentives including low interest loans, grants, and water rates and rate structures can influence water management, amount of water use, time of use, wastewater volume, and source of supply. Several urban runoff management strategies identified by the *California Water Plan Update 2009* include:

- instituting loans and grant programs that support better regional water management;
- adopting policies that promote long-run water use efficiency;
- developing modeling tools for economic analyses of economic incentives as well as guidelines and ranking criteria for grant and loan awards; and
- exploring innovative financial incentives.

Economic incentives can help to further projects and programs, assisting the region in achieving all four of its overall policies. As such, this RMS has been included for further consideration.

Ecosystem Restoration

Ecosystem restoration strategies are key to enhancing the region's rich natural resources. Potential benefits of ecosystem restoration include improved water quality and quantity for aquatic species and human consumption. Several ecosystem restoration strategies identified by the *California Water Plan Update 2009* include:

- increasing the use of setback levees and floodwater bypasses;
- creating programs that support and funds the identification of stream flow needs;
- establishing biological reserve areas that connect or reconnect habitat patches;
- expanding riparian habitat;
- devising climate change adaptation plans that benefit ecosystems, water, and flood management;
- reproducing natural flows in streams and rivers;
- controlling non-native invasive plant and animal species; and
- filtering of pollutants and recharging aquifers.

This RMS is fundamental to achieving the region's goal to Practice Resource Stewardship, and it may assist in achieving the goals to Maintain and Improve Water Quality and Improve Water Supply Reliability. As such, this RMS has been included for further consideration.

Forest Management

Much of the MAC region is characterized by forest, making forest management a critical strategy in the region. Forest management strategies focus on improving the availability and quality of water for downstream users on both publicly and privately owned forest lands. Potential benefits of forest management strategies include interception of rainfall, reduction of urban runoff, increased energy-efficient shade during hot weather, reduced flooding and increased dry-season base flows, and protection from surface erosion and filtering pollutants. Forest management strategies identified by the *California Water Plan Update 2009* include:

- establishing long-term monitoring to understand hydrologic changes resulting from possible climate change effects through the installation of stream gages, precipitation stations, water-quality and sediment monitoring stations, and long-term monitoring wells;
- increasing research efforts into identifying effective BMPs for forest management and the effects of wildfires;
- assessing sediment sources and erosion processes in managed and unmanaged forested watersheds;
- increasing multi-party coordination of forest management;
- improving communication between downstream and upstream water users; and
- developing public education campaigns for water users.

Forest management will be critical to achieving all four of the region's overall policies. As such, this RMS has been included for further consideration.

Recharge Area Protection

Recharge area protection protects recharge areas from pollution, which protects and maintains the water quality of groundwater supplies. Several recharge area protection strategies identified by the *California Water Plan Update 2009* include:

- expanding research into surface spreading and the fate of chemicals and microbes in recharge water;
- increasing funding for the identification and protection of recharge areas;
- creating education and media campaigns to increase public awareness and knowledge on the importance of recharge areas and relevancy to groundwater;
- requiring source water protection plans; and
- developing methods for analyzing the economic benefits and costs of recharge areas.

Recharge area protection is an important component to protecting the region's groundwater supplies, and will assist the region in achieving its overall goal to Maintain and Improve Water Quality. As such, this RMS has been included for further consideration.

Water-Dependent Recreation

This strategy provides for adequate access to water-related recreation activities. Water-dependent strategies identified by the *California Water Plan Update 2009* include:

- using existing data and new surveys to determine recreational needs;
- partnering with schools to provide drowning prevention programs primarily aiming at youth from urban and low income families;
- developing partnerships with universities to coordinate monitoring of public recreation use, equipment, and emerging water recreation trends;
- developing a procedure to incorporate climate change assessments within all infrastructure planning, budgeting, and project development;
- researching, identifying, and mitigating impacts of stream flows that prevent Native Americans from participating in their traditional cultural activities; and
- developing invasive species preventative measures.

Water-based recreation holds significant value to the residents and stakeholders in the MAC region, and this RMS will assist in achieving the region's overall goal to Practice Resource Stewardship. As such, this RMS has been included for further consideration.

Watershed Management

Watershed management involves coordinating and integrating the management of numerous physical, chemical, and biological processes at the watershed level to generate multiple benefits. Watershed management strategies identified by the *California Water Plan Update 2009* include:

- creating a scientifically valid tracking and reporting method to document changes in the watershed;
- assessing the performance of projects and programs;
- providing watershed information to better inform local land use decision makers on how to maintain and improve watershed functions; and
- using watershed approaches in which all RMS strategies are coordinated.

Watershed management has been - and will continue to be – an important framework for managing the water resources in the MAC region, and this strategy will assist the region in achieving all four of its overall policies. As such, this RMS has been included for further consideration.

Crop Idling for Water Transfers

Agriculture in the MAC region is primarily limited to small-scale operations, and the potential benefit associated with crop idling for water transfers is limited. As such, this RMS has been screened from further evaluation.

Dewvaporation or Atmospheric Pressure Desalination

Dewvaporation or atmospheric pressure desalination would heat brackish water until deposits of fresh water as dew are collected from the opposite side of a heat transfer wall. Because brackish supplies are not present in the MAC region, this strategy is not considered feasible. As such, this RMS has been screened from further evaluation.

Fog Collection

Fog collection is a form of precipitation enhancement that has not yet been implemented in California. This strategy is generally most appropriate for coastal regions that experience significant fog cover. Because the MAC region does not experience significant fog cover, this RMS is not considered feasible and has been screened from further evaluation.

Irrigated Land Retirement

Irrigated land retirement involves removing farmland from active use to increase water availability for other uses. Because agriculture in the MAC region is primarily limited to small-scale operations, the potential benefit associated with irrigated land retirement is limited. As such, this RMS has been screened from further evaluation.

Rainfed Agriculture

Rainfed agriculture involves performing all crop irrigation with rainfall. Rainfall quantity is difficult to predict, and rainfall is typically experienced in winter months, as opposed to during the summer growing season. Further, because agriculture in the MAC region is primarily limited to small-scale operations, the potential benefit associated with rainfed agriculture is limited. As such, this RMS is considered infeasible and has been screened from further evaluation.

Waterbag Transport/Storage Technology

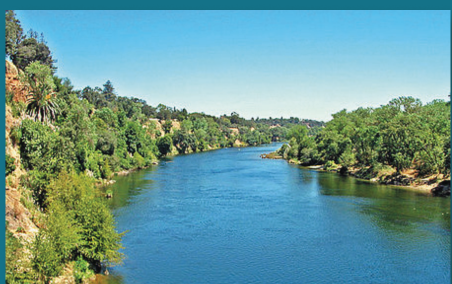
Waterbag transport/storage technology involves storing water from areas with unallocated freshwater supplies in large inflatable bladders, and towing them to an alternate region. Because the MAC region is not located in an area which could receive towed waterbags, this strategy is considered infeasible and has been screened from further evaluation.

3.2.2. Strategies Selected

The following RMS from the *California Water Plan Update 2009* were selected for inclusion in the MAC Plan Update for their ability to assist the MAC region in achieving its overall goals.

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency
- Conveyance – Regional/local
- System Reoperation
- Water Transfers
- Conjunctive Management & Groundwater Storage
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – Regional/local
- Drinking Water Treatment and Distribution
- Groundwater Remediation/Aquifer Remediation
- Matching Quality to Use
- Pollution Prevention
- Salt and Salinity Management
- Urban Runoff Management
- Flood Risk Management
- Agricultural Lands Stewardship
- Economic Incentives (Loans, Grants and Water Pricing)
- Ecosystem Restoration
- Forest Management
- Recharge Area Protection
- Water-Dependent Recreation
- Watershed Management

4. Implementing Projects and Programs



4. Implementing Projects and Programs

Integrated Regional Water Management (IRWM) Plans must select projects for inclusion in the Plan. The process must include the following:

- Procedures for submitting a project to the Regional Water Management Group (RWMG)
- Procedures for review of projects that consider a number of factors outlined in the Proposition 84 & 1E IRWM Guidelines
- A list of selected projects

4.1. Project Review Process

4.1.1. Procedure for Submitting Projects and Programs

Project solicitation is the process by which agencies, organizations, and/or members of the public can submit project concepts for inclusion in the IRWMP. To be considered for the IRWMP, projects must be able to be effectively described; however, they can be in any stage of development, from conceptual to design. There are many benefits to submitting a project for inclusion in the IRWMP, including raising local awareness of the potential project and associated benefits and positioning the project for potential State funding.

Two project solicitation periods were implemented as part of the MAC IRWMP update. An advanced announcement for a call for projects was emailed to the stakeholder contact list and posted on the MAC IRWMP website informing participants that the initial project solicitation period would be held from December 21, 2011 to January 20, 2012. A project information form was developed and distributed on December 21st for the first round of project solicitation. The form was emailed to the stakeholder contact list and posted on the website. In addition, RPC members were asked to distribute the form to others that might be interested and announce the process at their respective meetings. Project information forms were required to be submitted to the project team by January 20, 2012. If there was a project included in the 2006 IRWMP that an agency or stakeholder wanted included in the MAC Plan Update, they were requested to resubmit the project to ensure any updates to the project and status were included in the Update. Almost fifty projects were collected for the 2006 MAC IRWMP.

In addition, a second project solicitation period followed, with project information being due on May 30, 2012. This solicitation period was noticed in the same manner as the initial solicitation, with email announcements, a website update, and a request for distribution by RPC members. Holding a second solicitation provided project proponents with additional time to develop projects that would contribute to meeting the MAC Plan objectives and gather information necessary to complete the project template.

Forms submitted after the due date have been appended to the MAC Plan Update (Appendix G), but have not been included in the Plan sections. An official project solicitation process for the MAC region will occur at least once every two years, at a minimum, in which the RPC will meet to review the prioritized list and provide feedback. More frequent calls for projects may be conducted as deemed appropriate by the UMRWA Board of Directors. During the periodic project solicitation processes, projects submitted after the due date will be added, and the project list will be prioritized.

4.1.2. Procedure for Review and Selection of Projects/Programs

The project review process developed for the MAC Plan Update implemented a two-tiered approach of screening followed by evaluating projects, as depicted in Figure 4-1. The result of this process was a list of projects that meet regional IRWMP goals and statewide water resource management priorities while favoring projects which provide significant regional benefit. The order of prioritized projects does not reflect the recommended implementation order or priority of projects to individual agencies and organizations, but rather to the region.

After a project was submitted for inclusion in the MAC Plan Update, it went through a basic screening process. In order to be included in the IRWMP, each project met at least one regional goal, at least one Statewide Priority, and at least two Resource Management Strategies (RMS). This screening process is depicted as Steps 1 and 2 of Tier 1 as shown in Figure 4-1. Projects that do meet the minimum screening requirements may be modified or merged with another project to increase benefits to the region and meet the specified criteria for inclusion in the IRWMP. At the completion of the preliminary screening, 36 projects remained for evaluation and prioritization.

Tier 1 - Screening, Step 1

Step 1 of Tier 1 compared projects with the Statewide Priorities and the MAC Plan Update regional goals (see Section 3 of this document for more details). Projects must meet at least one regional goal and at least one Statewide Priority to move forward to Step 2.

Tier 1 - Screening, Step 2

In Step 2 of the Tier 1 prioritization process, each project was compared with the list of RMS identified for inclusion in the MAC Plan Update. These strategies are discussed in Section 3 and include the following.

- Agricultural Water Use Efficiency
- Urban Water Use Efficiency
- Conveyance – Regional/local
- System Reoperation
- Water Transfers
- Conjunctive Management & Groundwater Storage
- Precipitation Enhancement
- Recycled Municipal Water
- Surface Storage – Regional/local
- Drinking Water Treatment and Distribution
- Groundwater Remediation/Aquifer Remediation
- Matching Quality to Use
- Pollution Prevention
- Salt and Salinity Management
- Urban Runoff Management
- Flood Risk Management
- Agricultural Lands Stewardship
- Economic Incentives (Loans, Grants and Water Pricing)
- Ecosystem Restoration
- Forest Management
- Recharge Area Protection
- Water-Dependent Recreation
- Watershed Management

In order to move forward and be included in the IRWMP, each project must incorporate at least two of the RMS above.

Together, these two preliminary screening steps identified the projects that met both regional goals and objectives and the State's priorities for the IRWM planning process. Projects that met the minimum requirements of addressing at least one regional goal, one statewide priority, and two RMS were included in the MAC Plan Update and passed to Tier 2 of the evaluation and prioritization process.

4.1.3. Evaluation and Prioritization of Projects and Programs

The purpose of project prioritization is to identify those projects with highest value to the MAC region, as defined in the MAC Plan Update. The means by which this prioritization is achieved can vary significantly, but for a process that aims to achieve integrated and regional results, the selection of projects to be implemented must ultimately be achieved through consensus. The RPC is responsible for project review based on the information in the project information forms and the identified evaluation criteria. For the purposes of the MAC Plan Update, consensus is defined as the process by which agreement is reached by a group as a whole. It is important to note that inclusion of a project in the MAC Plan does not reflect endorsement by any or all members of the RPC or UMRWA.

The Tier 2 process yielded the prioritized list of IRWMP projects by utilizing a two step evaluation process.

Tier 2, Step 1 – Apply Evaluation Criteria

Step 1 of the Tier 2 process involves assessment of project benefits in several areas. Due to the conceptual nature of many of the projects and incomplete data, these projects were evaluated qualitatively. This evaluation focused on the following ten evaluation criteria.

Criterion 1: Maximize Economic Feasibility. Project benefits and costs were qualitatively assessed to establish a high level determination of economic feasibility. Projects were rated as follows.

Low = Lower benefit-cost ratio

Medium = Mid-range estimated benefit-cost ratio

High = High estimated benefit-cost ratio

Criterion 2: Address MAC Plan Goals. The specific goals each project met were identified to determine how well each project met regional needs. Projects were rated as follows.

Low = Addresses less than 2 specific regional goals

Medium = Addresses 2 - 4 specific regional goals

High = Addresses 5 or more specific regional goals

Criterion 3: Integrate with State RMS. In order to recognize multi-benefit, integrated projects, projects were assessed for the degree of RMS integration. Projects were rated as follows.

Low = Incorporates 2 RMS

Medium = Incorporates 3 - 5 RMS

High = Incorporates 6 or more RMS

Criterion 4: Provide Multi-agency/Entity Benefits. As a regional program, the IRWM Plan promotes projects with multiple partners. A project that benefits more than one agency may benefit a larger population, utilize economies of scale, reduce regional conflicts, and may be more likely to incorporate multiple benefits in multiple resource areas. Projects were rated as follows.

Low = Benefits 1 agency/entity

Medium = Benefits 2 agencies/entities

High = Benefits 3 or more agencies/entities

Criterion 5: Maximize Benefits to Disadvantaged Community (DAC) and Native American Tribes, and Minimize Environmental Justice (EJ) Impacts. Projects were assessed to identify projects that provide targeted benefits to address the critical water supply, water quality, and resource management needs of local DACs, EJ concerns, and tribal communities. Projects were rated as follows.

Low = Provides no DAC or Native American benefits; may have EJ impacts

Medium = Provides targeted benefits to one or more DAC or Native American community; but may have environmental justice impacts

High = Provides targeted benefits to one or more DAC or Native American community; does not have EJ impacts

Criterion 6: Ensure Technical Feasibility. The IRWMP seeks to promote projects that are not only economically feasible, but technically feasible as well. Projects were qualitatively assessed based on implementation feasibility, given knowledge about the project, location, and whether there are data gaps. Projects were rated as follows.

Low = Insufficient technical knowledge or supporting data to sustain claimed benefits/values

Medium = Adequate technical knowledge and supporting data to defend claimed benefits/values although some gaps may exist

High = Ample technical knowledge and supporting data to uphold claimed benefits/value

Criterion 7: Encourage Climate Change Adaptation or Mitigation Benefits. In order to recognize the potential implications of climate change in long-term planning, projects were assessed for their contribution to climate change adaptation and / or mitigation of greenhouse gas (GHG) emissions. Projects were rated as follows.

Low = Climate Change Adaptation and/or Mitigation Benefits Are Unlikely

Medium = Adaptation and / or Mitigation Benefits Are Likely

High = Adaptation and / or Mitigation Benefits Have Been Demonstrated

Criterion 8: Minimize Implementation Risk. To help identify projects that may have significant challenges achieving successful implementation and conversely, identify projects that have minimal institutional, political, and legal obstacles, this criterion was applied to the projects. Projects were rated as follows.

Low = High implementation risk due to documented institutional barriers such as regulatory, environmental, or permitting obstacles, and high degree of controversy, potential legal challenge, or potential partners' uncertainty

Medium = Moderate implementation risk due to documented institutional barriers such as regulatory, environmental, or permitting obstacles, and high degree of controversy, potential legal challenge, or potential partners' uncertainty

High = Minimal implementation risk due to documented institutional barriers such as regulatory, environmental, or permitting obstacles, and high degree of controversy, potential legal challenge, or potential partners' uncertainty

Criterion 9: Best Project for Intended Purpose. This criterion was applied to the projects to recognize that sometimes projects that may have the greatest likelihood of being realized to achieve a specific purpose may not always be the best projects from an economic, environmental, or social perspective. Projects were rated as follows.

Low = Other alternatives clearly exist that will be better to meet the intended need from a social, environmental, and economic perspective

Medium = Other alternatives exist that may be preferable from a social, environmental, and economic perspective

High = Project is the best possible alternative to meet the stated need from a social, environmental, and economic perspective

Criterion 10: Project Status / Readiness. This criterion evaluates the status of a project and its proximity to construction and/or implementation. Projects were rated as follows.

Low = Conceptual or preliminary planning completed

Medium = Advanced planning completed, final design and environmental documentation not completed

High = Fully ready with design and environmental documentation completed

Tier 2, Step 2 – Prioritize Projects

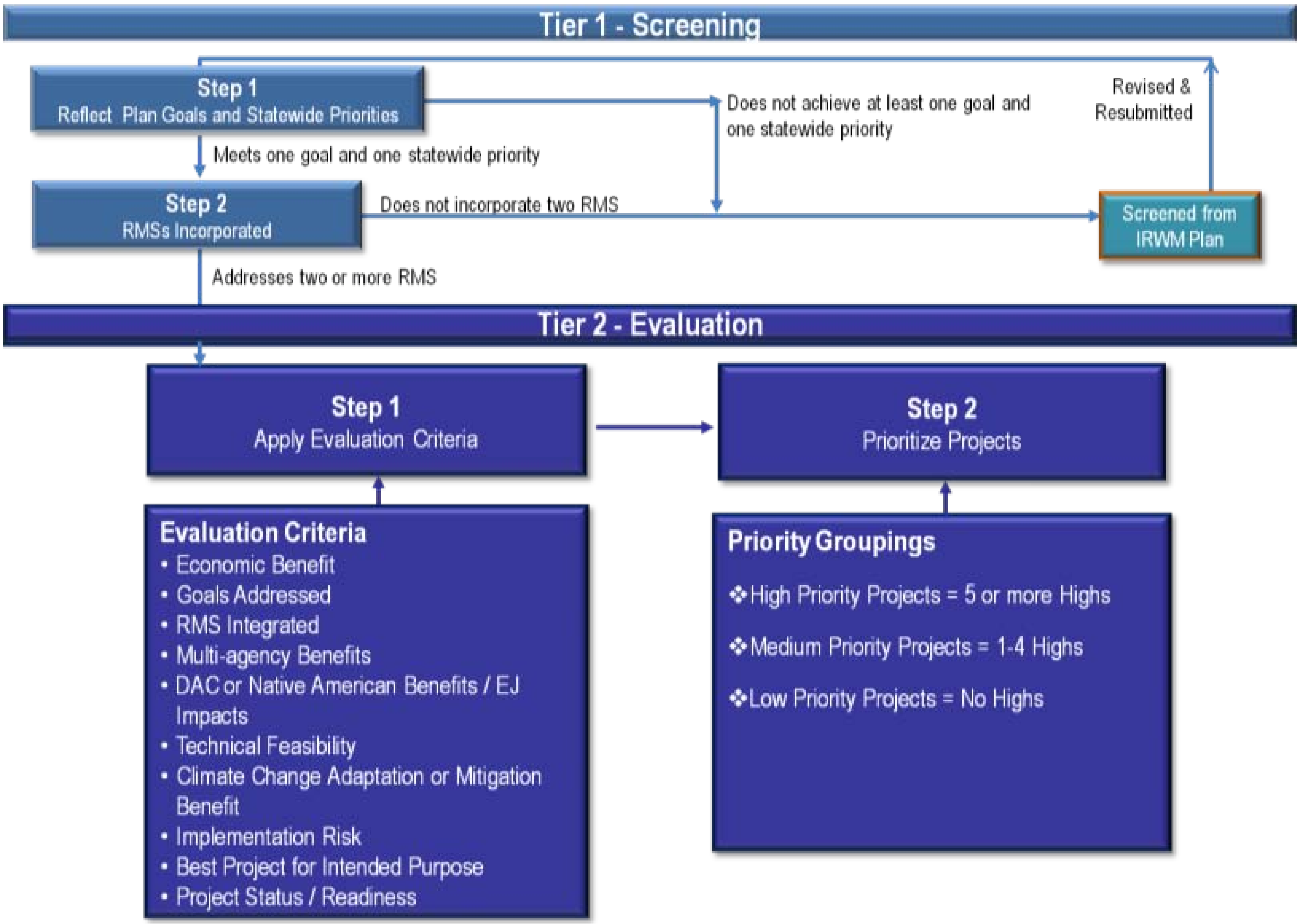
In Step 2 of the Tier 2 process, the projects were prioritized based on their overall scores. The projects received a final score of High, Medium, or Low, which were determined as follows.

High = Received 5 or more Highs on evaluation criteria

Medium = Received 1 to 4 Highs on evaluation criteria

Low = Received no High scores on evaluation criteria

Figure 4-1: Project Review and Prioritization Process



Results

During the two project solicitation periods, with the most recent period ending on May 30, 2012, eight agencies/entities submitted 37 projects for consideration. One project did not meet the minimum requirements and was eliminated from the project evaluation. The other 36 were prioritized using the evaluation methodology previously described. The application of this process generated 9 projects with Medium scores, and 26 projects with High scores.

The project list and the associated scores (as of November 2012) are included in Appendix B. The spreadsheets developed during the evaluation are also presented in Appendix B; Tier 1, Step 1 through Tier 2, Step 2 are demonstrated in the spreadsheets.

It should be noted that the RPC implemented a thorough project review process in which specific comments and questions related to each project were reviewed with project proponents and project scores were adjusted to address comments or concerns associated with preliminary project scoring. The result of this process is a more robust project list and prioritization, which will more effectively assist the Region in achieving its objectives.

Implementing the projects identified and evaluated through the Project Review Process will assist in addressing specific water management issues in the MAC Region. Table 3-6 summarizes the issues that will be addressed by project implementation.

4.1.4. Process for Updating the Project List

The MAC Plan Update is a living document and project needs can change frequently. Therefore, the project list will be updated periodically. When deemed appropriate by the RWMG, a project solicitation process will be conducted, project information forms will be completed by interested stakeholders, and the project proposals will be evaluated by the RPC per Plan criteria. The RWMG will convene a meeting (or several if needed) to facilitate the review of project proposals and evaluation, review and approve the updated list, and publish and post on the UMRWA website (www.umrwa.org) the updated project list as an appendix to the Plan Update.

Table 4-1: MAC Region Water Management Issues Addressed by IRWM Projects

Problem	Objective / Solution	Project(s) Meeting Objective
There currently is no emergency backup for the CAWP or AWS water systems.	Provide redundancy & emergency backup supplies for CAWP and AWS.	1 – CAWP & AWS Intertie
AWA's existing Silver Lake Pines and Tiger Creek pump stations are sometimes inoperable due to power outages and have significant operating costs (up to $300,000 annually).	Eliminate the need of the pump stations by installing a gravity pipeline to deliver water from the Tiger Creek Regulatory to the Buckhorn WTP for treatment.	2 – CAWP Gravity Supply Line
The Amador Canal has significant leakage and water loss.	Reduce water loss by converting the canal to a pipeline.	3 – Upper Amador Canal – Treated Pipeline Conversion [1] 5 – Upper Amador Canal – Untreated Pipeline Conversion [1] 8 – Lower Amador Canal Project
The existing storage and spray field system in Lake Camanche Village spill and cause water quality issues.	Improve the wastewater system in Lake Camanche Village.	4 – Lake Camanche Wastewater Improvement Program
AWA has limited treatment capacity at its Ione and Tanner WTPs.	Increase the water treatment capacity available to AWA.	7 – AWS Regional Water Treatment Plant
Backwash water from the Buckhorn, Ione, and Tanner WTPs is a valuable resource that is currently not being utilized.	Reuse the backwash water from the three WTPs.	9 – Backwash Water Reuse Project
AWA's existing water distribution system suffers from low pressures, leaving the community with minimal water supply and inadequate fire protection.	Study the system and identify prioritized improvements to enhance fire protection.	10 – CAWP Fire Storage Study [2] 15 – AWA Low Pressure Flow Improvements [2] 37 – CAWP Retail Distribution Domestic and Fire Protection Improvements
Along Highway 88 from Buckhorn to Martell, leach fields are relied upon, which have contributed to increased nitrate levels in surrounding soils and impacted groundwater quality.	Collect septic tank effluent from these communities and deliver it to a regional plant for wastewater treatment.	11 – Highway 88 Corridor Wastewater Trunkline Study
The communities of Jackson, Sutter Creek, Amador City, Ione, and Martell all have independently operated wastewater treatment facilities in need of repair and upgrades.	Replace the wastewater treatment facilities with a new regional wastewater treatment plant.	13 – Regional Wastewater Project
The Camanche water system does not currently provide the minimum required chlorine contact time (CT), the minimum level of water quality, or the minimum emergency and fire flow water storage.	Increase CT and storage to meet requirements.	16 – Lake Camanche Water Storage & Transmission Main

Problem	Objective / Solution	Project(s) Meeting Objective
The service laterals in the Camanche water system were installed in the late 1970's and as they age, they become subject to severe longitudinal cracking. They regularly leak and fail, causing significant damage to other infrastructure and substantial water loss.	Repair and replace the service laterals in the Camanche water system.	17 – Lake Camanche Water Service Replacement – Phase II
Historic nitrate as nitrogen concentrations have shown a continued increase at monitoring wells surrounding the Wildwood Community Leachfield System and the levels have exceeded the MCL in 2009.	Replace the leachfield and install a lift station to bring the effluent to higher elevations of the disposal site.	19 – Wildwood Leachfield Replacement
There are inadequate water supplies in Amador and Calaveras counties to serve development and provide drought protection in the future.	Increase water supplies in the counties.	20 – Bear River Reservoir Expansion Project
There are failing septic systems, likely causing increased pathogen levels in the region.	Perform site-specific analyses to document empirical and anecdotal information to demonstrate the need for investment to eliminate failing septic systems.	21 – Septic System Management Program
There is significant leaking and pipe failure in the CCWD water system.	Identify which pipelines and storage tanks have the greatest need for repair or replacement and implement.	22 – Leak Testing and Repair Program
Western Calaveras County (Valley Springs, Rancho Calaveras, Lancha Plana) has dropping groundwater levels and the basin is in a state of overdraft.	Install facilities (e.g. a pumping plant and pipelines) to deliver water from New Hogan Reservoir and the Mokelumne River to western Calaveras County.	23 – New Hogan Reservoir Pumping Project 24 – New Hogan Phase II Water Distribution Loop Project
The Sheep Ranch WTP is currently out of compliance according to CDPH	Upgrade the WTP to ensure compliance	25 – Sheep Ranch WTP Compliance Project
The areas surrounding Lake Camanche, served by EBMUD, AWA, and CCWD have a poor quality and unreliable water supply.	Create a new, reliable water supply for the Camanche Area.	26 – Camanche Area Regional Water Supply Project
The West Point WTP is currently in violation with the CDPH regarding a backup filter system.	Install a backup filtration system at the West Point WTP.	27 – West Point WTP Drinking Water Compliance Project
Breaching of East Panther Creek dam has resulted in scouring of the opposite bank and sediment flow into the creek and river, increasing turbidity and adversely affecting aquatic habitat.	Remove the East Panther Creek Dam and restore upper Panther Creek.	28 – East Panther Creek Restoration Project

Problem	Objective / Solution	Project(s) Meeting Objective
Salmon and steelhead populations have significantly decreased in the upper Mokelumne River.	Implement a program to move spawning salmon and steelhead to restore populations.	29 – Restoring the Upper Mokelumne's Anadromous Fish
Water demands must be reduced in order to offset potable water supplies and meet State requirements.	Implement a conservation program including residential surveys, high-efficiency washer rebate program, ultra low-flow toilet replacement program, etc.	30 – Amador Household Water Efficiency Project
The Stanislaus National Forest in the upper headwaters of the Middle Fork Mokelumne River requires restoration and maintenance to improve forest resiliency, watershed conditions, meadow function, and wildlife and ethno-botanical connectivity and diversity.	Implement landscape restoration treatments.	31 – Hemlock Landscape Restoration
The City of Jackson adopted Waste Discharge Requirements (WDRs) in 2007 that affect the quantity and quality of effluent that can be discharged to Jackson Creek, requiring modifications to treatment and discharge to comply.	Make improvements to the City of Jackson Wastewater Treatment Plant and modify discharge practices.	32 – City of Jackson Wastewater Treatment and Disposal Project
Due to an aging drainage system and 4-wheel drive vehicular traffic during the wet season on Ponderosa Way, there is significant erosion and siltation into Alabama Gulch, Dutchman Gulch, and Mokelumne River.	Reduce soil erosion by installing a gate to control traffic in winter months and improving the drainage system.	33 – Ponderosa Way Restoration Project
The existing Ione Clearwell Cover is over twenty years old and has developed numerous pinhole leaks that are possible sources of contamination as identified in various CDPH annual inspections.	Replace the cover with a newer, more resilient material.	34 – Ione Clearwell Cover Replacement
CDPH stated AWA must invest and improve the condition of the Buckhorn system's distribution storage tanks due to deteriorated conditions.	Replace the deteriorating tanks.	35 – CAWP Tanks Replacement Project
The Lake Camanche Village Unit 6 Lift Station C facilities are showing severe signs of deterioration and impending failure.	Replace the lift station facilities.	36 – Camanche Wastewater System Improvements
The Buckhorn WTP and CAWP distribution system do not comply with the Stage 2 Disinfection Byproduct (DBP) Rule.	Modify the Buckhorn WTP and CAWP distribution system to comply with the Stage 2 DBP Rule.	38 – CAWP Disinfection By-Product Reduction Project

1. Project 3 or 5 would be implemented, not both.
2. If Project 10 is implemented, Project 15 would not be needed.

4.1.5. Project Integration

The RPC developed the project review and evaluation process to foster integration and identify project efficiencies and maximize benefits. The high priority projects, as identified through the project review process, integrate RMS and tend to be multi-benefit projects. The more RMS a project integrates, and the more benefits it will achieve, the more likely it is to receive a High score. Of the 38 project submitted for inclusion in the MAC Plan Update, 14 projects received High scores for the RMS Integrated evaluation criteria, meaning each project integrates at least 6 RMS. 10 of the 14 projects that received High scores for RMS integration, received final High scores as well. When projects integrate multiple RMS there is the opportunity to take advantage of synergies in water management.

In addition, as part of the MAC IRWM Plan Update process, a regional project known as the Camanche Area Regional Water Supply Project (CARWSP) was identified as a project that could potentially integrate a number of resource management strategies, foster collaboration among three water suppliers in the region, and provide significant water supply and water quality benefits to disadvantaged communities. A feasibility evaluation was performed to evaluate and document the feasibility of completing CARWSP. The results of this feasibility assessment are summarized in Appendix G. Aspects of the project that integrate with the MAC Plan Update are described in the following section.

4.1.6. Integration of CARWSP into MAC Plan Update

The CARWSP planning process was enabled by a Proposition 84 IRWM planning grant received by the MAC IRWM Region from the California Department of Water Resources. Information developed during the CARWSP planning process will be reflected in the following sections of the MAC IRWM Plan Update (currently under development):

- Resource Management Strategies
- Finance
- Relation to Land Use Planning
- Coordination
- Integration

The information that will be integrated into Plan Update is summarized in the following sections.

Resource Management Strategies

A resource management strategy (RMS), as defined in the *California Water Plan 2009 Update* (DWR, 2009), is a project, program, or policy that helps local agencies and governments manage their water and related resources. A wide range of RMS will be required to achieve the MAC Region's goals and objectives. Table 4-2 presents the seven categories of RMS included in the CWP Update and considered for the MAC IRWM Plan. The RMS that CARWSP would contribute to achieving are noted, and described below.

Table 4-2: RMS from the CWP Update 2009

RMS Category	Resource Management Strategy	Apply to CARWSP
Reduce Water Demand	Agricultural Water Use Efficiency	
	Urban Water Use Efficiency	✓
Improve Operational Efficiency and Transfers	Conveyance – Delta	
	Conveyance – Regional/local	✓
	System Reoperation	
	Water Transfers	
Increase Water Supply	Conjunctive Management & Groundwater Storage	✓
	Desalination	
	Precipitation Enhancement	
	Recycled Municipal Water	
	Surface Storage – CALFED	
	Surface Storage – Regional/local	✓
Improve Water Quality	Drinking Water Treatment and Distribution	✓
	Groundwater Remediation / Aquifer Remediation	
	Matching Quality to Use	
	Pollution Prevention	
	Salt & Salinity Management	
	Urban Runoff Management	
Improve Flood Management	Flood Risk Management	
Practice Resources Stewardship	Agricultural Lands Stewardship	
	Economic Incentives (Loans, Grants, Water Pricing)	✓
	Ecosystem Restoration	
	Forest Management	
	Recharge Area Protection	
	Water-Dependent Recreation	
	Watershed Management	
Other Strategies	Crop Idling for Water Transfers	
	Dewvaporation or Atmospheric Pressure Desalination	
	Fog Collection	
	Irrigated Land Retirement	
	Rainfed Agriculture	
	Waterbag Transport / Storage Technology	

- *Urban Water Use Efficiency:* the Vintage Home Fixture Retrofit program included in CARWSP would improve urban water use efficiency in the CANS, CASS, Lake Camanche Village, and Wallace service areas by replacing non-conserving showerheads and toilets with low-flow fixtures.
- *Conveyance – Regional / Local:* CARWSP includes the conveyance system to deliver Mokelumne Aqueduct supplies from the regional WTP to the EBMUD, AWA, and CCWD service areas, improving regional conveyance.

- *Conjunctive Management and Groundwater Storage:* the regional WTP and existing groundwater systems would be managed conjunctively by providing treated surface water to CANS, CASS, Lake Camanche Village, and Wallace, and meeting peak demands and providing a backup emergency supply to Lake Camanche Village and Wallace using groundwater.
- *Surface Storage – Regional / Local:* the preferred alternative includes two local storage facilities; one for the Lake Camanche Village area and one for the Wallace area, to provide pressure regulation and fire protection.
- *Drinking Water Treatment and Distribution:* the regional WTP would treat surface water diverted from the Mokelumne Aqueduct which would allow for distribution of a high quality, reliable water supply to the CARWSP service areas.
- *Economic Incentives (Loans, Grants, Water Pricing):* the Vintage Home Fixture Retrofit would provide rebates for showerhead replacement and subsidize replacement of toilets for residents in the CARWSP service area still relying on non-conserving fixtures. Additionally, grant funding would be pursued for CARWSP through the IRWM grant program and possibly others.

Finance

To minimize up-front costs, the project would likely be implemented in phases, as described below.

- Phase 1: Implementation of Alternative 1 and Vintage Home Fixture Retrofit Components
  - Phase 1A – Aqueduct connection, raw water pipeline from Mokelumne Aqueduct to WTP, and 0.5 MGD WTP
  - Phase 1B – Treated water pipeline to CANS
  - Phase 1C – Vintage Home Fixture Retrofit for CANS, CASS, Lake Camanche Village, and Wallace
- Phase 2: Implementation of Alternative 2 Components (including Conjunctive Use Components)
  - Phase 2A – Expand WTP by 1 MGD
  - Phase 2B – Treated water pipeline to Lake Camanche Village, pump station and tank, and conjunctive use conversion
- Phase 3: Implementation of Remaining Alternative 3 Components
  - Phase 3A – Expand WTP by 0.7 MGD
  - Phase 3B – Treated water pipeline to Wallace, pump station and tank

Implementing the project in a phased manner provides flexibility in implementing the project and securing required funding. The costs for each phase are summarized below.

Table 4-3: Costs for CARWSP Phase 1

Project Proponents	Capital Cost
EBMUD	$3.5 million
AWA	$200,000
CCWD	$10,000
Total	$3.7 million

Table 4-4: Costs for CARWSP Phase 2

Project Proponents	Capital Cost	Cost Reduction from Phase 1 to 2
EBMUD	$0	$900,000
AWA	$5.9 million	N/A
CCWD	$0	N/A
Total	$5.9 million	

Table 4-5: Costs for CARWSP Phase 3

Project Proponents	Capital Cost	Cost Reduction from Phase 2 to 3
EBMUD	$0	$100,000
AWA	$0	$200,000
CCWD	$8.8 million	N/A
Total	$8.8 million	

EBMUD plans to move forward with Phase 1. The portion of the project that would serve EBMUD's CANS and CASS areas is currently at 90% design and is expected to be constructed in 2013-2014. It should be noted that, while EBMUD currently plans to move forward with Phase 1, Phases 2 and 3 may not proceed if outside funding cannot be secured to offset implementation costs and minimize the burden to ratepayers in the Lake Camanche Village and Wallace areas.

Relation to Land Use Planning

CARWSP was developed to be consistent with land use planning. The demands are based solely on existing units and approved or tentatively approved maps. No unapproved demands were considered in developing the demands to be met by CARWSP. In addition, both Amador and Calaveras Counties are in the process of updating their General Plans. CARWSP is consistent with all water-related goals and objectives in the draft Plans.

Coordination

DWR encourages coordination of water management projects among water agencies and stakeholders to generate efficiencies. CARWSP is an example of a water management project that would be coordinated among multiple water agencies (EBMUD, AWA, and CCWD) to generate efficiencies and cost savings by sharing facilities and minimizing staff requirements through operational agreements. The PPC provided an avenue for efficient coordination among the three project partners and UMRWA. Additionally, stakeholders were informed of CARWSP and asked to provide input to the CARWSP planning process through updates at the MAC IRWM RPC meetings; AWA, CCWD, and UMRWA Board meetings; and MAC IRWM public workshops.

Integration

CARWSP achieves integration through integration of water management activities and the stakeholders and entities in both Amador and Calaveras counties, as well as through integration of multiple RMS as previously described. CARWSP represents a collaboration that integrates the interests and water management needs of three water suppliers in the MAC Region. In addition, it includes surface water treatment, groundwater, and conservation measures, to create a program that integrates multiple water supplies and demand reduction measures. Conjunctive use is also incorporated through the management of surface and groundwater supplies. In addition to being a multi-benefit project, helping the MAC Region to achieve its IRWM goals and objectives, the project would integrate the following RMS: Urban Water Use Efficiency, Conveyance – Regional / Local, Conjunctive Management and Groundwater Storage, Surface Storage – Regional / Local, Drinking Water Treatment and Distribution, and Economic Incentives (Loans, Grants, Water Pricing).

4.1.7. Considerations for Future Updates

The IRWM planning process is an evolutionary process, in which each plan update generates new thoughts, ideas, and lessons learned. In order to ensure that future plan updates consider the lessons learned during this update, the RPC documented several considerations to be addressed in future updates. The RPC identified the following recommendations for future Plan updates.

- Allow for additional time for critical vetting of project submittals to ensure that project issues are addressed and there is consensus on project scoring.
- Consider integrating groundwater management more thoroughly into the IRWM plan. While the region is primarily served by surface water supplies, groundwater will be an increasingly important supply in coming years.
- Add more detailed cost and financing information to project summaries as the project mature and more information becomes available.
- Consider adding the creation of a DMS to future updates.
- Update the MAC Outreach and Communications Plan to include:
  - A process for identifying and engaging key stakeholder groups that are not currently participating in the IRWM planning process, including land use planning entities, DACs, and Native American tribes, among others. A process for ensuring greater participation by DACs should be identified as a high priority. In addition, participation in the IRWM planning process by planning departments, health departments, transportation agencies, fire districts, California Department of Fish and Game, the Regional Water Quality Control Board, and other entities should be encouraged.
  - A Policy for collecting and addressing public comments as part of future updates.
  - Guidance for information collection, review, and acceptance for inclusion in the MAC IRWM Plan.
  - Incorporation of additional stakeholder outreach meetings, focused on engaging key stakeholder groups that do not have time to commit to attending monthly RPC meetings, yet whose input is valuable. These meetings will be held at a greater frequency than the general public outreach meetings, and will be geared toward providing meaningful input for the RPC's consideration.
  - RPC representation on related stakeholder groups, such as the Amador and Calaveras Consensus Group that is currently working with the Bureau of Land Management and the USFS on forest restoration and fuel reduction projects.
- Update the regional conflicts discussion.
- When identifying data gaps in future updates, list specific data gaps identified by previous studies and consider requesting grant funds to fill data gaps.
- Perform a GHG emissions assessment for the project included in the Plan. Note: GHG emissions assessments will be performed for projects soliciting funding through the IRWM program. A high level, qualitative GHG assessment was completed as part of the project evaluation process in order to determine whether projects are likely to have climate change mitigation benefits.

4.2. Coordination with Water and Land Use Agencies

Integrated Regional Water Management (IRWM) Plans must:

- Document the local water planning documents on which it is based including:
  - A list of local water plans used in the IRWM Plan.
  - Discussion of how the IRWM Plan relates to planning documents and programs established by local agencies.
  - A description of the dynamics between the IRWM Plan and local planning documents.
- Contain processes that foster communication between land use managers and RWMGs with the intent of effectively integrating water management and land use planning and must:
  - Document the current relationship between local land use planning, regional water issues, and water management objectives.
  - Describe future plans to further a collaborative, proactive relationship between land use planner and water managers.

4.2.1. IRWM Water Planning History

The first MAC integrated regional water management planning effort was completed in 2006. This initial effort was based on a cooperative endeavor between the “partnering agencies” which included Amador Water Agency (AWA), Calaveras County Water District (CCWD), Amador County, City of Jackson, City of Sutter Creek, City of Plymouth, Amador Regional Sanitation Authority (ARSA), and East Bay Municipal Utility District (EBMUD). These partnering agencies which included local water planners (e.g. AWA, CCWD, EBMUD), land use agencies (e.g. Amador County), wastewater agencies (e.g. ARSA, City of Jackson), and disadvantaged communities (e.g. Sutter Creek and Jackson), entered into a Memorandum of Understanding (MOU) in October 2006 for the purpose of funding the development of the first MAC Plan and coordinating water resources planning and implementation activities.

The first MAC Plan process included other entities and stakeholders with interests in regional water planning in addition to the partnering agencies. These stakeholders played an essential role in plan development by providing a variety of ideas, values, perspectives, and cultures that represented the diversity present within the region. These stakeholder participants, representing a wide array of organizations with planning roles and responsibilities, included Calaveras County, Calaveras Public Utilities District, Eastern San Joaquin Groundwater Banking Authority, City of Ione, Jackson Valley Irrigation District, City of Lodi, Pacific Gas and Electric Company, Protect Historic Amador Waterways, and the Upper Mokelumne River Watershed Council. These stakeholders participated and provided input through their attendance at stakeholder meetings, by direct correspondence, and via other communications. The geographic boundary developed and used during this initial MAC regional planning process was broader than what is reflected in the current MAC region. The primary difference is that areas within Eastern San Joaquin County, which remain within the Northeastern San Joaquin County Groundwater Banking Authority’s (GBA) IRWM region, have been removed from the MAC region. This area was initially included in both regions (thus constituting an overlap area) because of the interest of both regions in evaluating mutually-beneficial conjunctive use opportunities. Subsequent to the completion of the two regions’ initial IRWM plans, it was decided that eliminating the overlap area, and thereby eliminating the associated governance complications, was a better approach. Thus, the decision to delete what is essentially a portion of the Lower Mokelumne River watershed from the MAC region was made in conjunction with the GBA region. The resulting change in the adjoining region’s boundary was subsequently approved by DWR as part of the 2009 RAP process.

The cooperative planning that resulted in the MAC region’s initial regional plan has not always been the norm. For many decades, the competing water needs of Amador and Calaveras counties and EBMUD presented obstacles to cooperative development of water resource solutions. These decades of rivalry and discord had rendered cooperative regional water planning an impossible challenge until recently. With the creation of the Upper Mokelumne River Watershed Authority (UMRWA) in 2000 and ongoing regional water resource planning venues promoted by the Integrated Regional Water Management Act and the Mokelumne River Forum, new opportunities to work together to develop solutions to today's water resource problems began to emerge. The boundary of the MAC region was configured in part to reflect this history, and in part to further opportunities for these historically competitive interests to work cooperatively to find mutually-acceptable water management solutions.

Several of the Authority's recent initiatives and accomplishments, briefly described below, are indicative of the local water planning conducted in the region, its ties to regional water resource planning and programs in the MAC Region, and interconnectivity with the IRWMP Update.

Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) - The Authority's water agency members and other MAC Region stakeholders have been exploring a potential inter-regional water resource evaluation and planning process with their counterparts in northeastern San Joaquin County. This joint endeavor was initially identified through the Mokelumne River Forum, a Department of Water Resources- (DWR-) facilitated process, The comprehensive MokeWISE work plan was developed through a consensus-based stakeholder process and served as the basis for a Prop 84 Planning Grant. The interregional grant application has tentatively been selected for funding by DWR.

Upper Mokelumne River Watershed Assessment and Planning Project - One of the Authority's milestone tasks, this $1.3 million project was completed in December 2007. The project was undertaken to advance the understanding of watershed water quality and related environmental issues, and to develop tools which will facilitate the long-term evaluation and management of Upper Mokelumne River watershed water and natural resources. Funding for the project was provided by Authority member agencies ($317,500) and by grants from Propositions 50 and 84 ($950,000). Development of this comprehensive watershed project was guided by a Project Advisory Committee (PAC), which included stakeholders representing a diverse set of watershed interests such as water, resource management, environmental resources, agriculture, timber, recreation and national forest lands. Baseline watershed water quality was characterized, providing a reference point for assessing water quality impacts associated with future changes in the watershed. Also, a physical hydrologic watershed model was developed using the Watershed Analysis and Risk Management Framework (WARMF) tool. The WARMF model was used to analyze the watershed's existing hydrologic and water quality characteristics as to simulate how water quality conditions could change based on changes to land uses and activities. Activities and reports prepared as part of this project included:

- *Wildfire Models* – Fire behavior was modeled throughout the watershed to gain a better understanding of high risk areas and potential impacts from wildfires. *FlamMap* was used to determine the relative hazard and flammability of selected watershed areas. This model allows prediction of fire behavior on a spatial basis by modeling flame length, heat release, rate of spread and type of fire (e.g. surface fire, crown fire). The *FARSITE* model was used to simulate potential fire behavior and predict where and how fast fire would spread from pre-selected burn ignition sites in the watershed. The fire behavior simulation outputs were used to develop three new categories of land use / land cover for the watershed based on burn severity: low, moderate and high. The spatial distribution of the burn severity categories for each selected ignition site was used as an input to the WARMF model to simulate potential effects on water resources resulting from wildfires in specific vulnerable areas of the watershed.
- *Water Quality Vulnerability Zones* – Areas within the watershed considered to have very high to moderate vulnerability to water quality contamination were identified based on key physical

characteristics of the watershed including slope, soils, vegetation and proximity to water. A map was developed identifying watershed vulnerability zones.

- *Watershed Assessment* – The water quality in the Upper Mokelumne River watershed was assessed in a three-step process. Guided by the stakeholder PAC, water quality benchmarks were established, specific water quality parameters of concern were identified, and selected parameters exhibiting historical exceedences were analyzed to determine source locations and characteristics.
- *Upper Mokelumne River Watershed Management Plan* – A management plan was prepared, addressing the findings of the watershed assessment by coupling scientifically valid data and technically-based recommendations to maintain and improve source water quality with stakeholder understanding and support. The PAC-guided plan contains a series of recommended management actions designed to reduce sources of contaminants, manage contaminated flows and sediments, and encourage regulatory and institutional controls.
- *Water Conservation Plan: A Guide for Assisting Authority Members Prepare Water Agency Conservation Plans* – This plan was prepared to provide UMRWA member water agencies with guidance in establishing individual agency-specific water conservation plans and thus aid in their efforts to improve water conservation and water recycling. The plan is designed to serve as a resource document for water agency staff and it includes basic water conservation plan elements found throughout the water utility industry. It also includes recommended water conservation measures and programs which may be adapted to fit the specific needs of water agencies in the region.

4.2.2. Local Water Planning Documents

The MAC IRWMP and this update were developed based on collaborative discussions regarding regional needs, proposed projects, and teaming for regional effectiveness. As various regional stakeholders shared their needs and objectives, similarities and opportunities for collaboration were identified. The RPC began developing a regional plan to bring about integrated projects for the benefit of the region, building on these similarities and opportunities. During plan preparation and development, data and water management strategies were collected from a number of existing local and/or sub-regional planning documents, and were integrated into the regional strategies presented in this document. Examples of local planning documents reviewed during the IRWMP development and update include Urban Water Management Plans, Water Supply Master Plans, Capital Improvement Plans, Recycled Water Master Plans, project Environmental Impact Reports/Environmental Impact Statements, and grant applications for other state and federal programs. It should be noted that not all RPC members agreed with the demands used in the MAC Plan Update (refer to Appendix G). Because the MAC Plan Update is not intended to supersede local planning documents, the best available information provided in local water plans was used. Table 4-1 summarizes key planning reports used in the IRWMP preparation process and update.

Table 4-6: Major Planning Reports Used to Create the M/A/C IRWMP

Document Title/Description	Publication Date	Agency(ies)/ Entity(ies)	Relation to IRWMP
Camanche South and North Shore Water Treatment Plants Evaluation	May 2003	EBMUD	Directly related to the Camanche Area Regional Water Supply Project.
Camanche Water Treatment Plant Replacement Project Mitigated Negative Declaration	July 2011	EBMUD	Directly related to the Camanche Regional Water Supply Project.

Document Title/Description	Publication Date	Agency(ies)/ Entity(ies)	Relation to IRWMP
Camanche Regional Water System Feasibility Study	October 1999	EBMUD	Directly related to the Camanche Area Regional Water Supply Project.
Cosumnes & Mokelumne Rivers Floodplain Integrated Resources Management Plan	January 2006	Southeast Sacramento County Agricultural Water Authority	For understanding of regional integrated planning for floodplain, riparian and riverine environments along the Cosumnes and Mokelumne Rivers.
County Water Master Plan	April 1995	CCWD	For general understanding of local water resources issues in Calaveras County.
Eldorado National Forest Land and Resource Management Plan, as amended		USFS	Directly related to management of forest and water resources within the Eldorado NF portion of the Upper Mokelumne.
Final EIR, Volume One: Updated Water Supply Master Program	September 1993	EBMUD	Discusses groundwater storage/conjunctive use as an alternative with groundwater storage to occur in the Lodi area.
Lower Mokelumne Watershed Stewardship Plan	May 2002	San Joaquin County Resource Conservation District	For general understanding of existing watershed studies and planning along the Mokelumne River.
Multi-Hazard Mitigation Plan	June 2006	Amador County	For general information regarding mitigation strategies for reducing potential losses resulting from fire, flood and other possible hazards. Directly relates to several projects.
Preferred Alternative Report, Wastewater Improvement District #11 – Lake Camanche Village	July 2004	AWA, EBMUD	Directly relates to the Lake Camanche Wastewater Improvement Project.
Reconnaissance Study of Two Potential New Water Supply Sources	November 1995	Amador County	Directly related to the Bear River Reservoir Expansion Program.
Report to the Amador Local Agency Formation Commission, Amador County Municipal Services Review	August 2008	Amador County	A countywide water and wastewater municipal services review – a State-required comprehensive study of services within a designated geographic area.
Stanislaus National Forest Land and Resource Management Plan, as amended	April 2010	USFS	Directly related to management of forest and water resources within the Stanislaus NF portion of the Upper Mokelumne.
Upper Mokelumne River Watershed Assessment and Planning Project	November 2005	Upper Mokelumne River Watershed Authority	For general understanding of existing watershed studies and planning along the Mokelumne River.
Urban Water Management Plan	2011	AWA	For understanding of Amador-area urban water needs, management and planning objectives.
Urban Water Management Plan	June 2011	CCWD	For understanding of Calaveras-area urban water needs, management and

Document Title/Description	Publication Date	Agency(ies)/ Entity(ies)	Relation to IRWMP
			planning objectives.
Urban Water Management Plan	June 2011	EBMUD	For understanding of EBMUD service-area urban water needs, management and planning objectives.
Various County General Plans	Various	Amador, Calaveras, San Joaquin and Alpine Counties, City of Ione, Jackson, Lodi, Plymouth, Sutter Creek and Amador City	For general understanding of local land use, environmental/water resources, economic, and administrative management issues.
Water and Wastewater Municipal Service Review for Calaveras Agency Formation Commission	April 2011	Calaveras County	A countywide water and wastewater municipal services review – a State-required comprehensive study of services within a designated geographic area.
Water Resources and Land Use Planning, Watershed-based Strategies for Amador and Calaveras Counties	December 2008	Amador and Calaveras Counties	For understanding relationship of water and land use planning.

The IRWMP will also be used as a source of information for other documents as well. It is intended to serve as an umbrella document, referencing and integrating many documents while also acting as a consolidated source of information. Figure 4-2 depicts this relationship. The MAC IRWMP is not intended to drive or direct other planning processes.

Figure 4-2: Relationship between IRWMP and Local Planning Documents

A variety of other planning documents are currently being prepared and/or updated that will be useful during the next MAC Plan Update and for ongoing regional water planning. For example, CCWD is currently preparing an Agricultural Water Demand Study, which is evaluating the potential for irrigated agriculture throughout the County. The results of this study will provide valuable input to the next Plan Update. Additionally, Amador County and Calaveras County are in the process of updating their General Plans. While the MAC Plan Update will not drive the General Plan and related land use planning processes, implementation of projects included in this Plan which improve water supply reliability and/or address water supply related conflicts may have land use implications, and land use decisions made in the general planning processes may have implications on water resources.

4.2.3. Current and Future Relationships with Local Land Use Agencies

Local water and land use agencies have a history of coordinating on shared topics and interests, such as planning for infrastructure for water and wastewater facilities to address unmet and future needs. As previously described, land use agencies including cities and counties have participated to varying degrees in the MAC IRWM planning process since 2006.

Efforts to further enhance land use and water management planning and coordination through the MAC update process have been hindered by the lack of available staff resources at both local land use planning agencies and water districts. County land use planners (as noted above) have been fully engaged in ongoing efforts to update county General Plans. Local water agencies, with insufficient funding to hire staff planners and/or engineers to perform planning functions, have not been able to engage in coordinated planning exercises. Consequently there is some frustration among MAC Update stakeholders that there is insufficient collaboration between land use planners and water agency managers to effectively plan and fully develop projects and programs which best meet the MAC Region's needs. While views as to the appropriate level of communication and coordination between land use planners and water resource managers varies quite significantly amongst stakeholders almost all agree that a higher level of communication and coordination would be beneficial.

Engaging other land managers responsible for planning and developing lands within the MAC Region, including the USFS, BLM and Sierra Pacific Industries, has also been a challenging endeavor. The USFS is a member of the RPC and while it has been an important contributor to the MAC Update process the USFS representatives have been unable to fully participate due to many competing obligations. The BLM and SPI have not participated, in part due to the lack of available personnel.

Relationship between Land Use Planning and Water Management

The primary mechanism for coordination between land use planners and water managers has traditionally been through updates to the county General Plans. This coordination occurred in developing the *Water Element Goals & Policies Report for the Calaveras County General Plan Update* (MWH, 2009). The Report was developed through a collaborative process among the Water Element Group, which included water and wastewater agency staff and directors, County staff, and representatives of public and private interests. Nine co-equal goals were developed in that process, one of which is to "promote interagency communication and cooperation between land use and water and wastewater entities, so that they may optimize utilization of their resources and provide the highest level of dependable, yet affordable, service, while respecting individual entities water rights and interests." Five policies were identified to meet the goal, all of which directly align with the MAC IRWM planning process:

- 8.1 Water and Wastewater Infrastructure: The County shall work with water and wastewater agencies in the planning, development, and construction of water and wastewater facilities needed to transmit, treat, store, and distribute potable water supplies, and to collect, convey, treat and dispose of wastewater pursuant to adopted General Plan policies, urban water management plans, water supply agreements, and master facilities plans.

- 8.2 Cooperation: The County shall support cooperative interregional planning efforts that have as a high priority the protection of existing water rights of local Calaveras County agencies.
- 8.3 Funding Sources: The County shall work with local agencies to identify and pursue alternative funding sources that can be used for projects that improve the water resources management opportunities in Calaveras County.
- 8.4 Water Supply Reliability: The County shall encourage water agencies to develop plans for responding to droughts and the effects of predicted global climate change, including contingency plans and the sharing of water resources to improve overall water supply reliability for the existing and future needs of the county.
- 8.5 Data Sharing: The County shall share relevant data and encourage water/wastewater agencies to share data to assist in planning activities.

In November 2012 Calaveras County decided it would not include a Water Element and instead, only include elements required by state law. Water will be addressed in the other elements of the General Plan Update, so it is possible the identified policies and goals included in the *Water Element Goals & Policies Report* may be incorporated into other portion of the General Plan Update. The MAC Region recommends Calaveras County include the policies and goals identified in the Report in future General Plan Updates.

Amador County is similarly in the process of updating its General Plan. The March 2011 Preliminary Draft General Plan does not include a Water Element; however, the Land Use, Economic Development, and Conservation elements include a series of goals aimed at protecting water supply and water quality, including the following.

Water-Related Land Use Goals

- Goal LU-4: Ensure adequate wastewater treatment, storage, and disposal capacity exists to serve the county's current and future demand.
- Goal LU-6: Ensure that safe and adequate water supply, wastewater disposal, and public services are available prior to development.

Water-Related Economic Development Goals

- Goal E-10: Encourage alternative means of providing water to agricultural users.

Water-Related Conservation Goals

- Goal C-1: Ensure that all future development permitted in the county can be provided adequate amounts of water.
- Goal C-2: Maintain and improve water supply planning and infrastructure.
- Goal C-3: Minimize negative effects of sewage treatment on water quality.
- Goal C-4: Minimize negative effects of point and non-point sources on water quality.
- Goal C-5: Reduce the negative effects of new development on stormwater runoff and non-point source water pollution.

The General Plans are developed with these water-related goals in mind. The General Plans, once adopted, serve as the blueprint for development throughout the Region. Water managers use the land use projections, as well as maps approved for development by local planning departments, to develop water demand projections, which are then included in their local planning documents. In this way, coordination between land use managers and water managers is maintained.

Plans to Further Collaboration between Land Use Planners and Water Managers

The following actions are proposed to further collaboration between land use planners and water managers in the region in the future.

- Although some land use planning representatives participate in the MAC IRWM planning process, several relevant land use planning agencies (e.g. county planners, BLM, SPI) are not currently represented. In future MAC Plan update activities, participation by these land use agencies and agencies with land use authority will be solicited and encouraged to participate in an effort to create a proactive relationship between land use planners and water managers, as well as foster communication between land use managers and the RWMG and agencies/entities participating in the IRWM planning process.
- During future General Plan updates, the MAC IRWM program may elect to form a workgroup of the RPC tasked with tracking and participating the General Plan updates and reporting back to the RPC on specific decisions being made related to water resources and opportunities to get actively involved. In this way, the IRWM program could serve as a regional forum to coordinate with General Plan updates.
- Periodic City-County-Water Agency Planning Meetings: The RWMG can encourage city and county planners and local water managers to hold joint planning meetings at regular intervals to improve communication and efficiencies. Joint planning meetings can be held at the staff level and/or by governing boards. Both options provide value in different ways, and both should be explored.
- Water Resource Planning Forum: To develop a better understanding and mutual appreciation of the issues and constraints faced by land use and water managing agencies (including the mission, priorities, and decision-making organization of these entities) the RWMG could host a forum where agency representatives present targeted information regarding their organization's mission, constraints, overlapping areas of interest, potential conflicts in priorities or objectives, and potential areas for improved coordination.

Through these actions, collaboration and more effective coordination between and among land use planners and water managers would be enhanced in coming years.

4.3. Impact and Benefit Analysis

Integrated Regional Water Management (IRWM) Plans must discuss potential impacts and benefits of Plan implementation.

The discussion must include impacts and benefits:

- within the IRWM Region
- between regions
- those directly affecting DAC, EJ related concerns and Native American tribal communities

The MAC IRWMP partners and stakeholders recognize the importance of pursuing and integrating multiple resource management strategies to achieve the greatest and most equitable benefit for the region. The MAC region stakeholders understand that implementing the MAC Plan Update will result in regional and localized benefits and potential impacts that must be addressed as part of the IRWM planning process for the Region. This section provides an overview of potential benefits and impacts from implementation of projects or programs included in the MAC Plan Update which implement the Plan. It should be noted that inclusion of a project in the IRWM Plan indicates that it passed the screening requirements outlined in Section 4.1, but does not necessarily reflect endorsement by the Regional Participants Committee (RPC). In addition, inclusion of a project in the IRWM Plan does not commit the Regional Water Management Group or RPC member(s) to implement the project. Implementation, if undertaken, is the responsibility of the project proponent. Prior to implementation and/or construction of any project included in this Plan, individual environmental review, compliant with the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and any other local, state and/or federal requirements as applicable, will be completed by the project proponents.

The potential impacts and benefits that implementing the projects included in the MAC Plan Update could achieve are shown in Table 4-2, and are described in more detail in the following sections.

Table 4-7: Potential Impacts and Benefits by Project Type

Project Type	Within the MAC Region		Interregional	
	Potential Impacts	Potential Benefits	Potential Impacts	Potential Benefits
Groundwater Projects				
Groundwater Supply Development	Water quality degradation Reduced groundwater availability and reliability	Increased groundwater storage / recharge Improved water supply reliability Improved water quality Reduced land subsidence and/or fissuring Local prosperity	Water quality degradation Reduced groundwater availability and reliability	Increased groundwater storage / recharge Improved water supply reliability Improved water quality Local prosperity
Conjunctive Use	Water quality degradation Reduced groundwater availability and reliability	Increased groundwater storage / recharge Improved water supply reliability Improved water quality Reduced land subsidence and/or fissuring Improved water management coordination Local prosperity	Water quality degradation Reduced groundwater availability and reliability	Increased groundwater storage / recharge Improved water supply reliability Improved water quality Reduced land subsidence and/or fissuring Improved water management coordination Local prosperity
Potable Water Supply Projects				
Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water supply reliability	None	None
Storage Facilities or Storage Operations	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water quality (through reduced groundwater pumping) Improved water supply reliability	None	Improved water quality (through reduced groundwater pumping)
Treatment Facilities	Energy consumption Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water supply reliability Improved water quality Economic benefits	None	None
Salinity Management	None	Improved water quality Long-term sustainability of water supplies Local prosperity	None	Improved water quality Long-term sustainability of water supplies Local prosperity
Conservation Projects				
Outreach and Education	Reduced discharges to Mokelumne and Calaveras Rivers	Improved water supply reliability Public education and environmental awareness	Reduced discharges to Mokelumne and Calaveras Rivers	Improved water supply reliability Public education and environmental awareness
Economic Incentives	Reduced discharges to Mokelumne and Calaveras Rivers	Improved water supply reliability Avoided costs of imported water supply Avoided costs of water supply infrastructure Local prosperity	Reduced discharges to Mokelumne and Calaveras Rivers	Improved water supply reliability Avoided costs of imported water supply Avoided costs of water supply infrastructure Local prosperity
Wastewater Projects				
Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water supply reliability	None	None
Treatment Facilities	Energy consumption Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water supply reliability Improved water quality Avoided costs of imported water supply Local prosperity	None	Improved water quality
Septic to Sewer Conversion	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water quality Local prosperity	None	None
Recycled Water Projects				
Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species Water quality degradation	Improved water supply reliability Increased nutrient levels for landscape irrigation Potable water offsets	None	Improved water supply reliability Potable water offsets

Project Type	Within the MAC Region		Interregional	
	Potential Impacts	Potential Benefits	Potential Impacts	Potential Benefits
Treatment Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species	Improved water supply reliability Potable water offsets Improved water quality Local prosperity	None	Improved water supply reliability Potable water offsets Improved water quality
Salinity Management	None	Improved water quality Improved water supply reliability Local prosperity	None	Improved water quality Improved water supply reliability Local prosperity
Urban Runoff Management Projects				
Stormwater Capture and Reuse / Recharge	Water quality degradation	Increased groundwater storage / recharge Improved water supply reliability Reduced land subsidence and/or fissuring Avoided costs of imported water supply Local prosperity	Water quality degradation	Increased groundwater storage / recharge Improved water supply reliability Avoided costs of imported water supply Local prosperity
Diversion to Sewer	Disturbance of habitat and endangered species	Improved water quality Flood control enhancement Increased recycled water	None	None
Pollution Prevention	None	Improved water quality	None	Improved water quality
Flood Management Projects				
Storm Drains or Channels	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species Increased sedimentation and erosion Economic impacts	Flood control enhancement Increased groundwater storage / recharge Avoided costs of flood damage Local prosperity	None	None
Ecosystem Restoration and Protection Projects				
Land Conservation	Economic impacts	Improved water quality Flood control enhancement Habitat protection, restoration, and enhancement Open space preservation	None	None
Invasive Species Removal	Disturbance of habitat and endangered species Increased sedimentation and erosion	Improved water quality Flood control enhancement Habitat protection, restoration, and enhancement	None	None
Restoration / Revegetation	Disturbance of habitat and endangered species	Improved water quality Flood control enhancement Habitat protection, restoration and enhancement Reduced threat of wildfires	None	None
Water-Based Recreation Projects				
Reservoir Recreation	Water quality degradation	Enhanced recreation and public access Local prosperity	None	None
Parks, Access and Trails	Disturbance of habitat and endangered species Increased sedimentation and erosion	Enhanced recreation and public access Local prosperity	None	None

4.3.1. Plan Implementation Benefits and Impacts

Regional Impacts and Benefits

Implementation of MAC Plan Update will lead to numerous benefits including, at a minimum:

- **A more reliable and high quality water supply.** Additional water supplies and conjunctive use lead to enhanced water supply reliability and assist with the improvement of water quality. Water quality projects ensure that existing water quality is sustained and protected. Reliable and high quality water is directly linked to economic and environmental health and well-being.
- **Cost-effective and multi-beneficial projects.** Opportunities for multi-beneficial projects, which can achieve a multitude of goals and objectives for several stakeholders rather than a single entity, provide increased value to stakeholders and the communities they serve. Integrated planning and collaboration can lead to multi-benefit projects that achieve cost savings through cost-sharing opportunities, economies of scale, resource sharing, and other mechanisms. Existing resources can be optimized, duplication of efforts avoided, and larger scale efforts developed to provide cost savings to all involved.
- **Shared experience and resources.** The completion of the MAC Plan Update and implementation of the Plan facilitates knowledge sharing and equips agencies to overcome future challenges by coordinating resources, more effectively meeting the needs of the region as a whole. In addition to direct quantitative benefits of Plan implementation, such as new or more reliable water supplies, indirect benefits are expected to result from avoiding the negative impacts of not implementing the projects.
- **Increased regional understanding.** Agencies and stakeholders are working together as a cohesive group to solve water resource problems in a consensus-based approach, resulting in a deeper understanding of the effects of each individual project on other agencies and stakeholders. This deeper understanding, in turn, reduces interagency conflicts that may prevent projects from gaining the necessary support for successful implementation.
- **Improved local understanding of water resources issues.** Through consistent and coordinated public outreach and education programs, local understanding of regional water resources issues, conflicts, and solutions will improve. Maintaining a consistent message will improve public understanding of water resource management issues and encourage the acceptance and understanding of integrated projects.

Potential impacts of implementation of the MAC Plan could include a variety of temporary construction-related impacts during project construction, including dust, noise, and traffic generation. Other impacts may include increased costs associated with water infrastructure financing. Additional impacts may be identified on a project-by-project basis during CEQA or NEPA analyses.

Interregional Benefits and Impacts

Interregional projects such as the Mokelumne Water Interregional Sustainability Evaluation (WISE) Program stand to provide benefits that extend beyond regional boundaries. The projects included in this Plan Update benefit not only the local agencies and residents of the MAC region, but multiple watersheds (Mokelumne, Cosumnes, and Calaveras River watersheds), the Delta, the East Bay Municipal Utility District (EBMUD) service area, and members of the public throughout California. Specific ways in which the projects contained in the Plan Update provide benefits beyond the MAC region include the following:

- Reduced effluent discharges (and associated pollutant loadings) into the Mokelumne and Calaveras Rivers due to increased recycled water use upstream, promoting improved water quality both in the Mokelumne and Calaveras Rivers and downstream in the Delta.

- Improved regional water supply and reliability for the East Bay, Amador County, Calaveras County and San Joaquin County, achieved through several water storage projects, will reduce pressure on the Delta to serve the region in times of significant drought. Additional wastewater reuse projects will also reduce the demand for upstream potable water, potentially increasing downstream supplies.
- Conjunctive use projects will increase water supply reliability within the region and in San Joaquin County, resulting in increased surface water supply availability in dry years and reduced pressure on the San Joaquin River as a water supply.

Most likely, though project dependent, construction-related impacts would not impact other IRWM regions, as project and program facilities would be implemented within the MAC region with temporary and local impacts, if any.

The MAC Plan Update also has the potential to benefit resources beyond local and regional water resources. Improved surface water quality will benefit the local ecosystem. Enhanced tree cover, while viewed as a habitat enhancement, may also directly benefit regional air quality through the creation of microclimates and the filtering capacity provided by trees. By optimizing water supply operations and implementing conjunctive use, additional surface water supplies may be available for hydropower generation to benefit statewide energy resources.

Benefits and Impacts to DACs, EJ-Related Concerns, and Native American Tribal Communities

Protection of the people and economy of disadvantaged communities (DACs) and Native American tribal communities in the region, and correction of environmental justice concerns are priorities for the MAC Plan Update. Environmental justice is addressed by ensuring that all stakeholders have access to the MAC planning decision-making process and that minority and/or low-income populations, such as DACs and Native American tribal communities, do not bear disproportionately high and adverse human health or environmental impacts. Working on a regional basis aids in protecting the economy of the MAC region and minimizing direct monetary impacts felt by DACs and Native American tribes in the region through the stabilization of water and wastewater utility rates. Implementation of the region's flood control projects will protect the local cities from disastrous flood damage, as was experienced in the winter and spring of 2006. Regional coordination has been and will continue to be achieved through the noticing of public meetings, to be held as needed to address public and stakeholder concerns, conducting routine reviews to ensure that DACs are not being adversely affected by project and Plan implementation, and by using grant monies receive to help offset project implementation costs.

Similar to DACs, Native American Tribes in the MAC region are encouraged to participate. Focused outreach to Native American within the MAC Region was completed as part of the Plan update. There are three federally recognized tribes within the MAC Region including:

- The Ione Band of Miwok Indians
- The Jackson Rancheria Band of Miwuk Indians
- The California Valley Mikwok Tribe, generally known as the "Sheep Ranch Tribe"

While there are no federally-recognized tribes, there are a number of state-recognized tribes in the region. Although none of the federally- or state-recognized tribes is actively engaged in the planning process, through the project review process UMRWA and the RPC have sought to minimize impacts to these communities and provide for equitable benefits associated with project implementation. Impacts to DACs and Native American tribes will be kept to a minimum, and ongoing coordination and public involvement will aid in preventing possible impacts. Construction of project facilities will create short-term environmental impacts (noise, dust, traffic disruption) at neighboring communities. A preliminary analysis of the areas affected by construction of project facilities will ensure that these construction nuisance impacts will not be borne predominantly by any minority population or low-income group.

4.3.2. Project / Program Impacts and Benefits

The potential benefits and impacts summarized in Table 4-1 are described in more detail in the following sections. Additionally, the projects included in the MAC Plan Update by project type are summarized in the table included in Appendix C. For each project, potential benefits and impacts are assumed to be similar to those identified for the specific project type.

Benefits

Increased groundwater storage / recharge

The Eastern San Joaquin subbasin, within the San Joaquin Valley Groundwater Basin, extends from the western corner of Calaveras County west of the cities of Stockton and Lodi. Use of groundwater for irrigation and municipal purposes has resulted in a continuous decline of available groundwater over the past 40 years. As of 1990, annual groundwater extractions in San Joaquin County had exceeded the estimated safe yield. Overdraft of the groundwater in this subbasin has created groundwater depressions in areas near Stockton and east of Lodi. Groundwater recharge could help improve the state of the subbasin. Groundwater improvement programs may include projects to:

- Enhance conjunctive management and groundwater storage
- Aquifer storage and recovery
- Stormwater capture and recharge
- Construction of new and/or rehabilitation of spreading grounds/recharge basins
- Improvement to groundwater monitoring
- Hydrogeologic investigations and groundwater modeling

Improved water supply reliability

Improving water supply reliability in the MAC Region is Policy 2, developed as part of the Regional Goals and Objectives. Projects that diversify the Region's water supply portfolio, create new supplies, improve efficiencies of existing supplies, or offset potable water supplies will improve the MAC region's water supply reliability. Projects that would achieve this benefit include:

- Water use efficiency and water conservation projects
- New water supply pipelines and/or rehabilitation/repair projects
- Water system tie-ins, interconnections, and diversion structures
- Water transfer projects
- Groundwater extraction and/or treatment projects
- Water storage and treatment projects
- Upgrading wastewater treatment facilities to produce recycled water
- Water quality protection projects

Improved water quality

Policy 1, as described in Section 3, Policies, Goals, Objectives, and Strategies, is to Maintain and Improve Water Quality. Different types of projects contribute to different types of water quality improvements. For example, groundwater recharge projects can improve groundwater quality in the overdrafted Eastern San Joaquin groundwater subbasin, while treatment improvement projects will improve potable water quality. Projects that improve water quality include, but are not limited to:

- Stormwater projects (e.g. stormwater capture and recharge or stormwater management to reduce volume of urban runoff discharged to surface waters)
- Upgrading wastewater treatment plants
- Groundwater monitoring and assessment
- Conversion of septic systems to municipal sewers
- Conjunctive management and groundwater storage
- Sewer collection improvements
- Water treatment projects
- Ecosystem restoration and revegetation projects
- Land conservation
- Salinity management

Reduced land subsidence and/or fissuring

Land subsidence occurs when groundwater is excessively pumped from a groundwater basin; the clay layers in the aquifer settle and the ground surface in the area lowers, eventually creating a cone of depression. Projects that will reduce groundwater pumping or increase groundwater recharge will help reduce land subsidence and fissuring. These projects include:

- Enhance conjunctive management and groundwater storage
- Stormwater capture and recharge
- Construction of new and/or rehabilitation of spreading grounds/recharge basins
- Improvement to groundwater monitoring
- Hydrogeologic investigations and groundwater modeling

Local prosperity

Local prosperity can be achieved by:

- Avoiding costs of imported water supply by increasing the use of recycled water, creating new water supply sources within the region, or capturing and reusing stormwater.
- Avoiding costs of water supply infrastructure with the implementation of water conservation and water use efficiency projects.
- Avoiding flood damage costs.
- Avoiding impacts to the economy (e.g. businesses and agriculture) associated with water supply interruption.
- Increased tourism with enhanced recreational opportunities and improved water quality.
- Benefits to the regional economy associated with constructing and maintaining proposed IRWM projects.

Additionally, as previously stated, working on a regional basis aids in protecting the economy of the MAC region and minimizing direct monetary impacts felt by DACs in the region through the stabilization of water and wastewater utility rates. IRWM planning and collaboration can lead to multi-benefit projects that achieve cost savings through cost-sharing opportunities, economies of scale, resource sharing, and other mechanisms. Existing resources can be optimized, duplication of efforts avoided, and larger scale efforts developed to provide cost savings to all involved.

Long-term sustainability of water supplies

Some groundwater basins throughout California contain salts and nutrient levels exceeding water quality objectives established in Water Quality Control Plans (Basin Plans). The high salt and nutrients concentrations could be from natural conditions and irrigation with surface water, groundwater, and recycled water. Salinity management is key in contributing to the long-term sustainability of groundwater supplies. Groundwater quality varies throughout the MAC region with overdraft in portions of the Eastern San Joaquin or Cosumnes Groundwater Subbasins. As new water supplies are developed, recycled water use increases, and groundwater recharge projects are implemented, the importance of salinity management will increase.

Public education and environmental awareness

Many water conservation, water quality protection, and water supply projects include public education and environmental awareness components, creating multi-benefit projects or programs. Public outreach programs and components can help promote and increase water conservation, educate about forest stewardship which can improve water resources, discourage illegal dumping of trash and litter in watercourses, and encourage appropriate water management practices including appropriate collection and disposal of hazardous liquid wastes and pharmaceuticals.

Increased nutrient levels for landscape irrigation

Depending on the nutrients supplied by the recycled water available, increasing the use of recycled water for landscape irrigation through construction of additional conveyance facilities could significantly reduce the amount of fertilizer required for the areas irrigated.

Potable water offsets

The benefits of potable water offsets will be achieved by stormwater and recycled water projects. As new non-potable water supplies are identified and the use for irrigation or other beneficial uses are implemented, surface water and groundwater in the MAC region will be freed up for other uses. The Eastern San Joaquin subbasin can be replenished as groundwater pumping is reduced and flows in the Mokelumne River and other surface water bodies in the watershed can increase as diversions are reduced. Potable water offsets are also tied to improved water supply reliability and diversification of the region's water supply portfolio. Projects that would provide potable water offsets include:

- Recycled water treatment and conveyance projects.
- Stormwater capture and reuse/recharge.
- Conversion of septic systems to centralized sewer collection systems to increase the amount of recycled water available.

Flood control enhancement

Flooding is a concern for many areas within the MAC IRWM planning region. Many cities and communities are included in 100-year floodplains (of both the Mokelumne River and its tributaries), including Sutter Creek, Jackson, Ione, and Mokelumne Hill. In some cases, like in the City of Plymouth, flooding is due to an inadequate storm drainage system, unable to handle heavy storms during winter and spring seasons. The Calaveras County General Plan discusses three basic types of potential flood hazards: stream-side overbank flows, areas of flat terrain with slow surface drainage, and inundation due to structural dam failure. Flooding can occur from heavy rainfall, rapid snow melt, saturated soils, or a combination of these conditions. Also, increasing development leads to an increase in impervious surface areas and a decrease in natural vegetative cover, which reduces the detention and attenuation characteristics of the overland areas. To reduce potential property and structure damage, and economic impacts, flood control enhancement may be provided by projects that:

- Capture and divert stormwater.
- Improve levee systems (e.g. floodwalls or setback levees).
- Install pervious pavement.
- Protection and manage floodplains.

- Construct regional flood control infrastructure.

Increased recycled water

By centralizing sewer collection systems in areas that may still be on septic, a greater volume of wastewater will be treated at the wastewater treatment facilities, creating more recycled water for beneficial uses. Increasing the amount of recycled water available for landscape, golf course, and school irrigation, industrial uses, and other uses, will lead to other benefits such as potable water offsets and increased nutrient levels for landscape, previously discussed.

Habitat protection, restoration, and enhancement

Projects that contribute to habitat protection and restoration have the ability to enhance the MAC Region's ecosystems and protect threatened, endangered, and sensitive species. The following types of projects would provide this benefit:

- Land conservation.
- Water quality protection projects that would result in surface water quality improvement.
- Invasive species removal.
- Restoration and enhancement of special aquatic features (e.g. wetlands, springs, bogs).
- Stormwater management and pollution prevention.
- Debris cleanup and habitat restoration.
- Meadow restoration.
- Forest fuels reduction.
- Road management activities to reduce runoff to streams.

Reduced threat of wildfire

Wildfires threaten property, lives, and ecosystems, and can adversely impact flood management and erosion. Ecosystem Restoration and Protection activities such as forest restoration can help reduce the threat of wildfire. There is already evidence that wildfires are becoming more frequent, longer, and more widespread, and they are expected to increase in frequency and severity due to climate change (CDM, 2011).

Open space preservation

Open space preservation is a benefit that can be achieved through implementation of land conservation projects. Preserving open space contributes to other benefits such as environmental and recreational benefits, as well as stormwater control, reduced runoff, and flood management benefits.

Enhanced recreation and public access

Reservoirs, parks, and the wilderness within the MAC Region are used by outdoor recreation enthusiasts throughout the year. Enhancing recreation and public access in the region will be achieved by projects that:

- Conserve and preserve open space and access to public land.
- Remove and control invasive species.
- Improve water quality.
- Provide appropriate sanitation facilities at recreation sites.
- Road management activities to reduce runoff to streams.
- Improve opportunities for public outreach and environmental education.

Impacts

Implementation of the projects described in this plan may also have quantitative and/or qualitative impacts if the MAC Plan Update and/or its component projects are not managed or implemented properly.

These impacts may include increased project costs to agencies and ratepayers, delayed construction and/or operation of planned facilities leading to delayed water supply and other benefits, negative impacts to surface water and/or groundwater quality, and more limited operational flexibility, especially in times of drought, leading to increased water rationing and associated pressure on water users and the environment.

Project-specific environmental compliance processes will be completed by project proponents prior to project implementation. These processes will determine the significance of project-related impacts. Each project will comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), if applicable prior to and throughout implementation.

Negative impacts that could be associated with the implementation of projects and programs included in the MAC Plan Update are similar to those of other water infrastructure projects. In general, temporary, site-specific impacts related to construction and potential long-term impacts associated with project operation are anticipated. Short-term, site-specific construction impacts from implementing physical project facilities may include increased traffic and/or congestion; noise; and impacts to public services, utilities, and aesthetics. Other potential, longer-term impacts are described in more detail below.

Water quality degradation

Groundwater-related projects, such as projects that increase groundwater pumping or implement conjunctive use, could degrade water quality if not operated appropriately for the groundwater basin and conditions. In addition, projects that involve the implementation of potentially contaminating activities in groundwater recharge areas could result in negative impacts to groundwater quality. Surface water quality could similarly be impacted by projects that encourage recreation and / or intensive development have the potential to increase loading of nutrients, bacteria, and other contaminants to adjacent surface water bodies, negatively impacting water quality for water supply and environmental needs.

Recreation-related projects also have the potential to increase erosion and sedimentation. Increased motor vehicle traffic and foot traffic can increase erosion and sedimentation to adjacent water bodies, negatively affecting water quality for water supply and the environment/habitat purposes. Water quality issues associated with increased erosion and sedimentation can be detrimental to aquatic communities. Additionally, storm drains and channel modifications that are implemented to manage flood flows can contribute to erosion and sedimentation. Projects that allow use of motorized watercraft may introduce organic contaminants to water bodies.

Reduced groundwater availability and reliability

There are groundwater quality issues in many areas within the Eastern San Joaquin groundwater subbasin, as well as the Cosumnes subbasin. Projects that impact water quality and/or yield could reduce overall groundwater availability and water supply reliability to users depending on the source. Increased groundwater pumping in the Eastern San Joaquin subbsain would contribute to existing overdraft conditions, potentially degrading water quality and further decreasing overall reliability.

Land use compatibility (rights-of-way)

A potential impact of any project that includes construction of physical facilities is land use compatibility. The types of projects that could potentially have land use compatibility, or rights-of-way issues, include:

- Water conveyance facilities
- Storage tanks or reservoirs
- Treatment plants
- Wastewater collection
- Recycled water distribution facilities

Construction of new facilities outside of disturbed areas such as roads could result in disturbance of otherwise undisturbed areas and may result in loss of open space and habitat.

Disturbance of habitat and endangered species

The MAC Region is a largely natural area with significant portions designated as rural or open space, including large portions of the Stanislaus and El Dorado National Forests. The region provides habitat for numerous species, including special-status species (i.e. endangered, threatened, sensitive, or candidate). Projects that involve facility construction have the ability to disturb surrounding habitat and endangered species, depending on the location, type of construction, and facilities. All projects implemented will comply with CEQA and NEPA, as applicable, and as part of the process, will identify and implement mitigation measures for potential environmental impacts as necessary.

Energy consumption

The water sector plays a significant role in California's energy consumption. Implementing certain projects may increase energy use. Water and wastewater treatment projects that require significant amounts of power may result in increased energy consumption in the region. Increased energy consumption can increase greenhouse gas emissions, further exacerbating projected climate change impacts.

Reduced discharges to Mokelumne and Calaveras Rivers

Agricultural and urban water use efficiency projects (i.e. water conservation) could reduce the quantity of water discharged to the Mokelumne and Calaveras rivers, effectively reducing streamflows and impacting aquatic habitat.

Economic impacts

Implementation of certain projects may have associated long-term economic impacts to agencies and ratepayers. Project financing has historically provided a challenge in the MAC Region. Even when grants and / or low-interest loans are available to subsidize project capital costs, agency rate revenues are sometimes insufficient to properly operate and maintain the project. . Because funds available to implementing agencies are generally limited it will be important to evaluate financing methods and avenues for potential projects prior to implementation such that potential economic impacts on ratepayers and agencies in the Region can be minimized.

4.4. Financing Plan

The Integrated Regional Water Management (IRWM) Plan must plan for implementation and financing of identified projects and programs including potential financing for implementation. The financing discussion must include:

- List of possible funding sources for continued development of the IRWM Plan
- List of funding mechanisms for the projects and programs in the Plan
- Explanation of the certainty and longevity of funding for the Plan and projects/programs in the Plan.
- Explanation of how O&M costs for projects that implement the Plan would be covered and the certainty of the funding

Given the low density development in the MAC region, project financing has always proven to be a major obstacle, often preventing projects from proceeding to implementation. Demands on agencies' and cities' limited funds continue to increase, construction costs continue to rise, existing aging infrastructure requires upgrades to meet growing demands, and future state legislation threatens to shift substantial property tax revenues away from special districts to the state general fund. In this economic climate, agencies are challenged to balance costs associated with supply water for new growth while ensuring the highest standards of water quality and supply reliability for existing customers, protect and enhance the sensitive ecosystems within the region, and minimize costs incurred by end-users. Further, projects that benefit the environment but do not provide new water or a measurable improvement to water supply reliability and/or water quality are wholly dependent upon public assistance for implementation.

4.4.1. Funding Sources and Mechanisms for Planning and Implementation

MAC IRWM regional stakeholders recognize the importance of maintaining the highest standards of cost-effectiveness for the development of, and future updates to, the MAC Plan, as well as projects and programs considered for implementation. Regional stakeholders are concerned about not passing on the costs of unnecessary or poorly justified MAC Plan-related activities to ratepayers in the form of increased water and wastewater rates. Agencies within the region have explored a variety of potential regional water resource planning and implementation funding vehicles including the State Revolving Fund, Proposition 50, 84, and 1E, Hazard Mitigation Grant Program, and other State and Federal grant and loan programs, in addition to rate revenues, bond financings, assessments, and potential county and municipal revenue sources. The development of this MAC Plan Update is being funded by a combination of UMRWA funding (budgeted specifically for this update) and Prop 84, Round 1 Planning Grant monies. Additionally, UMRWA member agency staff have contributed significant time and resources to completing the Plan Update, coordinating and participating on the Regional Participants Committee, and organizing stakeholder outreach efforts. The MAC region is committed to developing a useful and implementable IRWM Plan, which includes Plan performance monitoring and updating the Plan in the future to help ensure the Plan responds appropriately to current day conditions and issues.

With regard to projects and programs which implement this updated MAC Plan, estimated costs for each IRWM plan project are shown in Appendix C, along with potential funding sources (exclusive of additional local, state or federal grant monies). It should be recognized that each implementing organization has a unique set of revenue and financing methods and sources. This IRMWP does not provide an exhaustive list of funding sources available. Many of the same funding sources and/or mechanisms would be used for continued development of the IRWM Plan and for project / program implementation. The various potential funding sources for both updating the IRWM Plan and implementing projects are listed in Table 4-3. The funding mechanisms are further described in the following sections.

Table 4-8: Funding Sources for Development of the IRWM Plan and Implementation of Projects

Funding Mechanisms	Continued Development of the IRWM Plan	Project / Program Implementation	Certainty & Longevity of Funding
Capacity Fees		✓	Dependent upon rate structure adopted by project proponents
User Fees		✓	Dependent upon rate structure adopted by project proponents
User Rates / Recovery		✓	Dependent upon rate structure adopted by project proponents
General or Capital Improvement Funds	✓	✓	Dependent upon budgets adopted by project proponents and participating agencies
Bonded Debt Service		✓	Dependent upon debt carried by project proponents & bond market
Local, State, or Federal Grant Programs	✓	✓	Dependent upon future local, state, and federal budgets, and success in application process
Low-interest Loan Programs		✓	Dependent upon future local, state, and federal budgets, and success in application process

Capacity Fees

Capacity fees are used almost universally by water agencies as a measure to achieve and maintain equity among its past, present and future customers. For a growing water agency, capacity fees can represent more than half of the total revenue in any given year, and as such are very important to existing as well as future customers. Capacity fees are typically charged per connection, measured in equivalent dwelling units (EDUs). A single connection may encompass more than one EDU. In addition to the connection fee aspect of capacity fees, water agencies may also assess other fees, e.g., Commercial Acreage Fee (per acre) and Other Service Fee (per acre).

In some cases, if a developer builds a water pipeline or large water facility required by a water agency as a condition of development, then as partial or full payment for the water facility, a water agency may give fee credits to the developer in lieu of the developer paying fees. If the value of the water facility exceeds the amount of credits, a reimbursement agreement is typically executed authorizing payment to the developer of the remaining amount owed over a period of time which does not typically exceed a defined time period. Capacity fees can be controversial if not structured to achieve equity.

User Fees

Monthly user fees are assessed by some water agencies where an argument can be made that new facilities directly benefit existing customers. This is especially true for water agencies that are developing conjunctive use water systems where the existing customers may have paid for the groundwater component when they paid the development fee (through the purchase of the home). The surface water and/or recycled water component is a new water supply for a water agency that is needed for conjunctive use with groundwater supplies. In many cases, income from this monthly revenue source is used to pay debt service on debt financed assets.

User Rates/Rate Recovery

User rates or rate recovery pays for the operations and maintenance of a water agency or public utility's system. Within a water agency user rate, there is a fixed cost component that covers costs that do not vary with the amount of supplied water, such as labor and overhead expenses, and a variable cost component that covers costs that are based on the amount of pumping and applied chemicals to meet the water demands of the customers and vary with the amount of supplied water, such as the electrical and chemical costs. A water agency customer pays a monthly fixed rate and a variable rate based on the metered usage. In cases in which billing is not based on a metered usage, a single monthly rate is assessed that combines the average of the fixed and variable rates.

General or Capital Improvement Funds

General or capital improvement funds are monies that an agency sets aside to fund general operations and/or facility improvements, upgrades and, sometimes, development. These funds are usually part of their overall revenue stream and may or may not be project-specific.

Bonded Debt Service (Revenue Bonds)

In cases in which a large facility is needed to support current services and future growth, revenue bonds are issued to pay for new capital. In this way, a large facility can be paid for by bonded debt service at the time of construction with repayment of the debt service over a 20- to 30-year timeframe. This is a preferred approach to paying for high cost facilities because it avoids the perceived over-collection of fees from past customers that go toward facilities that serve present and future customers. The downside to bonded debt is that it cannot be accomplished with capacity fees alone due to the variability and uncertainty of new development over time. A user rate is needed as a bond document covenant in the event that development fees are not adequate to make the required annual payment for the debt service.

Local, State, and Federal Grant Programs

Grant programs at either the local, state, or federal level are periodically available to the region. In the past, UMRWA has applied for and received planning grant funding through the Department of Water Resources (DWR) IRWM grant program. This 2011/2012 MAC Plan Update is being funded by Prop 84, Round 1 planning monies. Additionally, UMRWA and members of the MAC Regional Participants Committee (RPC) have applied for and obtained state and federal funding for studies and projects benefiting the region. These monies typically require that local matching funds be available. The matching requirement shows a local commitment to promoting and completing the study or project. A grant is typically administered and contracted by a single agency within the region that works directly with the state or federal granting agency. Grants typically carry relatively high administration cost because extensive grant reporting may be required, and typically only a small portion of the grant may be used to cover grant administration.

In the past, the region has actively sought external funds for development of the MAC IRWMP and implementation of regional projects and programs. Examples of past sources of funding include:

- Federal Funding (Corps, Reclamation, FEMA)
- State Funding (Proposition 13, CALFED, Proposition 50, Proposition 84)
- Local Funding (impact fees, user rates, tax assessments)

These efforts are expected to continue to fund implementation of the projects and programs developed in the MAC Plan Update.

Low-interest Loan Programs

Several funding agencies provide low-interest loans for implementation of water resource-related projects. Low-interest loans can save the implementing agency significant amounts of money by reducing interest payments as compared with traditional bonds. SWRCB offers low-interest loans for wastewater and recycled water projects through its Clean Water State Revolving Fund (SRF) loan program, CDPH administers a similar SRF loan program for drinking water-related projects, and the California Infrastructure and Economic Development Bank (I-Bank) administers the Infrastructure SRF loan program for financing implementation projects such as sewage collection and treatment, water treatment and distribution, and water supply projects.

The Clean Water SRF program generally has approximately $200 to $300 million available in loans each year to help cities, towns, districts, Native American tribal governments, and any designated and approved management agency under Section 208 of the Clean Water Act to construct publicly-owned facilities including wastewater treatment, local sewers, water reclamation facilities, nonpoint source projects, and development and implementation of estuary comprehensive conservation and management plans. The interest rate is half of the most recent General Obligation (GO) Bond Rate at the time of the funding commitment. Over the last five years, the Clean Water SRF loan interest rate has ranged from 1.8% to 3.0%. Amounts available through the CDPH Safe Drinking Water SRF loan program vary, but approximately $100 to $200 million is available annually.

Available loan funding is dependent upon federal appropriations to each program. In the past, DWR has also offered low-interest loans for construction and feasibility studies for new local water supplies to local public agencies. The funding source, Proposition 82, has been exhausted for these loans, therefore, they are no longer available.

It is possible that low-interest loans may be available to fund projects and programs included in the MAC Plan Update.

4.4.2. Support and Financing for Operation and Maintenance of Implemented Projects

Ongoing support and financing of the operation and maintenance (O&M) of projects in this Plan Update are expected to derive from many of the same sources that were identified to fund project implementation. Support and financing will likely come primarily from local sources, including user rates, fees and assessments. Since regional projects and programs often involve multiple partner agencies, the range of local sources available is broadened. The details of financing these larger, multi-partner projects are typically worked out on a project-by-project basis. Large multi-purpose projects typically adhere to standard cost accounting and cost of service principles which are typically described and codified in the agreements for ownership, and operation and maintenance of facilities is typically developed as part of a project financing package.

O&M costs of proposed implementation projects must be evaluated as the overall viability of a particular project effort is determined. Any project that is advanced for implementation consideration must include an analysis to determine ability to operate and maintain the project and project benefits. The annual fiscal impact on user rates, and the willingness of ratepayers to accept any increased cost of service as may be required for project implementation, must be included in this analysis. The need for water and the economic hardship impacts that would occur, should the new source not be available, may also be considered as part of the analysis. Any benefits derived from replacing and/or updating existing systems can also be considered.

For non-water supply projects, alternate criteria must be considered in evaluating the region's ability to provide ongoing support. For example:

- Wastewater costs, using strict cost-of-service principles, can be considerable (including O&M costs). Cost recovery is primarily a function of an agency's ability to charge fees for wastewater collection and treatment of wastewater.
- Watershed improvement projects are designed to minimize the need for ongoing operation and maintenance expenses. Costs associated with monitoring and/or staff support to track and implement projects and studies can potentially be covered through membership contributions, grants, or by other non-profit funding vehicles not necessarily available to governmental agencies.
- Projects focused on providing water quality benefits must be designed to employ a process that allows for low-cost operation and maintenance. For example, debris build-up (and hence the need for its removal) must be a consideration in the system design.

To improve the MAC region's ability to provide ongoing support to priority projects, agencies and stakeholders in the region should work together to minimize associated O&M costs and gain savings from economies of scale.

4.5. Technical Analysis

The Integrated Regional Water Management (IRWM) Plan must:

- Document the data and technical analyses that were used in the development of the Plan.

The MAC Plan Update has been developed using sound technical information, analyses, and methods. Information and documents were collected from various sources including AWA, CCWD, EBMUD, and USFS, as well as Amador and Calaveras counties, and the cities within those counties. Multiple local water planning documents were reviewed and used to prepare the MAC Plan. These include Urban Water Management Plans (UWMPs), Water Supply Master Plans (WSMPs) including EBMUD's comprehensive WSMP 2040 (completed in 2011), project Environmental Impact Reports/Environmental Impact Statements (EIRs/EIRs) and feasibility studies, and grant applications for other state and federal programs. Table 4-1 in Section 4.2.2 summarizes some of the key planning reports used in the MAC IRWM planning process and update, while Table 4.2 lists the documents demonstrating the technical feasibility of specific projects included in the Plan Update. Additionally, the documents cited in the References section were reviewed and used in development of the MAC Plan Update.

The technical information included in these plans and studies is very suitable for developing the MAC Plan Update. While some are project-specific documents, others address water management issues on a local or regional basis. This allows for an understanding of regional issues shared by multiple entities in the Mokelumne Watershed as well as more specific, localized issues. Because some of the documents used in the update process are focused on understanding and solving local water resource issues, such as the *New York Ranch Reservoir Conservation and Management Plan*, there is a basis for not only the specific issues, but also potential solutions.

A regional study and management plan heavily relied upon in the update process is the *Upper Mokelumne River Watershed Assessment and Planning Project*, a $1.3 million milestone project completed by UMRWA in December 2007, was undertaken to advance the understanding of watershed water quality and related environmental issues, and to develop tools which will facilitate the long-term evaluation and management of Upper Mokelumne River watershed water and natural resources. Funding for the project was provided by Authority member agencies ($317,500) and by grants from Propositions 50 and 84 ($950,000). Development of this comprehensive watershed project was guided by a Project Advisory Committee (PAC), which included stakeholders representing a diverse set of watershed interests such as water, resource management, environmental resources, agriculture, timber, recreation and national forest lands. The project assessed baseline watershed water quality, providing a reference point for assessing water quality impacts associated with future changes in the watershed. In addition, a physical hydrologic watershed model was developed using the Watershed Analysis and Risk Management Framework (WARMF) tool. The WARMF model was used to analyze the watershed's existing hydrologic and water quality characteristics as to simulate how water quality conditions could change based on changes to land uses and activities. Activities and reports prepared as part of this project included:

- *Wildfire Models* – Fire behavior was modeled throughout the watershed to gain a better understanding of high risk areas and potential impacts from wildfires. *FlamMap* was used to determine the relative hazard and flammability of selected watershed areas. This model enables prediction of fire behavior on a spatial basis by modeling flame length, heat release, rate of spread and type of fire (e.g. surface fire, crown fire). The *FARSITE* model was used to simulate potential fire behavior and predict where and how fast fire would spread from pre-selected burn ignition sites in the watershed. The fire behavior simulation outputs were used to develop three new categories of land use / land cover for the watershed based on burn severity: low, moderate and high. The spatial distribution of the burn severity categories for each selected ignition site was used as an input to the WARMF model to simulate potential effects on water resources resulting from wildfires in specific vulnerable areas of the watershed.

- *Water Quality Vulnerability Zones* – Areas within the watershed considered to have very high to moderate vulnerability to water quality contamination were identified based on key physical characteristics of the watershed including slope, soils, vegetation and proximity to water. A map was developed identifying watershed vulnerability zones.

- *Watershed Assessment* – The water quality in the Upper Mokelumne River watershed was assessed in a three-step process. Guided by the stakeholder PAC, water quality benchmarks were established, specific water quality parameters of concern were identified, and selected parameters exhibiting historical exceedances were analyzed to determine source locations and characteristics.

- *Upper Mokelumne River Watershed Management Plan* – A management plan was prepared, addressing the findings of the watershed assessment by coupling scientifically valid data and technically-based recommendations to maintain and improve source water quality with stakeholder understanding and support. The PAC-guided plan contains a series of recommended management actions designed to reduce sources of contaminants, manage contaminated flows and sediments, and encourage regulatory and institutional controls.

The Plan consists of projects, programs, studies, and planning activities that local and regional planners have found to be technically feasible based on similar projects, pilot studies, technical analyses, benefit analyses, cost estimating, modeling and simulation efforts and data assessments.

As each project moves closer to design and implementation, technical and economic analyses will be conducted to confirm project feasibility and to provide any necessary feedback to modify the project's plan to improve its likelihood of success. The following table summarizes project-specific documentation that supports the technical feasibility of the project included in the MAC Plan Update, and therefore, the technical feasibility of Plan implementation.

Table 4-2: Documents Supporting the Technical Feasibility of MAC Plan Update Implementation

	Proponent	Project	Documentation Regarding Technical Feasibility of Project
1	AWA	CAWP & AWS Intertie	Ken Zeier, Amador Canal Potable Water Feasibility Report, 2009
2	AWA	CAWP Gravity Supply Line	1989 – Leedshill-Herkenhoff Study 1995 – HDR CAWP System Master Plan 2007 – AWA In-House Study
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	Ken Zeier. A Study on the Feasibility of Supplying Potable Water to Customers along the Upper Section of the Amador Canal in Central Amador County, 2009.
4	AWA	Lake Camanche Wastewater Improvement Program	2002 Lake Camanche Village Treated Wastewater Long Term Disposal Work Plan- KASL Engineers 2003- Wastewater Treatment and Disposal Alternatives Feasibility Study for EBMUD Camanche North and South Shore Recreation Areas and Amador Water Agency County Service Area (CSA) No.3- URS Corporation 2005- EBMUD/AWA Phase 2 Regional Wastewater Treatment and Disposal Study- Kennedy/Jenks Consultants 2005- AWA WWID #11- Interim WWTP and Effluent Alternatives- Kennedy/Jenks Consultants 2008- California Tiger Salamander Study and other critical species analysis- PBS&J
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	Ken Zeier. A Study on the Feasibility of Supplying Potable Water to Customers along the Upper Section of the Amador Canal in Central Amador County, 2009.
7	AWA	AWS Regional Water Treatment Plant	2004-Ione Water Treatment Plant Feasibility Study- Boyle Engineering 2008-Tanner Regional WTP Preliminary Design Report- Stantec Engineering
8	AWA	Lower Amador Canal Project	
9	AWA	Backwash Water Reuse Project	
10	AWA	CAWP Fire Storage	1995 CAWP Master Plan- HDR Engineering, Inc. 1995 Master Plan and Connection Fee for Amador County Water Agency, Improvement District No. 1- Engineering alliance, Inc, Bartholomew Engineering, Inc.
11	AWA	Highway 88 Corridor Wastewater Treatment,	

	Proponent	Project	Documentation Regarding Technical Feasibility of Project
		Transportation, Disposal	
12	AWA	Ione Treated Water Loop	
13	AWA	Regional Wastewater Project	Amador County Regional Wastewater Management Plan
14	AWA	New York Ranch Reservoir Conservation and Management	2007- New York Ranch Reservoir Conservation and Management Plan- Edith Read, Center for Natural Lands Management & Jim Robins, Alnus Ecologic 2008- Technical Report, New York Ranch Reservoir Model, HIS Hydrologic Systems 2010- New York Ranch Reservoir Natural Resource Conservation & Management Plan- Jim Robins, Alnus Ecologic
15	AWA	AWA Low Pressure Flow Improvements	
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	
17	AWA	Lake Camanche Water Service Replacement-Phase II	
19	AWA	Wildwood Leachfield Replacement	
20	AWA	Bear River Reservoir Expansion Project	Bear River Water Supply Alternatives for Amador Water Agency and Calaveras County Water District revised in 2005
21	UMRWA	Septic System Management Program	Upper Mokelumne River Watershed Management Plan - 2007
22	CCWD	Leak Testing and Repair Program	
23	CCWD	New Hogan Reservoir Pumping Project	Evaluating the Potential for Agricultural Development in Calaveras County, June 2011.
24	CCWD	New Hogan Phase II Water Distribution Loop Project	Evaluating the Potential for Agricultural Development in Calaveras County, June 2011.
25	CCWD	Sheep Ranch WTP Compliance Project	
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	Predesign Report – Water Treatment Facilities Camanche South Shore Recreation Area – EBMUD and CCWD – 1994 Camanche South Shore Water Treatment Plant Feasibility Study – EBMUD - 1999 Draft Mitigated Negative Declaration – EBMUD's Camanche Water Treatment Plant Replacement Project – July 2001 Camanche South Shore and North Shore Treatment Plants Evaluation – EBMUD – May 2003
27	CCWD	West Point WTP Drinking Water Compliance Project	
28	Foothill Conservancy	East Panther Creek Restoration Project	

	Proponent	Project	Documentation Regarding Technical Feasibility of Project
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	
30	Foothill Conservancy	Amador Household Water Efficiency Project	Amador Water Agency Conservation Plan. 2009.
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	North, N., P. Stine, K. O'Hara, W. Zielinski, and S. Stephens. 2009a. An ecosystem management strategy for Sierran mixed-conifer forests. General Technical Report, PSW-GTR-220. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, California. 49 pp.
32	City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	Wastewater Treatment, Storage, Disposal, and Reclamation Options Report" dated August 2010 and prepared by ECO:LOGIC
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	
34	AWA	Ione Clearwell Cover Replacement	
35	AWA	CAWP Tanks Replacement Project	
36	AWA	Camanche Wastewater System Improvements	June 2001 – Lake Camanche Village Unit 6 Pump Station 'C' Replacement Project Report
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	1995 Master Plan and Connection Fee Study- Engineering Alliance Inc. & Bartholomew Engineering, Inc.
38	AWA	CAWP Disinfection By-Product Reduction Project	June 2012 DBP & BW Reports

5. Plan Administration

5. Plan Administration

This chapter describes how the MAC Plan will be maintained and administered following its adoption by the RWMG. Included in this chapter are two separate but related sections: Plan Performance and Monitoring, and Data Management.

5.1. Plan Performance and Monitoring

Integrated Regional Water Management (IRWM) Plans must contain performance measures and monitoring methods to ensure the objectives of the Plan are met. This section should describe a method for evaluating and monitoring the RWMG's ability to meet the objectives and implement the projects in the IRWM Plan.

The intent of the Plan Performance and Monitoring section is to substantiate that the MAC Region: is efficiently making progress towards meeting the MAC Plan objectives, is implementing projects listed in the plan, and is ensuring that each project in the MAC Plan is monitored to comply with all applicable rules, laws, and permit requirements. This chapter describes the general process that will be employed to track MAC Plan performance and to monitor progress being made to implement the projects contained in this plan.

5.1.1. Tracking and Reporting MAC Plan Performance

A MAC Plan Performance Review will be conducted, at a minimum, every three years (or as deemed appropriate by the RWMG) to evaluate progress made toward achieving Plan objectives. The Plan Performance Review will be administered by the RWMG and supported by the RPC or, at its discretion, by a subcommittee of the RPC.

Two tables will be generated with each Plan Performance Review: one that addresses the extent to which the MAC Plan's objectives have been met, and one that describes progress made in implementing the projects listed in the MAC Plan. The first table, which will be entitled 'Progress Toward Achieving Plan Objectives', will report the performance measure data collected and submitted by the reporting agencies for each of the MAC Plan objectives listed in Chapter 3.

The second table, which will be entitled "Status of Project Implementation" will list all of the projects in Chapter 4 of the MAC Plan, their implementation status, and funding source. Projects that have been fully implemented will be highlighted separately.

Templates of these tables are provided below.

Table 10-1: Example Reporting Template: Progress toward Achieving Plan Objectives[1]

Goal: Reduce sources of contaminants.		
Objectives	Performance Measures	Monitoring/Reporting Result
Reduce abandoned mine flows and sediments.	Number of mines known to cause water quality issues for which remedial actions are implemented. Abandoned mines are defined as those in the Office of Mine Reclamation database plus other locally known mines.	
Reduce leakage from septic systems.	Number of problem septic systems identified; number of problem septic systems corrected; number of problem septic systems eliminated	
Increase bulky waste pickup programs, avoid illegal dumping, and increase collection of illegally dumped trash.	Number of new bulky waste pickup dates; estimated tons of illegal waste picked up; number of campaigns or other measures undertaken to stop illegal dumping.	
Identify informal recreation and camping sites with recurring waste issues and initiate remedial actions.	Number of identified problem sites; number of identified sites for which remedial actions are initiated.	

[1] This template includes the performance measures to be reported on for Policy 1, Goal 1 only. Similar tables will be prepared and completed for the remaining goals under Policy 1, as well as Policies 2 – 4, as part of the MAC Plan Performance Review.

Goal: Reduce sources of contaminants.		
Manage fire fuels to reduce wildfire impacts.	Number of acres on which fire fuel reduction measures are implemented.	
Increase public awareness of how contaminated water resources affect quality of life and public health.	Number of school classrooms, articles in local newspapers and water agency newsletters, and other programs that receive water quality-related curriculum.	
Track increase of small county-monitored water systems.	Number of small water supply systems monitored annually by the counties.	

Table 10-2: Example Reporting Template: Status of Project Implementation

	Proponent	Project	Status of Project Implementation
1	AWA	CAWP & AWS Intertie	
2	AWA	CAWP Gravity Supply Line	
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	
4	AWA	Lake Camanche Wastewater Improvement Program	
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	
7	AWA	AWS Regional Water Treatment Plant	
8	AWA	Lower Amador Canal Project	
9	AWA	Backwash Water Reuse Project	
10	AWA	CAWP Fire Storage	
11	AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	
13	AWA	Regional Wastewater Project	
14	AWA	New York Ranch Reservoir Conservation and Management	
15	AWA	AWA Low Pressure Flow Improvements	
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	
17	AWA	Lake Camanche Water Service Replacement-Phase II	
19	AWA	Wildwood Leachfield Replacement	
20	AWA	Bear River Reservoir Expansion Project	
21	UMRWA	Septic System Management Program	
22	CCWD	Leak Testing and Repair Program	
23	CCWD	New Hogan Reservoir Pumping Project	

	Proponent	Project	Status of Project Implementation
24	CCWD	New Hogan Phase II Water Distribution Loop Project	
25	CCWD	Sheep Ranch WTP Compliance Project	
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	
27	CCWD	West Point WTP Drinking Water Compliance Project	
28	Foothill Conservancy	East Panther Creek Restoration Project	
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	
30	Foothill Conservancy	Amador Household Water Efficiency Project	
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	
32	City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	
34	AWA	Ione Clearwell Cover Replacement	
35	AWA	CAWP Tanks Replacement Project	
36	AWA	Camanche Wastewater System Improvements	
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	
38	AWA	CAWP Disinfection By-Product Reduction Project	

5.1.2. Project-Specific Data Collection and Monitoring Plans

Proponents of projects implemented as part of the MAC Region IRWM Program will be required to develop project-specific monitoring plans prior to or in conjunction with project implementation. Project proponents will be responsible for collecting the data consistent with MAC Plan requirements for compatibility with statewide databases, performing the monitoring activities, validating the data consistent with MAC Plan requirements for compatibility with statewide databases, and reporting both to UMRWA and to appropriate state databases. For projects that receive implementation grant funding from DWR, UMRWA (as the RWMG) will act as the overseeing entity, ensuring that each project proponent 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 UMRWA will use as a guideline for overall program implementation. Data collected and analyses performed as part of the performance monitoring plans will be reported to UMRWA 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 MAC Plan 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 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 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 proponents 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 for inclusion in the Region's centralized data management system (DMS). The project sponsor will also provide UMRWA with confirmation that the data has been submitted to the appropriate statewide database.

UMRWA will maintain a centralized DMS on the UMRWA electronic file system, which will house all original data provided by project sponsors. The data will be maintained by UMRWA and copies of all data will be available to stakeholders and members of the public through the MAC IRWMP website. Data management is discussed in greater detail in the following section.

5.1.3. Using the Information Collected

The Plan Performance Review process will include an adaptive management component which will allow the RWMG to respond to lessons learned from analyzing collected performance measure and project monitoring data. With this information, the RWMG, through the RPC, may consider modifying IRWM Plan objectives, performance measures, the applicability of selected resource management strategies, and the project review and prioritization process. These actions may in turn determine the types of projects that will be selected and implemented in the future.

Local agencies implementing projects as part of IRWM Plan implementation 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. Whenever the MAC Plan is updated in the future and regional objectives are revisited, the RPC will discuss and evaluate the MAC Plan Update implementation. The results of project-specific monitoring efforts will be utilized to identify areas where Plan implementation may need to be modified to best achieve Plan objectives moving forward.

For those projects included in this IRWMP that may be implemented independently from the MAC Region IRWM 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 Plan Performance Review, the RWMG will assess the extent to which the MAC Plan's objectives have been met, based on the projects and programs completed throughout the Region. In this way, progress made toward achieving Plan objectives by projects implemented outside of the IRWM 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.

5.2. Data Management

The Integrated Regional Water Management (IRWM) Plan must describe the process of data collection, storage and dissemination to IRWM participants, stakeholders, the public, and the State.

Data includes technical information such as design submittals, feasibility studies, reports, and any information gathered for a project in any phase of development (i.e. planning, design, construction, operation, and monitoring).

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 IRWM implementation activities can be integrated into existing State databases.

To this end, the MAC Plan Update has established standard data management documentation practices for IRWM Plan projects and programs that are required to be followed for projects and programs implemented as part of the IRWM program. Projects and programs implemented outside of the IRWM Program are encouraged to follow similar protocols to maximize usefulness and compatibility of data collected throughout the region, and to improve potential integration into statewide databases. The data proposed to be collected and anticipated reporting procedures are presented in the sections below. For the purposes of this plan, the term data refers to and includes technical documentation (such as designs, feasibility studies, and reports), as well as technical information collected as part of project or program planning, design, implementation, and operation.

5.2.1. MAC Region Data Needs

Throughout the MAC Region, a variety of local, state and federal agencies and non-governmental organizations collect valuable water quality data, but that data is not assembled in a uniform or collaborative manner, and in many cases is neither compatible nor comparable. Much of the data that is collected is program-specific with limited applicability region-wide. The MAC Region's IRWM planning process can help facilitate better information sharing and identify data needed by the region's agencies and organizations, project proponents, and stakeholders to more efficiently analyze and understand water quality and environmental conditions within the region.

Procedural data needs in the MAC Region include the following.

- Uniform data management protocols for MAC Plan projects to allow broader sharing and comparability
- Centralized data management to provide a means for addressing regional questions about the condition of water resources in the region.

In addition, the following data needs that are broadly applicable to the MAC Region were identified through the Upper Mokelumne River Watershed Assessment and Planning Project and RPC discussions conducted as part of the MAC Plan Update.

- Water quality, temperature, and streamflow monitoring data throughout the Region to assist in tracking water quality trends.
- Information on non-water quality related watershed conditions.

- Additional information on the location and extent of septic system-related water quality issues in the Region.
- Project specific information, such as project financing solutions

5.2.2. Data Collection Techniques

Data associated with the design and implementation of projects included in the MAC Plan Update 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, some of which are shown in Table 5-1. Data may also be developed by project sponsors using numerical models such as HEC, H2ONet, and various hydraulic and hydrologic models. Working with the project sponsors, the agencies shown in Table 5-1, and regional stakeholders, the MAC IRWM Program will continue to search for data relevant to the MAC IRWM resource management strategies on an ongoing basis. Any identified data gaps will be filled through the identification of new data sources or new or expanded monitoring activities.

Table 10-3: Sources of IRWMP Data

Federal	State	Local
National Climate Data Center	California Irrigation Management Information System (CIMIS)	Amador County
National Resource Conservation District	Department of Fish & Game	Alpine County
Army Corps of Engineers	Department of Public Health	Calaveras County
Bureau of Reclamation	Department of water Resources	City Planning Departments
U.S. Fish & Wildlife Service	State Water Resources Control Board & the Regional Water Quality Control Board	Upper Mokelumne River Watershed Council
U.S. Geologic Survey	California Natural Diversity Database	Northeastern San Joaquin Groundwater Banking Authority
National Marine Fisheries Service	California Department of Pesticide Regulation	Mokelumne, Calaveras, and Cosumnes River Water Purveyors
U.S. Environmental Protection Agency		Stakeholders
The Nature Conservancy		
U.S. Forest Service		

Data collected in conjunction with MAC Plan implementation projects will vary based on the type and scope of each individual project. Table 5-2 outlines the types of data expected to be collected by project type. These data will include, at a minimum, data relevant to surface water, groundwater, water quality, stormwater, and ecosystem restoration.

Table 10-4: Data to be Collected through IRWM Project Implementation

Data Type	Water Supply	Recycled Water	Water Quality	Stormwater and Flood Management	Ecosystem Restoration	Groundwater Management
	Project Type					
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 Section 5.1 Plan Performance and Monitoring, MAC Region project proponents implementing projects through the IRWM Program 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 implemented through the IRWM Program, 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 in Section 5.1 Plan Performance and Monitoring, 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 proponents 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 for inclusion in the Region's centralized data management system (DMS). The project sponsor will also provide UMRWA with confirmation that the data has been submitted to the appropriate statewide database.

5.2.3. Existing Monitoring Efforts

There are several ongoing monitoring efforts within the region that may generate information useful to the IRWM planning program, including those by the US Forest Service, EBMUD, PG&E, and others. For example, several programs are currently completing baseline mapping of vegetation and wildlife on the Mokelumne River, as well as historical and ongoing surveys of birds, amphibians, reptiles and small mammals. Additionally, Mokelumne River streamflows, water levels, and water quality monitoring are conducted on an ongoing basis. These efforts are being conducted to fulfill regulatory requirements or support watershed studies.

All agencies in the region providing water supply and water and wastewater treatment services are also conducting regulatory monitoring operations. As part of their regular operating procedures, these agencies conduct both influent and effluent water quality analyses.

5.2.1. The MAC Region DMS

UMRWA will maintain a centralized DMS on the EBMUD server, which will house all original data provided by project sponsors. The procedure for submitting data for inclusion in the DMS is as follows.

1. The project sponsor completes monitoring and data collection in accordance with the approved project-specific monitoring plan, including QA/QC procedures.
2. The project sponsor validates data consistent with data validation protocols outlined in the project-specific monitoring plan.
3. The project sponsor "spot-checks" data for accuracy at the time of entry to the database to identify any apparent errors.
4. The project sponsor submits the data to the appropriate statewide database.
5. The project sponsor submits the data to UMRWA for inclusion in the Region's centralized data management system (DMS).
6. The project sponsor provides UMRWA with confirmation that the data has been submitted to the appropriate statewide database.
7. UMRWA maintains the data in the centralized database.
8. UMRWA disseminates the data to stakeholders and members of the public through the MAC Plan webpage.

Data collected will be compatible with statewide databases because the project-specific monitoring plans will be developed based on guidance provided for applicable statewide database. While project sponsors will be responsible for submitting data to the appropriate statewide databases, UMRWA will be able to confirm that this has been done based on the confirmation of submittal required.

The DMS will serve the important function of assisting the RWMG in its goal to share collected data by requiring consistent methodologies for data collection and housing all data in a centralized location that is easily accessed by stakeholders and members of the public. In this way, the DMS assists the RWMG in accomplishing the objectives of improved data comparability and accessibility.

5.2.2. Data Dissemination

Data collection, review, and dissemination are activities that occur during both the MAC Plan update process, and subsequently during the implementation of the updated MAC Plan. During the update process data has been disseminated primarily via project-specific documentation and associated meetings, inter-agency collaboration on issues and projects of mutual interest, discussion at ongoing stakeholder/RPC and Authority meetings, and through website postings. Project proponents, RPC members, and IRWM planning participants are all jointly responsible for data dissemination. Coordination among regional members and other relevant agencies in the development of data has occurred for several specific projects (e.g. Raise Lower Bear Reservoir project, EBMUD's WSMP 2040) with data shared by and between the participating agencies. Collaboration between agency and stakeholder participants in the Upper Mokelumne River Watershed Assessment Project previously led to the development of a major water quality database which in turn supported the development of the WARMF (Watershed Assessment and Risk Management Framework) water quality model of the Upper Mokelumne watershed. UMRWA Board and committee meetings, and meetings of the RPC, have served as venues for sharing data on subjects ranging from climate change to public health dangers of swimming in certain local waters. Environmental documentation processes (i.e. CEQA and NEPA) have also allowed for dissemination of data developed for review by interested stakeholders and the public. These methods will continue to be employed.

As described previously, all data will be housed in a centralized DMS on the EBMUD server, maintained by UMRWA. All data collected will be made available to stakeholders and members of the public through the MAC IRWM webpage (http://www.umrwa.org/mac_documents.html). Hard copies and CDs may be available to interested parties without Internet access. Periodic updates of the MAC IRWMP will be distributed in a similar manner.

Dissemination of data to statewide programs administered by both the SWRCB and DWR will support statewide data needs. As described previously, individual project sponsors will be responsible for submitting data to the appropriate statewide database(s) consistent with the approved project-specific monitoring plan. UMRWA will confirm that this submittal has occurred based on the project sponsor's confirmation reporting.

In addition, MAC IRWM planning participants have supported statewide data needs in the past through voluntary participation, and will continue to do so in the future by making collected data available to programs such as the California Environmental Resources Evaluation System (CERES), Surface Water Ambient Monitoring Program (SWAMP), Groundwater Ambient Monitoring Assessment (GAMA) program, and the California Environmental Information Catalog (CEIC) when appropriate and feasible. Data will also be disseminated to DWR for inclusion in its databases, such as the Water Data Library (WDL), which contains groundwater level and water quality data. Finally, stakeholders, agencies, and the public may request all publicly available IRWMP data (i.e., non-proprietary and non-confidential) from any of the MOU signatories for this IRWMP.

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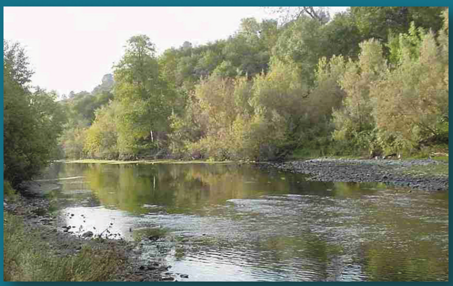

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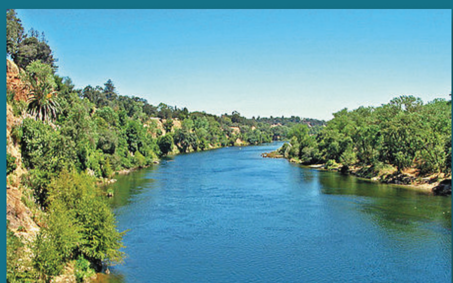
Appendices

Appendix A- Other Agencies with Water Resources Management Responsibilities in the Region

Other Agencies with Water Resources Management Responsibilities in the Region

Agency Name	Location and Services Provided
Amador County Service Areas (CSAs) 1, 2, and 3	Provide water services to communities of Silver Lake Pines, Tiger Creek Estates, Sierra Highlands, Mace Meadows, and Camanche Village. Beginning in 2001, AWA provided operations, maintenance, administration, accounting and billing for these CSAs.
Amador Fire Protection District	Provides fire suppression, fire prevention, emergency medical and rescue services in its boundaries, to approximately 85% of unincorporated Amador County, and also to the City of Plymouth, by contract.
Amador Resource Conservation District (ARCD)	Provides conservation technical assistance to agricultural and individual landowners and initiates community-wide conservation programs in resource management (e.g. agricultural, watershed, woodland resource management, habitat restoration, irrigation water management, fuels reduction).
City of Angels	The City began providing water service to its citizens in 1985 upon the purchase of a water system from PG&E. It directly provides domestic water services to the area within the city limits, including surface water treatment and distribution, raw water delivery and recycled water delivery to a golf course. The City owns and operates a WWTP and provides wastewater collection, treatment an disposal options to its sewer customers within its city limits and treatment and disposal services to the Six Mile Village community by contract with CCWD. The City entered into a JPA with Union Public Utility District (UPUD) to form the UPA to purchase and operate two hydroelectric projects – the Utica Hydroelectric Project and Angels Hydroelectric Project.
Blue Lake Springs Mutual Water Company (MWC)	Blue Lake Springs MWC relies on groundwater wells to serve approximately half of its resort community near Arnold which has a about 1,700 water connections; CCWD supplies wholesale water to serve the other half. The MWC owns and operates the storage and distribution system within the subdivision.
California Department of Forestry and Fire Protection (CALFIRE)	CALFIRE provides fire prevention, suppression, and fire related law enforcement for timberlands, wildlands and urban forests in the State Responsibility Area.
Drytown County Water District (DCWD)	DCWD purchases treated surface water from AWA and distributes it to residential and commercial users. DCWD does not provide water treatment services, but provides a majority of the necessary operation and maintenance of the water distribution system.
Fiddletown Community Services District (CSD)	Fiddletown CSD provides treated groundwater to its residential users in Fiddletown. It owns and operates the domestic groundwater well and distribution system serving ~66 connections.
Fly-in Acres MWC	CCWD supplies wholesale treated water to this 160 parcel community near Arnold. The Fly-in Acres MWC owns and operates the storage and distribution system within the subdivision.
Jackson Valley Fire Protection District (JVFPD)	Provides fire prevention, protection and suppression services as well as BLS emergency response. JVFPD overlaps with CALFIRE State Response Area, but provides primary structure fire response.
Kirkwood Meadows Public Utilities District (KMPUD)	Provides treated water for domestic irrigation uses to its service area located in Amador, Alpine and El Dorado counties. It relies on groundwater to serve 848 connections.
Lili Valley Water Company	Provides groundwater production and distribution to 55 homes in a small subdivision east of West Point. The Company owns and operates two groundwater wells, a storage tank and a treatment system to control copper corrosion.
Lockwood Fire Protection District	Provides fire protection, fire suppression and BLS. Overlaps with State and Federal Responsibility Areas, but has the primary responsibility for fire structure responses.
Rabb Park CSD	Rabb Park CSD purchases treated surface water from AWA through the CAWP

Agency Name	Location and Services Provided
	system and distributes it to residential users. The CSD provides operation and maintenance of the water distribution system serving ~100 connections.
River Pines Public Utility District (RPPUD)	Supplies treated groundwater and surface water from the South Fork Cosumnes River to domestic users. The PUD pumps, treats and distributes the water and bills customers, but relies on AWA for emergency maintenance services and technical services. RPPUD serves ~200 conenctions.
Sunset Heights CSD	
Sutter Creek Fire Protection District (SCFPD)	Provides fire prevention, fire suppression services, basic life support and rescue services in its boundary area in addition to ~39 square miles outside its bounds.
Volcano CSD	Volcano CSD provides groundwater extraction, water treatment and water distribution services to the community of Volcano, serving about 75 connections. AWA provides contract maintenance services to the CSD.
Willow Springs Water District (WSWD)	WSWD is an inactive agency; it previously diverted water from the Arroyo Ditch, but there are no longer flows through Arroyo Ditch during irrigation season and WSWD does not have any water rights or the capacity to provide services. District landowners rely on private wells.
Mineral Mountain Estates Mutual Water Association (MWA)	The MWA provides groundwater production and distribution to 34 connections in a subdivision near Sheep Ranch Road between the communities of Sheep Ranch and Murphys. It operates three groundwater wells, a water treatment system, and a storage tank.
Mokelumne Hill Sanitary District (MHSD)	Provides wastewater collection, treatment and disposal services to the unincorporated community of Mokelumne Hill. All services are provided by MHSD except for billing which is provided by CPUD.
Murphys Sanitary District (MSD)	Provides wastewater collection, treatment and disposal services directly through district staff to the unincorporated community of Murphys and surrounding areas within its boundaries. It owns and operates a WWTP and sewer collection infrastructure.
San Andreas Sanitary District (SASD)	Provides wastewater collection, treatment and disposal services to the community of San Andreas and neighboring areas.
Snowshoe Springs Association	CCWD provides wholesale treated water to Snowshoe Springs Association to serve its 300 home subdivision near Big Trees Village. Snowshoe Springs Association previously relied on its own groundwater wells, but they were forced to abandon them in the 1970s due to poor water quality. The Association owns and operates the storage and distribution system within the subdivision.
Union Public Utility District (UPUD)	UPUD provides raw and treated water services, relying on CCWD and UPA for delivery of surface water. It provides services within its bounds to the communities of Murphys, Douglas Flat, Vallecito, Six Mile Village, and Carson Hill. UPUD does not provide recycled water services.
Utica Power Authority (UPA)	UPA was formed as a JPA in 1995 by the City of Angels, CCWD, and UPUD. The JPA was formed to manage a water conveyance and hydroelectric power system that PG&E was in the process of selling to CCWD.
Valley Springs Public Utility District (VSPUD)	VSPUD provides groundwater extraction, treatment and distribution for domestic use directly with district staff to unincorporated Town of Valley Springs. It also provides wastewater collection, treatment and disposal services to the unincorporated Valley Springs.
Wallace Community Service District (WCSD)	WCSD provides well water treatment and distribution for domestic use and wastewater collection, treatment and disposal services, but contracted with CCWD in 2009 for operation and maintenance of WCSD water and wastewater facilities. WCSD provides water and wastewater services to the gated community of Wallace Lake Estates and the unincorporated Town of Wallace.

Appendix B – RPC Meeting Notes

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING MINUTES

Regional Participants Committee (RPC) Meeting No. 1
January 22, 2009; 6:00 pm to 8:45 pm
Amador County Administration Building, Jackson California

Attendance and Introductions

RPC Members	Present	Absent	Affiliation	Alternate
Pete Bell	X		Foothill Conservancy	
Krista Clem	X		Golden Dale Subdivision	
Brianna Creekmore		X		
Mike Daly	X		City of Jackson	
Bob Dean		X	Calaveras County Water District	
Debbie Dunn	X		Amador Water Agency	
Dixon Flynn		X	City of Plymouth	
Tom Francis	X		East Bay Municipal Utility District (EBMUD)	
David Graesch		X	Calaveras Public Utility District	
Ross Jackson		X	PG&E/ERC	
Chris Katopothis	Briefed 1/26		Alpine Watershed Group	
Gene Mancebo	X		Amador Water Agency	
Phil McCartney		X	Mokelumne Hill Sanitary District	
Ted Novelli		X	Amador County	
Ed Pattison	X		Calaveras County Water District	
Rod Schuler	X			
Gary Slade	X		Amador Fly Fishers	
Susan Snoke		X	Upper Mokelumne River Watershed Council	
Terry Strange	X		Resident	
Ed Struffenegger	X		Sierra Pacific Industries	
Madonna Wiebold	X			
Hank Willy	X		Jackson Valley Irrigation District	
Observers	**Present**	**Absent**	**Affiliation**	
Jerry Budrick	X		Ledger-Dispatch	
Gary Thomas	X		Amador Water Agency	
Dave Andres	X		Calaveras County Water District	

Project Team	Present	Absent	Affiliation	
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)	
Leslie Dumas	X		RMC Water and Environment	
Karen Johnson	X		Water Resources Planning	

Introductions and Background

The first meeting of the RPC for the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update (MAC Plan Update) was begun by Rob Alcott at 6pm at the Amador County Administration Building Board of Supervisors Chambers in Jackson, California, on Thursday, January 22, 2009. Alcott talked along with a PowerPoint presentation providing background information on the 2006 IRWM Plan, the purpose of the MAC Plan Update, the new State integrated regional water management program requirements, and breakdown of Proposition 84 funding. The Upper Mokelumne River Watershed Authority (Authority) history was described along with the MAC Plan Update organizational structure, and the Regional Participant's Committee (RPC) and Authority roles on the project. The MAC Plan Update has been divided into three project phases, the first of which is occurring now; Phase 2 will be the preparation of an application for planning grant funds for Phase 3; and Phase 3 is to prepare the Plan Update. Tasks associated with each project phase were listed, and the three over-arching goals for the project described as follows:

- Ensure a competitive plan
- Ensure a comprehensive plan
- Complete within timeframe and budget

There was a discussion about the number of IRWMPs in San Joaquin Valley competing for funds, DWR's need for conflicts to be identified and described and how they will be resolved through the identification of projects as strategies.

The group was ok with using Disadvantaged Communities (DACs) as a term describing economically disadvantaged communities within the watersheds (which are identified based on income data by census tract). Clarification was made that DACs do not receive money, but rather are communities whose input will be specifically solicited and with whom communications about the project will be provided through an identified representative. Representatives were identified for most DACs as presented in the Community Outreach Plan. Concern was expressed that the volunteer representatives may not be considered by the communities to be representing them. Recommendations of who would be a better representative for each of these DACs were requested. Concern was expressed that other smaller non-DAC communities, such as Dry Town, should also have representation. There was a discussion about how difficult it is to solicit interest in volunteering for this role and that public agency representatives were identified wherever possible. For example, Wilseyville will be represented by Calaveras County Water District.

Alcott discussed how the State has not yet released the IRWM Plan guidelines to be followed for the MAC Plan Update; they are anticipated in early summer of 2009. We will know then what sections of the 2006 plan need to be updated.

Community Outreach Plan

Alcott presented the highlights of the draft outreach plan which attendees received in a mailing prior to the meeting. The plan focuses on RPC involvement, community outreach, and participation from DACs. The project website will be the primary tool to notify interested persons of upcoming workshops and progress on the project. The RPC is to guide the development of the products by reviewing draft documents and providing input at the RPC meetings.

The schedule of RPC meetings will be determined during scoping of Phase 3, once planning grant funds are obtained. During discussion it was noted that meeting every two to three months may not be enough to get through the tasks. Alcott noted that the meeting schedule will depend in part on the amount of funds received for Phase 3.

The RPC was ok with the draft Community Outreach Plan as written.

Governing Procedures Guidebook

Karen Johnson walked through key points within each section of the Governing Procedures Guidebook. A healthy discussion was held on the proposed decision process of holding a majority vote when consensus is not reached. The group decided that the voting process will be removed from the Guidebook. The text of sections C.1 and C.2 will be rewritten to reflect the following:

- The decision-making goal is to have everyone agree on the matter at hand;
- Members should use "can they live with it" as their standard;
- If all members don't agree on the matter at hand, then those who disagree must put forward a reasonable alternative;
- If, after due consideration, agreement on the matter at hand cannot be reached, the RPC will determine how to resolve the impasse.

Additional members can be added to the RPC, but it was recommended that they be included before the next RPC meeting, anticipated to be held in the fall 2009. After the second meeting, too much knowledge on setting up the project process and developing key decisions will already be passed and it will be difficult to bring others up to speed.

Concern was expressed over the governance structure of the Authority being the final decision maker because the Authority is primarily composed of water agencies, not a full range of organizations like the CABY IRWMP governance structure. However, with the majority vote decision process removed from the governing procedures, most of the concerns with the governance structure were resolved. The RPC Governing Procedures was subsequently approved by the RPC with the revisions documented above.

The boundary of the MAC Plan Update was reviewed and changes being made since the 2006 plan were discussed in detail. The overlap with Cosumnes/American/Bear/Yuba (CABY) boundary is still being resolved; two overlaps currently exist – the area of north western Amador County including Plymouth and a small area in the northeastern part of Amador County. The plan is to keep both areas in the MAC region if possible. The overlap with the region in San Joaquin County was removed entirely since it is in another IRWMP boundary and was only added original for a joint project. Little John's Creek watershed, which drains directly to the Delta, was added to the Stanislaus plan boundary. The only additional area which still needs attention is the Kirkwood ski area which does not overlap with CABY but the Kirkwood PUC's snow generating water supply is within the American River watershed of CABY.

A topic came up at the end of the meeting but is described here because it will be an additional edit to the Guidebook. If a RPC member plans to bring up a topic not on the agenda, they will notify the project team a week prior to the meeting so that all attendees can be informed of this new topic. Any information to be presented on the new topic will also be provided prior to the meeting to all attendees so that time is not lost at the meeting reviewing information that could have been reviewed ahead of time.

Regional Water Resource Issues

A list of MAC Plan Update topics that the California Department of Water Resources (DWR) will likely require addressing and a list of projects from the 2006 Plan were presented to the RPC to initiate discussion of potential conflicts and issues that will need to be resolved by the plan update in Phase 3. The DWR IRWM Plan guidelines will identify how the plan will be structured around the issues and conflicts to ensure that a strategy is developed for resolution of each issue. These issues and conflicts will also aid the project staff in drafting the first cut of a vision statement and goals and objectives for the RPC to develop in Phase 3. Johnson facilitated a brainstorming session on potential issues which is summarized in an attachment to these minutes.

Other Items

Time will be allocated on future meeting agenda to allow participants to bring up topics relevant to the MAC Plan Update.

Next Steps and Adjournment

The next RPC meeting will be scheduled, hopefully, during the summer for the fall of 2009. The RPC identified 1:30pm on the 2nd or 4th Wednesdays of the month as a good meeting time.

Once the application guidelines are released, the project team will submit a planning grant application for the Phase 3 effort. This is anticipated to occur in the early summer or late spring of 2009. RPC members will be kept apprised by email of application preparation and other activities between now and the next RPC meeting. If the application package needs letters of support from the community, Alcott will contact individuals with this request.

The revised Governing Procedures Guidebook and meeting minutes will be sent for review to those in attendance as well as RPC members who were not able to attend. It was requested that if RPC members have comments on the revised items or any other topic being discussed by email, that they not respond to all included in the email. This will reduce the number of emails RPC members receive.

Because of past problems with mailings for Pete Bell, paper copies of documents will be sent via overnight service without signature to ensure that the package is delivered to his home. Address corrections were made for Debbie Dunn and Gary Thomas. Materials will also be sent via email to all members and others on the RPC mailing list. Gary Thomas will check with Amador Water Agency regarding his participation as a RPC member.

The meeting concluded at approximately 8:45 p.m.

ATTACHMENT

Brainstorming Session on Potential Conflicts and Issues

Note: This list reflects comments provided by RPC members during a brainstorming session during the meeting. Additional issues and conflicts were obtained from the Upper Mokelumne River Watershed Assessment and Planning Project and are noted here with that source. The potential conflicts and issues were then organized by topic. They will be consolidated and refined in Phase 3 of the MAC Plan Update project.

Land Use and Water Use Conflicts

- Amador County General Plan housing element will result in more development in areas with no water/wastewater infrastructure
- Supply and infrastructure not adequate to meet growth planned for in the general plans of Amador County and its cities
- Provision of infrastructure in dispersed, low density areas
- Watershed protection versus community economic needs
- Groundwater overdraft versus development approvals
- Groundwater quantity and quality is not adequate to accommodate growth
- Disperse development does not allow for management of contaminated runoff versus compact or low impact development (UMRWAP)
- Increased population in watersheds per the General Plans will increase presence and expedite the transport of contaminants to waterbodies (UMRWAP)

Environmental Protection

- Wild and Scenic River status versus additional storage
- PG&E pumped storage project on North Fork
- Third party impacts from reuse and conservation (reduced return flows)
- Fish passage on lower Mokelumne River
- Management of federal lands resulting in environmental impacts

Water Quality Conflicts

- Recreational water quality impacts
- Wastewater discharge water quality
- Failing septic system contaminant leakage to river versus the right to live near the river
- Failing septic system contaminant leakage to surface water and groundwater versus body contact recreation and drinking water (UMRWAP)
- Cloud seeding water quality impacts
- Wastewater treatment levels and technology versus environment and benefits
- Improper disposal of household wastes (UMRWAP)

- Wastewater treatment plan overflows during high precipitation events (UMRWAP)
- Inactive mines without restoration cause leaching of soils with high mineral content and surface runoff of contaminants to waterbodies (UMRWAP)
- Over application of household fertilizers contributes contaminant loadings to surface waters (UMRWAP)
- Increased impervious surfaces exacerbates flooding which contributes contaminants to surface waters versus designing streets and compact development with techniques to reduce peak flows, minimize runoff, and remove contaminants during flow (UMRWAP)

Supply Management

- New water supply versus recycled water versus conservation of supplies
- Stormwater management and rights to use this water
- Climate change impacts
- Water rights concerns
- Supplies not matched to use (e.g., industrial users receiving potable supplies)
- White water recreation versus flat water recreation

Forest Management

- Timber harvesting practices cause disturbance of vegetation and soils which contributes loadings to surface waters (UMRWAP)
- Roads and road maintenance practices contribute to erosion, peak runoff, and transport of contaminants in runoff to surface waters (UMRWAP)

Fire Management

- Wildfires cause disturbance of vegetation and soils which contributes loadings to surface waters (UMRWAP)
- Fire response to protect landowner and water quality objectives versus managing naturally-occurring fires (UMRWAP)
- Fuel management techniques can result in short term water quality impacts (UMRWAP)

Economic Impacts (in addition to above related issues)

- Costs of projects and financing
- Aging existing water and wastewater infrastructure
- Drinking water regulations may not reflect realistic protection of human health (treatment levels too onerous)
- Local economic opportunities versus out of region resources

Miscellaneous

- Upstream versus downstream interests differ
- Cumulative effects of IRWMPs on the Delta (e.g., projects changing flows to Delta)
- State decisions impact region
- Lack of public understanding of watershed issues
- No coordination between groups that need to solve problems (e.g., agricultural costs of water testing)

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING MINUTES

Regional Participants Committee (RPC) Meeting No. 2
May 26, 2010; 1:30 pm to 3:45 pm
Amador County Administration Building, Jackson California

Attendance and Introductions

RPC Members	Present	Absent	Affiliation	Alter-nate
Pete Bell	X		Foothill Conservancy	
Krista Clem-O'Sullivan		X	Golden Vale Subdivision	
Brianna Creekmore		X	West Point Community	
Mike Daly	X		City of Jackson (present for part of meeting)	
Dixon Flynn		X	City of Plymouth	
Tom Francis	X		East Bay Municipal Utility District (EBMUD)	
Sarah Green		X	Alpine Watershed Group	
Donna Leatherman	X		Calaveras Public Utilities District	
Gene Mancebo	X		Amador Water Agency	
Phil McCartney		X	Mokelumne Hill Sanitary District	
Ted Novelli	X		Amador County Board of Supervisors	
Ed Pattison	X		Calaveras County Water District	
Rod Schuler	X		Retired Amador County PW Director	
Gary Slade		X	Amador Fly Fishers	
Susan Snoke		X	Upper Mokelumne River Watershed Council	
Terry Strange		X	Resident	
Steve Wiard		X	Sierra Pacific Industries	
Madonna Wiebold		X	Resident	
Hank Willy		X	Jackson Valley Irrigation District	
vacant		X	PG&E/ERC	
vacant		X	U.S. Forest Service	
Interested Persons	**Present**	**Absent**	**Affiliation**	
Bob Dean	X		Calaveras County Water District	
Gary Thomas	X		Amador Water Agency	
Debbie Dunn	X		Amador Water Agency	
Anne Littlejohn	X		Central Valley RWQCB	
Gen Sparks	X		Central Valley RWQCB	
Erik Christeson	X		Amador Water Agency	

Project Team	Present	Absent	Affiliation
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Leslie Dumas	X		RMC Water and Environment
Karen Johnson	X		Water Resources Planning

Introductions and Business

The second meeting of the RPC for the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update (MAC Plan Update) was begun by Rob Alcott of the Upper Mokelumne River Watershed Authority (Authority or UMRWA) at 1:40pm at the Amador County Administration Building in Jackson, California on Wednesday, May 26, 2010. The meeting agenda was emailed to RPC members and interested persons on February 16, 2010. A PowerPoint presentation was used for this meeting. The presentation slides provide details that are summarized here along with discussion highlights.

Karen Johnson described the goals of the meeting and the agenda. This was followed by self introductions by those in attendance. She presented several administrative action items since the first RPC meeting in January 2009 as described here.

- Edits had been made to the RPC membership roster to reflect changed positions and the addition of the U.S. Forest Service. It was suggested that Amador District be added in addition to Calaveras District. The RPC reviewed and agreed to the changes and welcomed Donna Leatherman to the RPC as the new General Manager of Calaveras Public Utility District. Congratulations were given to Gene Mancobo as the new General Manager of Amador Water Agency (AWA). Name suggestions were made regarding vacant positions: Jim Frasier for US Forest Service, Rich Dobel for PG&E, Steve Wiard for SPI. Alcott will follow up with these suggestions.
- Johnson described changes made by the RPC at the January 2009 meeting to the Governing Procedures regarding a decision process. The RPC agreed to the changes.
- Based on input from the first meeting, it was determined that the best meeting times are on the second and fourth Wednesdays at 1:30 PM.
- If a RPC member adds an item to the meeting agenda, it must be provided to the consultant team at least one week prior to the meeting.

MAC Plan Activities Update

Rob Alcott updated the RPC on UMRWA activities for the MAC Plan Update since the last meeting. He discussed the submittal of the RAP application and DWR's approval of the MAC region, the establishment of a UMRWA Board Advisory Committee (BAC) and where it fits into the MAC Plan Update organization and decision structure, and the FY

2010 project related budget items. The budget includes the current Phase 2 effort involving RPC meetings in 2010 and preparation of applications for both Proposition (Prop) 84 implementation and planning grants.

State IRWM Program Draft Guidelines and Proposal Solicitation Packages

Leslie Dumas discussed the Department of Water Resources' (DWR) recently released draft Integrated Regional Water Management (IRWM) Guidelines and Proposition 84 funding allocations. Competition for the first round of *implementation* grants is between four regions within the San Joaquin funding area; ~$6.33m available this cycle. Assuming an equal division of funds amongst the four qualifying regions (a 25 percent allocation) would result in $1.6m. Matching grant requirements of 25 percent (not including DACs) were discussed by the group. No State funds can be used as matching funds. Dumas mentioned that the cost/benefit analysis and AB1420 compliance for best management practices required by draft guidelines are of concern throughout the State due to costs to complete. *Planning* grants are competitive statewide and have a maximum award of $1m with a local match of 50 percent. Planning grants are not just for IRWMPs but for anything planning-related.

Implementation grant eligibility is only for projects in adopted IRWM plans with the exception of DAC projects addressing critical issues and for leak detection/repair and metering projects. The final guidelines and Proposal Solicitation Packages (PSP) are anticipated to be released July 1, 2010 with planning grant applications due mid-August and implementation grant applications due September 1, 2010.

Implementation Grant Application

Alcott described the tentative implementation grant application process and schedule. Project selection eligibility and criteria were discussed along with a draft short list of candidate projects. The importance of projects being "shovel ready" was discussed, meaning that projects that do not need CEQA documentation or design work to be completed will get a higher score. DWR is likely to approve or disapprove the package as a whole; they will not pick projects to approve. It was mentioned that Plymouth received funding from another source, so those projects were removed from the draft candidate project list.

Pete Bell added the East Panther Dam removal project to the list and most, not all, agreed that this project adds diversity to the initial list which may make it more competitive. The RPC discussed, at length, how to go about reducing the number of projects on the initial list.

It was agreed that AWA would drop the county-wide project that would be too costly and instead define and estimate costs for AWA and Lake Camanche Village (DAC) leak detection and repair programs that are focused and ready to implement. Calaveras County Water District (CCWD) will define a West Point project that includes a phased distribution system replacement program; will determine if the filter project should be included; and will define a focused leak detection and repair program. Bell will define the East Panther Creek dam removal project to define the project and costs It was suggested that these project definitions would identify multiple, measurable benefits and phasing of projects as well as identify readiness to be implemented. It was suggested that Dumas review the project descriptions and score them as if she were a DWR reviewer.

If UMRWA submits an implementation grant application, it is obligated to complete the MAC Plan Update to the new standards within two years. Concern was expressed that the UMRWA BAC will be hit too hard with technical details of the proposed projects; Alcott allayed this concern because the BAC has already been briefed on the application process details and what is coming up at their next meeting; they are prepared for these next steps.

Planning Grant Application

The planning grant application process and schedule was described by Alcott. RPC members were asked for their preference on meeting frequency so the consultant team can reflect preferences in the scope and budget for updating the plan. It was decided that monthly meetings will be budgeted to ensure that RPC members can be actively involved in ongoing decisions, be knowledgeable about issues at hand, and establish project momentum. However, meetings will be cancelled prior to the meeting date, with adequate notice, if not needed.

A discussion was held regarding adding a task to the MAC Plan Update scope in the planning grant application to address conflicts with the Integrated Regional Conjunctive Use Program (IRCUP). The RPC decided that this would be of great value; it is an opportunity to establish a formal process to resolve, or at least educate everyone on, the conflicts. As with the Water Forum in Sacramento, major players involved in the regional water resources conflicts and issues can use a formal process to discuss conflicts and work towards mutual benefits.

Next Steps and Adjournment

Once the final guidelines and PSPs are released, the project team will prepare and submit planning and implementation grant applications. The implementation grant and planning grant application packets will be submitted September 1 and August 15, respectively, based on DWR's current schedule. RPC members will be kept apprised of activities by email between now and the next RPC meeting.

The next RPC meeting is anticipated to be scheduled during summer of 2010; it may be held in July, but will depend on DWR's release of final Guidelines and PSPs. Interest was expressed that it be held prior to the June 18th or July 23rd Authority Board meeting to review the refined candidate project descriptions before the implementation grant application is prepared. Depending on the timing of activities, this may occur or email communications used instead to allow RPC members time to review and comment quickly, if schedule is of concern.

Meeting minutes and other correspondence will be sent via email to all members and interested others on the RPC mailing list. The project website will be updated with materials from this May 26, 2010 RPC meeting.

The meeting concluded at approximately 3:45 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING MINUTES

Regional Participants Committee (RPC) Meeting No. 3; Community Workshop No. 2
October 12, 2011; 1:35 pm to 4:15 pm
Amador County Administration Building, Board Chambers, Jackson California

Attendance and Introductions

RPC Members	Present	Absent	Affiliation	Alternate
Pete Bell	X		Foothill Conservancy	
Krista Clem		X	Golden Vale Subdivision	
Mike Daly	X		City of Jackson	
Jeff Gardner	X		City of Plymouth	
Tom Francis	X		East Bay Municipal Utility District	
Sarah Green		X	Alpine Watershed Group	
Donna Leatherman		X	Calaveras Public Utility District	
Gene Mancebo		X	Amador Water Agency	
Ted Novelli	X		Amador County Board of Supervisors	
Edwin Pattison	X		Calaveras County Water District	
Rod Schuler	X		Retired Amador County PW Director	
Gary Slade		X	Trout Unlimited, Sac-Sierra chapter	
Susan Snoke		X	Upper Mokelumne River Watershed Council	
Hank Willy	X		Jackson Valley Irrigation District	
New Members				
Teresa McClung	X		USFS Stanislaus National Forest	
Tom Infusino	X		Calaveras Planning Coalition	
Observers	Present	Absent	Affiliation	
Jason Preece	X		Department of Water Resources	
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District	
Art Toy	X		Amador Water Agency	
Lou Mayhew	X		Interested citizen, Wallace	
Muriel Zeller	X		Interested citizen, Valley Springs	
Erik Christeson	X		Amador Water Agency	
Mary Anne Garamendi	X		Stewardship Through Education	

Project Team	Present	Absent	Affiliation	
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)	
Leslie Dumas	X		RMC Water and Environment	
Karen Johnson	X		Water Resources Planning	
Alyson Watson	X		RMC Water and Environment	

Introductions and Background

The third meeting of the RPC and the second community workshop for the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Update was initiated by Rob Alcott at 1:30pm at the Amador County Administration Building, Board of Supervisors Chambers in Jackson, California, on Wednesday, October 17, 2011. Alcott introduced the project team and began a PowerPoint presentation providing background information on the 2006 MAC IRWMP, and the purpose of the current MAC Plan Update. Portions of the MAC IRWMP requiring modification for consistency with State guidelines were reviewed.

Karen Johnson presented the overall schedule for the project, including RPC meetings and community workshops. Johnson requested that RPC members make the project team aware if they are going to miss meetings. Johnson reviewed the governance structure, as well as roles and responsibilities of RPC members representing stakeholder organizations.

Governing Procedures and RPC Member List

Johnson reviewed the Governing Procedures Guidebook, which was the subject of the last RPC meeting. An RPC member identified a section of the governing procedures that needed to be changed based on recommendations from the previous meeting. Section G –Amendments should read: Amendments to these guidelines, if needed, will be made upon the consensus approval of RPC members present at any regularly scheduled RPC meeting.

This correction will be made to the Governing Procedures Guidebook. The RPC approved the Guidebook as revised.

Johnson and Alcott reviewed the RPC member list. Gary Slade is no longer with Amador Fly Fishers; he is now with the Sac-Sierra Chapter of Trout Unlimited. Gary Slade and Sarah Greene both contacted Alcott to let him know they are interested in continuing membership but were unable to attend the meeting. The RPC approved his continued participation despite his change in affiliation. Alcott identified a series of vacancies to be filled.

- Amador Fly Fishers
- Sierra Pacific Industries
- West Point community representative
- Native American community representative
- El Dorado National Forest
- Stanislaus National Forest

The RPC voted to add several new members and interested persons and for Alcott to reach out to several others to gage interest in joining.

RPC voted to add to RPC

- Teresa McClung (Stanislaus National Forest)
- Tom Infusino (Calaveras Planning Coalition). Although Mr. Infusino is counsel for the Foothill Conservancy, he stated he would not be representing them in the RPC.

Potential RPC Members to be identified and/or contacted

- Rick Hopson, Jann Williams and/or Rob Grasso (El Dorado National Forest)
- George Wendt (OARS)
- Dustin Rocksvold (Amador Fly Fishers)
- Bureau of Land Management, Mother Lode field office (Bill Haigh)
- Central Sierra RC&D (Valerie Kleinfelter)
- County RCDs (as opposed to RC&Ds), including Dan Port
- Local Department of Transportation Representatives
- County land use planners

Potential Interested Parties to be added to the Interested Parties list

- Mary Anne Garamendi
- Ann Hayden (Environmental Defense Fund)

Ross Jackson of PG&E has been transferred into another division and has forwarded the RPC information to Linda Krieg. Pete Bell asked Alcott to identify a more senior representative.

DWR's Revised IRWM Plan Guidelines and Revised MAC Plan Framework

Alyson Watson provided an overview of work completed since the 2006 MAC IRWMP. The bulk of the work was completed as part of the Region Acceptance Process (RAP).

A proposed reorganization of the final report was presented which would provide a more logical flow. The reorganization covers all sections required by the Plan standards, and deviations from the Plan standards are relatively minor. Jason Preece of DWR indicated that plans do not need to follow the order of the Plan standards, provided the required information is included. Although governance has typically been located at the end of the report, it is logical to put it at the beginning. The RPC voted to approve the revised table of contents.

Report Text Completed To-Date

Watson walked through updates to the following report sections and solicited feedback from the RPC.

- Governance
- Region Description
- Coordination
- Stakeholder Involvement
- Local Water Planning

The RPC provided the following comments and feedback on Chapter 1

- The National Forest descriptions and information may not be correct in some places in the Region Description and needs to be expanded on. Alcott will send Teresa McClung an editable version of the document for suggested edits.
- The Region Description will include a discussion of how the MOU with CABY ensures coordination between the regions regarding the overlapping IRWMP boundaries. In particular, a "heads up" will be provided on proposed projects that impact the other region.
- The River Pines area should be a disadvantaged community (DAC) located in the Cosumnes overlap area. Watson noted that DAC mapping will be completed once the 2010 Census data is available, and the team will check on whether River Pines is a DAC in those data.
- Forest Management Plans should be added to the document list. The Stanislaus plan is available on its website but perhaps not the Eldorado plan.
- An RPC member asked why Table 1-1 does not include small utility districts. The text will be updated to indicate that this is a list of larger water providers. A comprehensive list of local utilities including wastewater agencies and community services districts will be provided as an appendix.
- Stanislaus and El Dorado National Forests should be added on page 1-16.
- Figure 1-7 should be updated to reflect general land uses such as urban, agricultural, forested, etc., rather than land cover.
- Word versions of the document should be provided to Tom I, Bob, Edwin, Teresa, and Ted for editing.
- Table 1-1 or text should be updated to indicate that Amador Water Agency is now the primary water supplier for the City of Plymouth with its own wells used as backup supply.

- Municipal Service Review reports for Calaveras County and Amador County LAFCOs, available on each website, should be included in the document list.
- Table 1-9 should indicate that the foothill yellow-legged frog is also a federal-listed species.
- McClung will ask her biologist to update Table 1-9 with species.
- A section should be added to summarize issues associated with invasive aquatic and terrestrial species in the region.
- Questions were raised by RPC members regarding the validity of Urban Water Management Plan projected water demands, particularly CCWD's projected agricultural demands. Disagreement over demand assumptions will be noted as a challenge / conflict in section 1.4.1 rather than attempting to resolve the conflict as Alcott stated it is outside the scope of the RPC. This conflict will come up again when projects are discussed.
- Un- or under-maintained roads should be included in Section 1.4.3: Water Quality Conflicts instead of 1.4.5 Forest Management.
- Biomass removal / forest trimming costs should be included in 1.4.7 Economic Impacts.
- 1.4.4 supply management should include meadow rehabilitation / restoration to slow water releases.
- Under forest and fire mgmt (1.4.5 and 1.4.6), we should list increasing vegetation densities outside of the natural range of variability.

The RPC provided the following comments and feedback on Chapters 2 and 3

- The group voted to move future community workshops to the evening to enhance the ability of interested citizens to attend.
- The group discussed using SurveyMonkey.com to poll the public on the importance of various objectives. The RPC was split on whether to do this. An RPC member noted that Johnson explained previously under governing procedures that it is the RPC's charge to represent their respective interest areas and bring those opinions to the meetings. The RPC agreed that the need for such as tool will be explored at a later date when there is something (e.g., proposed projects) that the public may want to comment on. The RPC member also noted that a public awareness campaign can be conducted collectively by the group and financed together. This can being sustainability to the group.
- In Section 2.3.2, there is a broken link that needs to be fixed.
- A discussion was held on whether anonymous comments should be solicited from the project website. If names are required, the content may be of higher quality, yet may prevent some folks from expressing their opinions. It was agreed by the group that the ability to comment anonymously will be revisited if comments are received.

- Table 4-1 should be expanded to include more planning documents. The document with no date and no name should be deleted. WSMP 2040 should be deleted until such time as it is approved (was overturned by the court). FERC relicensing documents should be included on the list but the relevant sections provided to the team for use. The Calaveras County Watershed Assessment should be listed. RPC members will send additional names of reports for inclusion in this list and relevant sections to the consultant team.
- Section 4.2 is only Coordination with Water Planning, not land use planning, and should be renamed for clarity with a new section provided.

Climate Change

Leslie Dumas presented information on climate change analysis performed for the Upper Mokelumne watershed by EBMUD as part of WSMP 2040. This information was provided at the meeting as background information on modeling that has already been completed. The project team would like to build upon existing work to the greatest extent possible to allow funding to be utilized in other areas. This presentation was provided for information only at this time. The approach to integrate climate change impacts into the Plan will be discussed in greater detail at subsequent meetings.

An RPC member noted that it is important to consider the dampening effect of the reservoirs on the Upper Mokelumne system; earlier runoff would only be felt in above-normal and wet years in which the capacity of the reservoir system is exceeded in spring months; otherwise, the reservoirs could be managed to provide releases similar to the current schedule.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Draft the meeting summary and distribute it.
- Prepare IRWM sections on Goals and Objectives and the Project Solicitation Process.
- Prepare and distribute binders for new RPC members.

The RPC is asked to complete the following items.

- Review the draft RPC meeting summary and bring comments to the next meeting.
- Send additional comments on the draft IRWMP sections to Rob by October 26, 2011.
- Send suggestions for goals, objectives, and project solicitation process to Rob by October 26, 2011
- Review new IRWMP sections in advance of next meeting.

Alcott and Tom Francis described additional efforts being conducted in parallel with the MAC IRWMP Update. Currently, the UMRWA is working with the Eastern San Joaquin Groundwater Banking Authority to put together a joint planning grant application for funding to further assess the Integrated Regional Conjunctive Use Project (IRCUP). The U.S. Bureau of Reclamation is also currently performing a gap analysis to identify what additional technical and environmental work must be done before a comprehensive feasibility study can be undertaken.

In addition, it was noted that Prop 84 grant funding was obtained by UMRWA for local implementation projects, and that the collaborative decision making process (a separate planning task funded by the Prop 84 Planning Grant) is scheduled to get underway in November.

The next RPC meeting is scheduled for Wednesday, December 14, 2011 at 1:30pm.

The meeting concluded at approximately 4:15 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 4
December 14, 2011; 1:35 pm to 4:00 pm
Amador County Administration Building, Conference Room C, Jackson California

Attendance and Introductions

RPC Members	Present	Absent	Affiliation	Alternate
Pete Bell	X		Foothill Conservancy	
Krista Clem		X	Golden Vale Subdivision	
Mike Daly		X	City of Jackson	
Tom Infusino	X		Calaveras Planning Coalition	
Jeff Gardner	X		City of Plymouth	
Tom Francis	X		East Bay Municipal Utility District	
Sarah Green		X	Alpine Watershed Group	
Donna Leatherman		X	Calaveras Public Utility District	
Gene Mancebo	X		Amador Water Agency	
Teresa McClung		X	USFS Stanislaus National Forest	
Ted Novelli	X		Amador County Board of Supervisors	
Edwin Pattison	X		Calaveras County Water District	
Rod Schuler	X		Retired Amador County PW Director	
Gary Slade	X		Trout Unlimited, Sac-Sierra chapter	
Susan Snoke		X	Upper Mokelumne River Watershed Council	
Hank Willy	X		Jackson Valley Irrigation District	
Observers	**Present**	**Absent**	**Affiliation**	
Jason Preece	X		Department of Water Resources	
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District	
Project Team	**Present**	**Absent**	**Affiliation**	
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)	
Karen Johnson	X		Water Resources Planning	
Alyson Watson	X		RMC Water and Environment	

Introductions and Background

The fourth meeting of the RPC for the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Update was initiated by Rob Alcott at 1:30pm at the Amador County Administration Building, Conference Room C, in Jackson, California, on Wednesday, December 14, 2011.

Alcott began the discussion by confirming that each RPC member received his or her packet. RPC members requested that the project team evaluate the feasibility of using regular mail as opposed to overnight delivery. In addition, the project team should eliminate the signature requirement such that packets will be left when RPC members are not physically available to sign.

Alcott introduced the project team and began a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #4. Changes to RPC membership were reviewed (addition of Teresa McClung and Tom Infusino). Alcott discussed his actions to reach out to other potential RPC members representing PG&E, SPI, Amador Flyfishers, CSRC&D, Eldorado National Forest, BLM and OARS to which no responses had yet been received. Jeff Gardner offered to provide Alcott with contact information for the Ione Band of Miwok's community development director to solicit RPC participation. Alcott will reach out to local Native American groups to solicit their participation.

Alcott reviewed the RPC Governing Procedures Guidebook which states that if an RPC member misses two sequential meetings, the RPC may elect to remove that member from the RPC. The RPC requested that Alcott contact RPC members who have missed the last two meetings to determine if they are interested in continuing participation. If they elect to leave the RPC, they will be asked to identify an alternate representative from their organization to participate in their place.

Policies, Goals, Objectives, and Performance Measures

An overview of the draft Policies, Goals, and Objectives was presented; it was developed to provide guidance to the updated Plan. Policies are overarching regional commitments, goals are intended outcomes, objectives are actions to achieve goals, and performance measures are used to track progress in meeting goals and objectives.

The RPC began discussing each policy, goal, and objective. It was explained that goals and objectives will eventually be applied to projects qualitatively as a screening tool in the project review phase. Comments received during the RPC meeting included the following.

- The updated IRWM Plan should include an appendix with definitions (such as a glossary) for terms such as firm yield; this may be based on the California Water Plan glossary and/or other existing documents.
- Goals and objectives should be reviewed in conjunction with the project review process to ensure that the number of goals and objectives for different policies does not result in a review process that inadvertently gives preference to specific project types.
- Education and outreach should be considered and, where appropriate, incorporated into the goals and objectives.

- Regional cooperation, and achieving mutually beneficial outcomes, is a major goal of IRWM planning. This should be incorporated into the policies, goals, and objectives if possible. (It was discussed later under evaluation criteria.)
- Source water supply protection should be considered, possibly under Policy 2 (Improve Water Supply Reliability), or as a preamble. Source water supply protection refers to the concept that different forms of land use, land management, vegetation, etc, can affect water supply. Edwin Pattison and Bob Dean agreed to draft language to address this issue.
- It should be clearly stated in the Plan that the RPC and the agencies represented by the RPC members do not have jurisdiction / authority to achieve many of the recommended outcomes. The Performance and Monitoring section of the Plan should identify those specific agencies that will be contacted to collect data to be used to assess progress as described by the draft performance measures.
- Where possible, performance measure data should be reported in context (e.g., as a percentage rather than a number). All agreed that this will not be possible in many cases due to limitations on available information (e.g., an unknown number of abandoned mines) and quantifying values. For example, Penn Mine is one mine restoration project with a greater value than many restoration projects combined.
- Performance measure 4 under Policy 1 Goal: "Manage stormwater flows and transport of sediments and contaminants" should be expanded from the number of grazing permits requiring off-stream watering to refer more broadly to the number of programs or actions minimizing impacts from grazing.
- The objective under Policy 3 Goal: Identify opportunities for public access, open spaces, trails, and other recreational benefits" should be interpreted as not being limited to a component of a water supply or water quality project; this objective could include stand-alone environmental projects.

Quantified performance measures must be realistic to monitor. Someone will be tasked with preparing annual progress reports; the effort will likely have a small budget. Entities to contact for completing the annual monitoring will be provided in the Plan.

It was agreed an editable electronic version (in MS Word) of the draft policies, goals, objectives, and performance measures will be emailed to the RPC. Edits were requested to be provided to the project team before the next RPC meeting on February 8, 2012.

The RPC discussed the common (or mirror) chapter from the 2006 IRWM plan. The group would like to maintain a common chapter moving forward. Alcott will coordinate with Mel Lytle of the Eastern San Joaquin IRWM Region about the process for preparing updates to the common chapter.

Alyson Watson reviewed the handout of Resource Management Strategies and Statewide Priorities. Most RMSs identified by the California Water Plan were determined to be applicable to the MAC Region, with the following exceptions: Desalination, Crop Idling for Water Transfers, Dewvaporation or Atmospheric Pressure Desalination, Fog Collection, Irrigated Land Retirement, Rainfed Agriculture, and Waterbag Transport / Storage Technology. RPC members did not disagree with the exceptions.

All Statewide Priorities identified by the Proposition 84 Guidelines were captured by the proposed policies, goals, and objectives. This is beneficial to the region because it means that the IRWM Plan will likely promote projects that align with Statewide funding priorities.

Project Solicitation Process and Schedule

Watson reviewed the proposed Project Solicitation process. In order to collect project information to be used to finalize the Project Review Process for the February RPC meeting, project information needs to be received by the end of January 2012. As such, the Project Solicitation process will occur from December 20, 2011 through January 20, 2012. Projects included in the 2006 Plan will need to be re-submitted to be included in the updated Plan. Watson will send out an updated Project Information Form on December 20 to collect the information needed to complete the review process and subsequent Plan sections.

Recognizing that this could be a difficult timeframe for some agencies, the project solicitation process will be extended, allowing additional projects to be submitted through a May 23 timeframe.   The benefit of submitting projects by January 20 is that project proponents will have an opportunity to see how their project fared in the prioritization process and revise and resubmit their project to strengthen its scoring if desired. Proponents not submitting their projects by the January 20 deadline will not have the opportunity to revise and re-submit their projects to enhance scoring.

The draft Plan indicates that UMRWA, in the future and at its discretion, may hold periodic project solicitation processes and reconvene the RPC to review and prioritize submitted projects. In this way, the IRWM program may accept additional projects in advance of future funding opportunities without revising the entire Plan.

On a different note, a question was raised regarding the Collaborative Decision Process contract and if the results will be integrated into the MICUP and/or this Plan. Alcott indicated that it will be embedded in this Plan.

Project Screening, Evaluation, and Prioritization Process

Karen Johnson reviewed the proposed project review process which was structured around a common screening, evaluation, and prioritization framework. Recommended changes from the 2006 Plan were highlighted. The initial screening process, which relies on the submitted project reflecting Plan Goals, Statewide Priorities, and RMSs was retained. For the projects that passed the screening step into the evaluation process, the 2006 Plan included a step to prioritize projects based on three specific criteria that were determined to be of greater importance than other criteria (i.e., updates antiquated water and wastewater infrastructure, generates additional regional water supply, or improves fire suppression capabilities). Johnson suggested eliminating this step as it determines a separate set of prioritized criteria and the three groupings must be maintained throughout the evaluation process.

Instead, the projects passing the screening steps would then be evaluated against a set of evaluation criteria, and a draft set of criteria was presented for discussion. Because of the lack of remaining meeting time, the evaluation criteria were discussed very briefly with the intent of going back over this topic at the next RPC meeting to allow for more time for members to review the materials. It was recommended that the evaluation process evaluate projects qualitatively, using a Low / Medium / High scoring system, against the criteria. With a clear set of criteria, projects can be configured or reconfigured to best meet the criteria, improve efficiencies, and maximize the benefits, thus ranking higher in prioritization.

The prioritization process has changed from the 2006 framework by removing the prioritization criteria based on project readiness. This is recommended since some projects of great value may take longer to implement, such as planning projects. It is recommended that projects be prioritized by being grouped into three priority tiers, with the highest tier including projects that received the most "High" rankings of the evaluation criteria (e.g., 3 plus), the middle tier including projects that received a medium number of "High" rankings (1 to 2 "Highs"), and the bottom tier including projects with no "High" rankings .

The project team agreed to distribute an editable electronic version of the draft evaluation criteria via email to allow RPC members to comment directly. Comments received during the RPC meeting included the following. These items and the whole recommended process will be discussed again at the next meeting.

- The RPC supported dropping the 2006 prioritization step which involved prioritizing projects based on their ability to update antiquated water and wastewater infrastructure, generate additional regional water supply, or improve fire suppression capabilities.

- A recommendation was made that the evaluation criteria to address MAC Plan Update Goals be changed to address a set number of goals per policy.
- The criterion to provide multi-agency/entity benefits should be changed to reflect achieving a high benefit among the greatest number of people. The criteria should support implementing as many projects as possible.
- It was recommended that public ratepayers should support the projects which can be addressed by the economic benefit criterion.
- The technical feasibility criterion should be revised to better accommodate planning projects. Rather than being tied to a design timeline, it should correspond to knowledge / information to support the project feasibility. A suggested change was included in the editable electronic version emailed to the RPC after the meeting.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Distribute electronic versions of the Goals and Objectives and evaluation criteria for additional comment by the RPC. The project review process will be discussed again at RPC Meeting #5 (February 8, 2012).
- Distribute via email the Project Information Form on December 20 for the first round of the project solicitation process. The projects submitted by January 20 will be run through the draft screening, evaluation, and prioritization process with the preliminary results presented for discussion at RPC Meeting #5.
- Draft and distribute this meeting summary.

The RPC is asked to complete the following items. Any comments or edits due on January 6 will be accepted any time before or at the February 8 meeting to allow for more review time.

- Provide comments on draft Chapters 3 and 4 by January 6.
- Provide comments on the draft Policies, Goals, Objectives, and Performance Measures, by January 6.
- Provide comments on the draft project review process, and evaluation criteria in particular, by January 6.
- Submit projects to the IRWM Plan by January 20.

The next RPC meeting is scheduled for Wednesday, February 8, 2012 at 1:30pm.

The meeting concluded at approximately 4:00 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 5
February 8, 2012; 1:30 pm to 4:00 pm
Amador County Administration Building, Conference Room C, Jackson California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell (Katherine Evatt)	X		Foothill Conservancy
Mike Daly	X		City of Jackson
Tom Francis		X	East Bay Municipal Utility District
Jeff Gardner	X		City of Plymouth
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo (Art Toy)	X X		Amador Water Agency
Teresa McClung (Rick Hopson)	 X	X	US Forest Service
Ted Novelli	X		Amador County Board of Supervisors
Edwin Pattison	X		Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
Gary Slade	X		Trout Unlimited, Sac-Sierra chapter
Hank Willy	X		Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece	X		Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Don Stump	X		Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Introductions and Background

The fifth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Rob Alcott at 1:30pm at the Amador County Administration Building, Conference Room C, in Jackson, California, on Wednesday, February 8, 2012.

Alcott began the discussion by confirming that each RPC member received his or her packet of meeting materials. Alcott then began a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #5. Changes to RPC membership were reviewed (removal of Krista Clem, Sarah Green, and Susan Snoke). Alcott noted that he had attempted to reach out to Krista Clem, but did not receive a response. He also contacted Sarah Green, who explained she cannot travel to each meeting due to the distance and conflicts. Rob agreed to include her on the interested parties email list allow her to participate on an issue-by-issue basis. Susan Snoke stated she was unable to participate. Alcott asked whether there are other representatives from the Upper Mokelumne River Watershed Council that could participate in her place, but no other candidates were identified. The RPC agreed to remove these three members and move them to the interested parties list. This is consistent with the RPC Governing Procedures Guidebook which states that if an RPC member misses two sequential meetings, the RPC may elect to remove that member from the RPC.

Teresa McClung and Rick Hopson represent the U.S. Forest Service (USFS) Stanislaus National Forest and USFS El Dorado National Forest, respectively. Rather than have separate representatives, Alcott proposed that the two jointly represent the USFS with McClung acting as the primary representative and Hopson as the alternate. The RPC agreed on this approach.

The group approved the RPC Meeting #4 minutes. Pattison had one comment regarding weighting criteria which is discussed later during the meeting.

Alcott also summarized a series of outreach communications to three local Native American groups to solicit their participation. None have expressed interest in participating to date.

Policies, Goals, Objectives, and Performance Measures

An overview of the draft Policies, Goals, and Objectives was presented at the prior RPC meeting (Meeting #4). The RPC had then attempted to discuss each policy, goal, and objective, but not all of the information was reviewed during the meeting, so at Meeting #4 it was agreed that an editable electronic version (in MS Word) of the draft policies, goals, objectives, and performance measures would be emailed to the RPC for input. Edits were requested to be provided to the project team before the RPC Meeting #5. Gary Slade provided comments which were addressed by the Project Team. The Project Team provided the RPC the revised list of draft policies, goals, objectives, and performance measures prior to meeting #5 to review. A monitoring/reporting agency is needed for each performance measure. The draft document provided to the RPC had some suggested monitoring/reporting agencies for some of the performance measures to provide a start to the discussion. It is important to avoid developing performance measures that are impractical or impossible to monitor or achieve. It was suggested that the Plan could include language stating that more detailed performance measures or related information may be included in the annual report. This would provide an opportunity to clarify some of the measures at the time of reporting, as appropriate (e.g. if only one mine was remediated, but it was a large mine that caused significant groundwater quality impacts, that might be worth noting in the annual report).

Alcott suggested the RPC categorize the measures as follows: Tier 1 - keep the objective and performance measures as is; Tier 2 - keep the objective as is, but modify the performance measures; Tier 3 - drop the objective and measure entirely. Rather than review each performance measure during the meeting, the RPC agreed the Project Team will send the RPC an electronic version of the policies, goals, objectives, and performance measures. The RPC will review these and provide comments by February 22, 2012.

Project Solicitation Process and Schedule

Watson revisited the proposed project solicitation process. The initial Project Solicitation process occurred from December 20, 2011 through January 20, 2012. A total of 28 projects were submitted by the RPC members. Other projects can be submitted until May 23, 2012. If an RPC member submitted a project that was not included in the list in the presentation or in the handout, let the Project Team know.

Watson provided a brief overview of the proposed evaluation process discussed during RPC Meeting #4. The Project Team performed a preliminary evaluation of the 28 projects based on the project review process which helped identify proposed changes and additions to the project review process.

- A new evaluation criterion was proposed. Based on DWR's Prop 84 Guidelines, project status should be considered in the project review process. Readiness to proceed will not affect the Plan Update, so it will not be "scored" as high, medium, or low.
- The economic benefit criterion needs to be assessed. The Project Team proposed using a Benefit-Cost (B:C) analysis approach, consistent with the DWR Guidelines. Not all project proponents provided all of the information requested on the project information form used for the project solicitation process. As a result, complete cost information for the 28 projects is unavailable (i.e. very few provided capital costs and O&M costs, and very few provided quantitative benefit information). This

makes it difficult to complete a quantitative B:C analysis. The Project Team proposed the following:

- Calculating the cost portion of the B:C Ratio:
  - If the project proponent does not submit any capital or O&M cost information, the project will receive a cost score corresponding to a high-cost project.
  - If a capital cost is provided, but no O&M cost, then O&M is assumed to be 1% of the capital cost.
  - If the project proponent does not include a project life, then a life of 25 years will be assumed.
  - A present value cost will be developed based on this information.
  - Present value costs for all submitted projects will be calculated.
  - A cost score of 1 will be assigned to those projects with PV costs in the lowest third compared to other submitted projects, a score of 2 will be assigned to those projects with PV costs in the middle third compared to other submitted projects, and a score of 3 will be assigned to those projects with PV costs in the highest third compared to other submitted projects.
- Calculating the benefits portion of the B:C Ratio:
  - The RPC suggested that, rather than subjectively assigning a benefit score, the same methodology used to assign an objectives score could be used to assign the benefit portion of the B:C ratio.
  - A benefit score of 1 will be assigned to those projects achieving only one goal, a score of 2 will be assigned to those projects achieving 2 to 4 goals, and a score of high will be assigned to those projects achieving 5 or more goals.
- Calculating the B:C Ratio:
  - The B:C ratio will be developed by dividing the benefit score (1, 2 or 3) by the cost score (1, 2, or 3).
- Calculating the Economic Benefit Score:
  - An economic benefit score of "Low" will be assigned to those projects with B:C ratios in the lowest third compared to other submitted projects, a score of "Medium" will be assigned to those projects with B:C ratios in the middle third compared to other submitted projects, and a score of

"High" will be assigned to those projects with B:C ratios in the highest third compared to other submitted projects.

The Project Team will reevaluate the projects based on the new method for developing B:C ratios and will create score cards summarizing the results of the evaluation for each project. The score cards and project information forms will be uploaded to the MAC IRWMP website so the RPC members can look at other project proponent's forms and scores.

Project Evaluation Process

Johnson reviewed suggested changes to the proposed project review process. RPC Meeting #4 recommended changes from the 2006 Plan were highlighted. The initial screening process, which relies on the submitted project reflecting Plan Goals, Statewide Priorities, and RMSs was retained. For the projects that passed the screening step into the evaluation process, the 2006 Plan included a step to prioritize projects based on three specific criteria that were determined to be of greater importance than other criteria (i.e., updates antiquated water and wastewater infrastructure, generates additional regional water supply, or improves fire suppression capabilities). Johnson suggested eliminating this step as it determines a separate set of prioritized criteria and the three groupings must be maintained throughout the evaluation process. The RPC agreed.

Instead, the projects passing the screening steps would then be evaluated against a set of evaluation criteria, and a draft set of criteria was presented for discussion. Because of the lack of remaining time at the RPC Meeting #4, the evaluation criteria was revisited at RPC Meeting #5; the RPC agreed with all evaluation criteria and descriptions.

Johnson emphasized the importance of completing the forms in full since the project team only knows about the project, based on what the forms says.

Bell wondered if a regulatory-focused evaluation criterion should be added. The RPC agreed it should be added, but the question of how it can be quantified was a question. Johnson stated the project team would develop draft language for the implementation risk criterion for discussion at RPC Meeting #6.

During Meeting #4 there was discussion that source water supply protection and how different forms of land use, land management, vegetation, etc, can affect water supply should be included in the MAC Plan Update. Pattison and Dean agreed to draft language to address this issue. Pattison prepared draft language and provided it to the Project Team who provided it to the RPC has a handout. No comments were provided at the meeting on the language. The RPC is to provide input by February 22.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Distribute electronic versions of the PowerPoint presentation to the RPC.
- Distribute electronic versions of the policies, goals, objectives, and performance measures and instructions for separating them into different groups (i.e. Tier 1, 2, and 3) to the RPC.
- Revise the policies, goals, objectives, and performance measures based on RPC input received before RPC Meeting #6.
- Reevaluate 28 projects based on new methodology for B:C ratios and economic analysis criterion. Create score cards.
- Upload project information forms and score cards to the MAC IRWMP website.
- Draft and distribute this meeting summary.

The RPC is asked to complete the following items.

- Provide comments on draft policies, goals, objectives, and performance measures by February 22.
- Provide comments on draft source water supply protection language Pattison prepared.

The next RPC meeting is scheduled for Wednesday, March 21, 2012 at 1:30pm.

The meeting concluded at approximately 4:00 p.m.

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 6
March 21, 2012; 1:35 pm to 4:00 pm
Amador County Administration Building, Conference Room C, Jackson California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell (Katherine Evatt)	X 	 X	Foothill Conservancy
Mike Daly	X		City of Jackson
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner	X		City of Plymouth
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo (Art Toy)	* X		Amador Water Agency
Teresa McClung (Rick Hopson)	X 	 X	US Forest Service
Ted Novelli	X		Amador County Board of Supervisors
Joone Lopez (Jeff Meyer)	X 	 X	Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
Gary Slade	X		Trout Unlimited, Sac-Sierra chapter
Hank Willy	X		Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece	X		Department of Water Resources
Bob Dean		X	Upper Mokelumne River Watershed Authority, Calaveras County Water District
Don Stump	X		Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson		X	RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

*GM had a prior commitment and arrived late to the meeting.

Introductions and Background

The sixth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated

by Rob Alcott at 1:30pm at the Amador County Administration Building, Conference Room C, in Jackson, California, on Wednesday, March 22, 2012.

Alcott began a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #6. The primary purpose of the meeting was to review the policies, goals, objectives, and performance measures, and discuss evaluation criteria. Rob explained that should we not get through all of the policies, goals, objectives, and performance measures, a subcommittee of interested RPC members or the entire RPC could meet in April to continue the discussion. As described in the following sections, not all of the material was covered so the RPC agreed to meet on April 16, 2012 at 1:30 p.m. at the same location but downstairs in Conference Room A (next to the Board chambers).

The group approved the RPC Meeting #5 minutes.

Policies, Goals, Objectives, and Performance Measures

The draft policies, goals, and objectives were discussed at two prior RPC meetings with an updated version drafted between meetings. Gary Slade, Art Toy, and Pete Bell provided comments which were addressed by the project team through a revised draft mailed to the RPC prior to meeting No. 6. Tom Infusino provided comments on the previous version of materials on 3/20/12, too late for the team to incorporate before the meeting; hard copies of Infusino's comments were provided as handouts during the meeting.

A summary of the discussion is as follows.

- Alcott stated that RPC, when debating how best to articulate performance measures, should keep in mind that meaningful measures should (1) be clear and unambiguous, (2) address manageable conditions (e.g. we do not want to monitor the daily average temperature), (3) be reliable indicators of trends, and (4) be measureable (i.e. a number or percentage).
- None of the four RPC members who provided email comments on the goals and objectives document labeled any of the objectives/ performance measures as Tier 3, so none were removed.
- Teresa McClung wondered if we are to measure the objectives using the performance measures, many of which begin by "reduce" or "increase," do we have baselines. Alcott responded that where baselines do not already exist and are readily available, the first year of monitoring/measuring will create baseline data/information.
- It was suggested that language be provided in the IRWMP report describing examples of performance measures. In addition, the report should include a discussion of any divergent opinions of the group.
- Comments on the policies, goals, objectives, and performance measures.

- P1 Goal: Reduce sources of contaminants
  - Objective 1: Reduce abandoned mine flows and sediments. The question of how abandoned mines are defined was raised. Infusino called the Office of Mine Reclamation and determined they have a list and map of abandoned mines. If appropriate, this will be used to establish the baseline and provide the definition of abandoned mines. Objective will be modified to include definition. Bell and others commented that there are many other abandoned mines that the Office of Mine Reclamation is unaware.
  - Objective 2: Reduce leakage from septic systems. It was suggested to change "failed septic systems" to "problem septic systems" in the performance measure. The RPC agreed with this change. The performance measure may also be broken down into three separate measures (i.e. number of septic system problems identified, number of septic system problems corrected, and number of septic system problems eliminated). Infusino's notes describe his conversation with Mike Israel (Amador County Environmental Health) and Brian Moss (Calaveras County Environmental Health) about potential projects to include in the IRWMP. The Septic System Management Plan, a project submitted by UMRWA during the recent MAC Plan Update project solicitation period includes further developing septic system improvements for Barney Way, as suggested by Moss. Karen Johnson suggested Infusino coordinate with Israel to submit his suggested project of obtaining state funds for a fee waiver for low income, senior, and Native American homeowners who need inspections. Both of these septic system related projects have environmental justice benefits which should be noted in the project form to ensure a high ranking of that criterion.
  - Objective 3: Increase bulky waste pickup programs, avoid illegal dumping, and increase collection of illegally dumped trash. PG&E will be added to the monitoring / reporting agency.
  - Objective 4: Provide toilets at informal recreation sites. Many questions arose regarding this objective. What is an informal recreation site? Do we want to install toilets at these sites? It was noted that adding trash receptacles at sites can actually increase illegal dumping. McClung explained that an informal recreation site, referred to as dispersed sites by the USFS, are by definition, sites without toilets and picnic tables. She does not think that the objective should prescribe the solution. If the USFS found a dispersed site that had waste issues, there are multiple solutions

they could explore including adding a toilet and waste receptacle, or adding signage regarding wag bags and/or leaving no trace. They may also try to discourage the use of the site. The project team will modify this objective to read: "Identify disposal and waste issues at informal recreation sites." And the performance measure to read: "The identification of problems and solutions for reducing contamination associated with informal recreation sites."

    - Objective 5: Manage fire fuels to reduce wildfire impacts. No changes / comments.
    - Objective 6: Increase public awareness of how contaminated water resources affect quality of life and public health. No changes / comments.
    - A new objective was suggested. Objective 7: Monitor water quality in small water supply systems. RPC agreed to add it.
  - P1 Goal: Manage stormwater flows and transport of sediments and contaminants. A member commented that if the goal is to reduce sediment, then timber harvesting should be addressed. He noted that each objective is more urban-focused. It was noted that the USFS already has best management practices (BMPs) in place for forest management, so the objectives should identify what can be done above and beyond existing requirements.
    - Objective 1: Reduce peak stormwater flows to minimize runoff. Change to "Reduce stormwater runoff from peak storm events." Someone asked what was meant by the number of public education actions taken to reduce stormwater flow, included in the performance measure. This refers to educating the public about retaining stormwater on-site slowing peak attenuations by encouraging the retrofit of existing developments with rain gardens, pervious pavement, and other low impact development techniques. Performance measure edited to clarify: "…and number of public education actions taken to encourage the reduction of stormwater runoff."
    - Objective 2, 3, and 4 – no changes / comments.
  - Policy 2: Based on a suggestion received, Policy 2 was edited from "Improve water supply reliability" to "Ensure water supply reliability and ensure long-term balance of supply and demand." Toy disagreed with the addition of "ensure long-term balance of supply and demand." Infusino and Bell approved of the addition. This discussion was postponed until the next meeting.
  - P2 Goal: Ensure sufficient firm yield water supply.

- Objective 1 - No changes / comments.
- Objective 2: Timely implementation of identified water supply enhancement projects. After discussion of the suggested addition of "environmentally, socially, and economically sustainable scheduled…" into the performance measure, the group agreed to remove this objective entirely because it would be difficult to measure accurately.
- Objectives 3 and 4 – no changes / comments.
- A new objective was suggested, Objective 5: Ensure that demand projections are supportable and realistic. Foothill Conservancy suggested this new objective and the associated performance measure: "Number of water demand projections that use Department of Finance and other historical and projected demographic data, as well as water cost sensitivity analyses, to determine demand." Johnson described three primary approaches to developing demand projections: (1) Applying per capita water demands to population data. This reflects residential water demands only and not non-residential uses. (2) Using a socioeconomic model that is data intensive and based on assumptions that are not transparent. (3) Applying demand factors to land uses as identified in general plans which reflect local land use interests, public review, and environmental compliance requirements. Some RPC members noted that the Amador County general plan has not been update in 30 years. Infusino noted that EBMUD attached comments regarding its demand projections in their Urban Water Management Plan (UWMP) as an appendix. He wondered if comments on Amador Water Agency's and Calaveras County Water District's UWMPs could be attached to the IRWMP also. It was suggested he request they be attached to the UWMPs instead of the IRWMP. This objective and performance measure will be edited and revisited at the next meeting.

The review of policies, goals, objectives, and performance measures was stopped because of the lack of time remaining. The RPC agreed to meet on April 16, 2012 to continue discussion of the policies, goals, objectives, performance measures, and evaluation criteria.

Evaluation Criteria

Johnson provided a quick overview of the four different approaches for the economic benefit criterion. The four approaches are also described in the RPC Meeting No. 6 presentation handout. During Meeting No. 5 this criterion was discussed in more detail (see notes from RPC Meeting No. 5) as an approach based on judgment of benefits. An RPC member suggested an approach to divide the grouping of benefits by the total project present value costs (approach #2) and, after the meeting, the Project Team developed approaches #3 and #4 based on groupings of costs and groupings of benefits. The recommended approach #4 is derived by dividing the number of goals the project reflects by three ranges of project costs: 1-up to $2 million, 2-$2 to $20 million, and 3-greater than $20 million. The RPC will review the approaches prior to the April meeting to aid in discussion at that meeting. This change and others made to the evaluation criteria, based on comments received before the meeting, will be reviewed at the next meeting.

A revised project summary spreadsheet was provided as a handout at Meeting No. 6 which shows the current score for each project. (The final ranking is based on approach economic criterion #4.) New project forms and updated forms can be submitted to Alyson Watson until May 23, 2012. Johnson emphasized the importance of completing the forms in full since the project team only uses information about the project based on what is provided in the form. If information was missing, the project received a "low" ranking on that criterion.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Revise the policies, goals, objectives, and performance measures discussed during RPC Meeting #6 based on RPC input received.
- Draft and distribute this meeting summary.

The RPC is asked to complete the following items in advance of the next meeting.

- Review the revised policies, goals, objectives, and performance measures.
- Review the economic benefit criteria approaches.

The next RPC meeting is scheduled for Monday, April 16, 2012 at the Amador County Administration Building at 1:30 p.m. The meeting room (Conference Room A) is located downstairs next to the Board of Supervisors' chambers.

The meeting concluded at approximately 4:00 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 7
April 16, 2012; 1:35 pm to 4:00 pm
Amador County Administration Building, Conference Room A, Jackson California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell (Katherine Evatt)	X 	 X	Foothill Conservancy
Mike Daly	X		City of Jackson
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner		X	City of Plymouth
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo (Art Toy)	X X		Amador Water Agency
Teresa McClung (Rick Hopson)	X 	 X	US Forest Service
Ted Novelli	X		Amador County Board of Supervisors
Joone Lopez (Jeff Meyer)	X 	 X	Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
Gary Slade	X		Trout Unlimited, Sac-Sierra chapter
Hank Willy	X		Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece		X	Department of Water Resources
Bob Dean		X	Upper Mokelumne River Watershed Authority, Calaveras County Water District
Don Stump	X		Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson		X	RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Introductions and Background

The seventh meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated

by Rob Alcott at approximately 1:35pm at the Amador County Administration Building, Conference Room A, in Jackson, California, on Monday, April 16, 2012.

Alcott began the meeting, following the agenda for RPC Meeting No. 7 provided in the RPC meeting packets sent to participants via mail. The primary purpose of the meeting was to review the policies, goals, objectives, and performance measures, and discuss evaluation criteria, if time allowed.

The group approved the RPC Meeting #6 minutes.

Karen Johnson and Rob noted that the next RPC meeting is scheduled for May 9th which falls during the middle of the ACWA conference. Because several PRC members will be attending ACWA, it was proposed the meeting be rescheduled; the group agreed on Monday, May 14th at 1:00 p.m. in Conference Room C (upstairs).

Policies, Goals, Objectives, and Performance Measures

The draft policies, goals, objectives, and performance measures were discussed at three prior RPC meetings with updated versions drafted between meetings based on RPC input. Gary Slade, Art Toy, Pete Bell, and Tom Infusino previously provided comments which were incorporated into a single handout (in track changes) and provided in the RPC packets prior to this meeting. In addition, edits agreed upon during RPC Meeting No. 6 were incorporated in the handout. For the most part, policies, goals, and objectives highlighted in yellow in the handout were discussed, while edits not highlighted were thought to be straight forward and less controversial and thus required less time.

The discussion began with the first goal of Policy 2. A summary of the discussions is as follows.

- Policy 2: Improve Water Supply Reliability and Ensure Long-Term Balance of Supply and Demand
    - The RPC agreed on the addition of "and Ensure Long-Term Balance of Supply and Demand" to the policy.
- P2 Goal: Ensure sufficient firm yield water supply.
    - At RPC Meeting No. 6, the RPC agreed to delete Objective 2: Timely implementation of identified water supply enhancement projects. Infusino suggested adding a status column to the project summary spreadsheet that agencies could update annually to show progress is being made on the projects included in the MAC Plan Update. He noted that if an agency were applying for State funding to implement a project to meet a regulatory requirement and did not receive funding and therefore could not implement the project, the tracking of the status

would be a useful tool in demonstrating this non-action. It was agreed that Objective 2 remain deleted, and that this discussion be noted in the Plan itself.

- Objective 2 (previously 3). Encourage diverse water supply portfolios to meet agency demands: edits made to performance measure to add examples: "…, including for example but not limited to, demand management, water reuse, and water neutral development ordinances."
- Objective 4. Ensure that demand projections are supportable and realistic: Bell believes that the general plan land use methodology is too complex to be implemented in this region but was ok with the suggested wording. All agreed on the suggested wording of the objective and performance measure. Infusino requested the RPC members be added to Monitoring/Reporting Agency so that they are recognized in case they would like to express concern over demand projections.
- Objective 5. Balance long-term regional supply and demand: This was a new objective suggested by Foothill Conservancy. It was discussed that the performance measure "Number of water plans that incorporate demand management and water reuse" does not relate to balancing water supply and demand. After much discussion, it was suggested the performance measure instead reference agencies' water supply planning process and multiple documents as a source. The objective was revised to: "Balance long-term regional supply and demand in a water supply plan" and the performance measure was modified to: "Number and/or percentage of water agencies addressing supply and demand in their long range planning process."

- P2 Goal: Maintain and improve water infrastructure reliability. No changes made.
- P2 Goal: Promote water conservation, recycling, and reuse for urban and agricultural uses.
  - Objective 1. Establish and implement water conservation and efficiency programs based on best management practices (BMPs): The performance measure referenced California Urban Water Conservation Council (CUWCC) BMPs. Gene Mancebo noted that AWA has a stand-alone conservation plan that does not include the CUWCC BMPs. It was agreed that the percentage of agencies meeting SBx7-7 targets (20% reduction in per capita consumption by 2020) would be an adequate performance measure. If an agency is not meeting its reduction target, it will report what percentage of BMPs it is implementing. Edits made.
  - Objective 2. Maximize use of recycled water from wastewater treatment plants: Hank Willy would prefer this objective be removed as he has worked with the City of Jackson to get treated effluent from its

wastewater treatment facility to irrigate JVID fields, but has not been successful due to State and other regulatory requirements. Other participants believed the objective should stay in with modifications to the performance measure to acknowledge efforts by agencies to promote increased use of recycled water. Tom Francis noted EBMUD is a monitoring/reporting agency, but their primary service area is not within the watershed or region. He will report data as available. The performance measure was modified to reflect "efforts to promote" increased use instead of programs.

- Objective 3: Reduce demand through water-neutral development: This is a new objective proposed by Foothill Conservancy. The RPC agreed with the addition of this objective with revisions to reflect agencies' willingness to promote water-neutral development. Joone Lopez commented that CCWD works with developers to reduce water use, but to force developers to create water-neutral development through an ordinance could have a significant impact on local economy. Objective revised to: "Moving toward a reduction in demands through water-neutral development." Performance measure revised to replacing ending with: "… number of land use agencies that are working towards developing water neutral results within the watershed."
- P2 Goal on drought mitigation measures, no change.

- Policy 3: Practice Resource Stewardship
    - P3 Goal: Protect, conserve, enhance, and restore the region's natural resources
        - Objective 1: edits accepted
        - Objective 2: Promote water resource projects that achieve an equitable balance between conflicting interests while minimizing harm to natural resources and incorporating natural resource protection, mitigation, and restoration: It was agreed the performance measure "Number of projects with broad based community support" did not relate to the objective. With the addition of the new policy, Policy 4: Focus on areas of common ground and avoid prolonged conflict, all agreed the performance measure should be changed to: "Percentage of fully mitigated impact by projects."
        - Objective 3: In the performance measure, "programs" was changed to "land area".
    - P3 Goal: Maintain or improve watershed ecosystem health and function
        - Objective 1: Teresa McClung noted that many of the performance measures are "number of…" but that oftentimes the USFS measures restoration in acres or miles of stream for example. This

performance measure will include the addition of "and/or land area" after "number of projects."

- The remaining two P3 goals were accepted as edited.

- Policy 4: Focus on areas of common ground and avoid prolonged conflict. This is a new policy proposed by Foothill Conservancy. It was agreed that portions of the objective and performance measure are redundant with the implementation risk evaluation criterion. There was much discussion over this policy because of the reference in the goal to prioritizing projects with the broadest community support. Lopez noted that she does not believe the goal as written should be a goal because sometimes agencies make decisions to implement projects that may not have full public or community support (e.g. some communities may not support recycled water projects). All were accepting of the following language.

  Goal: Prioritize projects that have the best likelihood of being completed in the planning horizon.

  Objective: Identify high controversy projects and work towards common ground solutions.

  Performance Measure: Percentage of projects that have parties working on common ground solutions.

This completed the review and discussion of the policies, goals, objectives, and performance measures. They will be revised based on the discussions at this meeting to create a final version.

Evaluation Criteria

The discussion of evaluation criteria was postponed until RPC Meeting No. 8.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Revise the policies, goals, objectives, and performance measures discussed during RPC Meeting #7 based on RPC input received.
- Draft and distribute this meeting summary.

The RPC is asked to complete the following items in advance of the next meeting.

- Review the economic benefit criteria approaches which were distributed in the Powerpoint handout prior to RPC meeting number 6.

The next RPC meeting is scheduled for Monday, May 14, 2012 at the Amador County Administration Building at 1:00 p.m., upstairs in Conference Room C.

The meeting concluded at approximately 4:00 p.m.

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 8
May 22, 2012; 1:00 pm to 3:45 pm
Amador Water Agency Board Room, Sutter Creek, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell (Katherine Evatt)	X	 X	Foothill Conservancy
Mike Daly		X	City of Jackson
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner		X	City of Plymouth
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo (Art Toy)	X	 X	Amador Water Agency
Teresa McClung (Rick Hopson)		X X	US Forest Service
Ted Novelli		X	Amador County Board of Supervisors
Jeff Meyer	X		Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
Gary Slade	X		Trout Unlimited, Sac-Sierra chapter
Hank Willy	X		Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece		X	Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Don Stump	X		Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott		X	Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Purpose of RPC Meeting #8

The eighth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Karen Johnson at 1:00pm at the Amador Water Agency Board Room, in Sutter Creek, California, on Tuesday, May 22, 2012.

Johnson began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #8. The two primary purposes of the meeting were to confirm the policies, goals, objectives, and performance measures agreed upon at the previous meeting, and to discuss and finalize evaluation criteria and the evaluation and prioritization process.

The group approved the RPC Meeting #7 minutes.

Confirm Final Policies, Goals, Objectives, and Performance Measures

The finalized policies, goals, objectives, and performance measures were discussed. A summary of the discussion is as follows.

- For Policy 4: Focus on areas of common ground and avoid prolonged conflict, information is needed from the project proponents. For each project proponent, we need to understand how these projects comply with the goal: "Prioritize projects that have the best likelihood of being completed in the planning horizon". The planning horizon is 20 years. The question is: does your agency prioritize the project to the point where it is likely to be implemented in the 20-year planning horizon.
    - For example, if there is a project to use ephemeral streams for water conveyance, there could be some environmental issues, but they could be overcome. Evaluation and scoring should evolve and reflect current conditions over time.
    - Projects should provide a process for outreach and input.
- A goal under Policy 3 was once "Minimize adverse effects on biological and cultural resources." It was separated into two goals based on RPC input at Meeting No. 6. The goals now include "Maintain or improve watershed ecosystem health and function" and "Minimize adverse effects on cultural resources." The score each project received for the combined former goal was used for each of the separated goals, as indicated in the revised project summary spreadsheet. Under this self scoring process, if there is a change to these rankings the project proponents are to notify RMC.
- Information should be emailed to Alyson Watson at awatson@rmcwater.com.
- The performance measure for Policy 3, the first goal, second objective: "Promote water resource projects that achieve an equitable balance between conflicting interests while minimizing harm to natural resources and incorporating natural

resource protection, mitigation, and restoration" was revised based on RPC input. It now reads: "Percent and ratio of fully mitigated impacts by project as compared to all impacts".

With these changes, the policies, goals, objectives, and performance measures were finalized.

Project Evaluation Criteria

Johnson went over the Proposed Evaluation Criteria Modifications – March 8, 2012 handout and the list of Evaluation Criteria, RPC Meeting #6-March 21, 2012. Interest was expressed by the RPC to categorize projects by type of project. Categories were then based on the general policy topics and in turn reflected in the project summary spreadsheet, an update of which was provided in the mailing for this meeting with extra copies provided at the meeting.

An overview was provided of the three approaches to the Economic Feasibility criterion discussed previously. A new, fourth approach was recommended which is similar to the third approach, but would have static cutoffs for the low, medium, and high criteria as opposed to comparing projects against one another. The proposed evaluation approach tiers are as follows.

- High: Project cost is <$2 M = score of 1
- Medium: $2M - $20 M = score of 2
- Low: >$20 M = score of 3

The cost score (e.g., 1, 2, or 3) is then divided by the benefit score (based on number of goals addressed, and the resultant ratio was used as the basis for the Economic Feasibility score, based on the following cutoffs.

- High: 2.5+
- Medium: 1.5 – 2.5
- Low: 0 – 1.4

Additional comments included:

- Tom Infusino would appreciate a new table with project title; Resource Management Strategies (RMS), Statewide Priorities (SPs), and MAC goals; capital costs; and priority result. This summary table will aid in the review of projects to ensure that they are meeting all RMS, SPs, and goals.
- The group discussed the time limit of having project information submitted by May 23. The consulting team agreed to extend the deadline for revising projects to May 30. This will be noted on the website.

- EBMUD is reviewing the disadvantaged communities (DAC) definition for the region to ensure that the list is complete. RMC will send the RPC members a link to DWR's GIS DAC coverage for reference.
- Implementation Risk criterion
  - If anyone is going to submit information on why a project has implementation risk, they will need to coordinate with the project proponent prior to the score being adjusted.
  - The June RPC meeting will provide an opportunity for the group to discuss any projects that have low / medium scoring based on disagreements between project opponents and proponents.
- Reasonable end-user cost criterion suggested by Pete Bell was discussed.
  - The group reviewed the proposed criterion. The consultants discussed the difficulties in assessing costs to end users for projects, as well as determining whether the customers will consider the costs reasonable. This criterion includes multiple dimensions of cost avoidance, rate affordability, fines and health impacts, and the cost of doing nothing.
  - The group agreed that the criterion is a good concept, but is probably not feasible to do in this process at this time due to budget and staff constraints. It will be noted in the section of the MAC Plan Update as a recommendation for a future criterion during an update.
  - This criterion and the following criterion regarding best project for intended purpose may not apply if the project is mandated.
- Best project for intended purpose criterion suggested by Pete Bell was discussed.
  - It was discussed that sometimes projects that have the greatest likelihood of being realized are not necessarily the best projects. The best projects may not be cost effective or may have compliance issues, etc.
  - This new criterion would have to be well-defined in order to score projects.
  - The RPC decided to include this criterion as drafted; this will be self-reported by project proponents and is due by May 30 to RMC.
- Amador Water Agency's Camanche South Shore Treatment Plant should be removed from the list because it is the same project as the EBMUD project.

Project Evaluation and Prioritization Process

Johnson asked whether we should retain the three high scores as the threshold for the overall high score. The RPC agreed.

Johnson asked the RPC if they would like to prioritize the goals. Discussion included:

- All members of the group have agreed to the goals, regardless of priority, which is a success.

- Goals of the diverse range of RPC members are very different, thus making it difficult to prioritize which are most important and of limited value.
- The RPC decided that it would not make sense to prioritize the goals because the existing goals are all important for different reasons for each participant and the entity they represent on the RPC.
- Should mandated projects be elevated in importance? RPC members will discuss mandated projects outside of the committee meetings so discussion can be added to the plan document to describe which are mandated projects, etc.

Impacts and Benefits, and Finance Plan Sections

RMC will email the electronic sections of the impacts and benefits and finance sections to the RPC for review and comment.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Send Pete Bell hard copies of the project information forms.
- Email Jeff Meyer CCWD's project information forms in MS Word format.
- Revise the Project Summary Spreadsheet to include the new evaluation criterion on best project for the intended purpose and the goal associated with the new Policy 4; remove columns showing Economic Benefit approaches 1 through 3; and delete AWA's South Shore Camanche Regional WTP.
- Create a project summary table that shows the project title; project goals, SPs, and RMSs it meets; capital costs, and final priority score (high, medium, or low).
- Provide information to RPC regarding MAC DAC definitions.
- Note project solicitation extension to May 30th on the website.

The RPC is asked to complete the following items in advance of the next meeting.

- Revise project information forms including the following information.
  - Overall accuracy, completeness, and any updates of the projects
  - The ranking for the goals "Minimize adverse effects on cultural resources" and "Maintain or improve watershed ecosystem health and function."
  - Discuss how the project will meet the new evaluation criterion regarding best project for intended use.
  - Does the project meet the goal in the new Policy 4. "Prioritize projects that have the best likelihood of being completed in the planning horizon."

The next RPC meeting is scheduled for Wednesday, June 27, 2012 at the Amador County Administration Building at 1:00 p.m. in the upstairs conference room. The meeting concluded at approximately 3:45 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 9
June 27, 2012; 1:05 pm to 3:30 pm
Amador County Administration Building, Conference Room C, Jackson, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell (Katherine Evatt)	X	 X	Foothill Conservancy
Mike Daly		X	City of Jackson
Tom Francis (Joaquin Cruz)	 X	X	East Bay Municipal Utility District
Jeff Gardner	X		City of Plymouth
Tom Infusino		X	Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo (Art Toy)	X X		Amador Water Agency
Teresa McClung (Rick Hopson)		X X	US Forest Service
Ted Novelli		X	Amador County Board of Supervisors
Jeff Meyer (Don Stump)	 X	 X	Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
Hank Willy		X	Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece	X		Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Pat McAvery	X		Calaveras Parks and Recreation Commission
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Purpose of RPC Meeting #9

The ninth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Rob Alcott at 1:05pm in Conference Room C at the Amador County Administration Building, in Jackson, California, on Wednesday, June 27, 2012.

Alcott began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #9. The primary purposes of the meeting were to finalize the project review process and associated project summary spreadsheet, reconfirm governance structure and text, and determine responses to Project List commenters.

The group approved the RPC Meeting #8 minutes.

Project Review Process

Alcott briefly summarized the three letters that were provided to the RPC providing comments on the project list. The letters were from Muriel Zeller, Foothill Conservancy, and the Ratepayers Protection Alliance. RPC members were asked to individually consider the comments as they review and discuss the projects. The commenters will be invited to the September 24th Community Workshop to provide additional public input.

Prior to RPC Meeting #9, the Tamarack Spring Mutual Water Company contacted Alcott with interest in submitting a project for inclusion in the MAC Plan Update. Alcott provided the project information form, which the Tamarack Spring Mutual Water Company completed and submitted. The form was provided to the RPC meeting attendees as a handout. Alcott asked if the RPC was okay with the project being evaluated and included in the Plan (even though the project solicitation period had ended). Some RPC members asked whether the project is within the MAC Region or the Tuolumne-Stanislaus Region. The RPC agreed that the project could be included in the project evaluation if it was determined to be located within the boundaries of the MAC Region. RMC will confirm project location. If the project meets the minimum requirements and is within the MAC Region, it will be evaluated and added to the project summary spreadsheet and the Plan. [Note: It was subsequently determined that the Tamarack Spring Mutual Water Company service area is not located within the MAC Region. The Tamarack Spring representative was provided Tuolumne-Stanislaus IRWM Region contact information and has since established a working relationship with that region.]

The Project Team proposed a new evaluation criterion to comply with the DWR Prop 84 Guidelines. The proposed criterion is as follows:

- Project Status/Readiness

- High – Fully ready with design and environmental documentation completed
- Medium – Advanced planning completed, final design and environmental documentation not completed
- Low – Conceptual or preliminary planning completed.

Alyson Watson explained that the addition of the criterion to the evaluation process would not hurt any project's final score or remove any of the projects from the list. Conversely, it could improve a project's final score by assigning an additional high score. The group recognized that some of the projects submitted for inclusion are construction projects while others are planning-level (e.g. modeling or evaluations), and planning-type projects may receive a lower score, when in actuality, they are ready for implementation. Jason Preece from DWR noted that it is important to include the criterion because DWR needs this information later in the process, especially during grant applications. Because we are at evaluating the projects for inclusion in the MAC Plan Update, not a grant application, there was discussion about whether the the criterion should be included. The RPC agreed the criterion should be added, with the understanding that it refers to implementation project readiness at this particular time, and would be updated in the future as the project list is updated and during grant application processes.

Because new evaluation criteria were added at this meeting and at RPC meeting #8 (i.e. best project for intended purpose), Karen Johnson discussed the potential need to change the scoring threshold for final project scores. The final score was previously based on the number of high scores on evaluation criteria received, as follows: 3 or more High scores = High; 1 to 2 High scores = Medium; no High scores = Low. To prevent all of the projects from receiving high scores, the RPC agreed that the scoring thresholds should be changed such that 5 or more High scores = High; 1 to 4 High scores = Medium; no High scores = Low. This change will be made in the project evaluation spreadsheet which will be distributed (hard copies) to the RPC members upon finalization.

Watson asked if the RPC was okay with the project evaluation results. This led to a more detailed discussion of the projects. Pete Bell reviewed some of the comments submitted by the Foothill Conservancy in its letter dated May 30, 2012. He noted that there were two projects that had the Resource Management Strategy "Fog Collection" checked off, but the proponent must have thought "Fog" meant fats, oils, and grease, rather than actual fog. The two check marks were removed from the evaluation spreadsheet. Questions over aspects of several other Amador Water Agency (AWA) projects were raised. RPC Member Gene Mancebo responded to the questions with additional clarifying information. Several other suggested changes were discussed and some were incorporated into the spreadsheet as approved by the RPC.

The committee then discussed whether additional time was needed to further review the project list. Bell commented that he could not support all of the listed projects, and he felt that some project descriptions are inadequate and some project assessments are inaccurate. Watson replied that the RPC needed to decide if further project review was desired; the Project Team would support additional review but noted that the project schedule and budget were becoming constraints. Watson also reminded the committee that inclusion of a project in the updated MAC Plan does not constitute support for the project and that the draft Project Review section includes language to that effect. The majority of RPC members indicated that they did not wish to continue a project-level review process. Bell commented that he was not satisfied with the project descriptions and not in agreement with some of the project evaluation scores but because inclusion of the projects in the plan did not represent endorsement of the projects he could 'live with' the project list and evaluations. Other committee members agreed, and the project list and evaluations were accepted by the RPC.

Watson commented that the RPC should be commended for their project vetting process. In many regions, stakeholder committees do not have the opportunity to review project information and discuss questions, comments, and project details at meetings. The discussion was valuable and helped clarify certain stated benefits of some of the projects, as well as identify errors.

Governance

In response to a request by Bell, the RPC was asked to discuss the MAC Plan Governance section (which had been reviewed at RPC meeting #3 on October 12, 2011). In a meeting of an IRWM region south of the MAC Region, an attendee incorrectly stated that the UMRWA Board of Directors make all of the MAC Plan Update-related decisions, and the stakeholders do not have decision-making authority. Bell referenced a section of DWR's Prop 84 Guidelines that discussed inclusion of non-profit organizations and questioned whether the MAC Region's governance structure is consistent with DWR requirements. RPC Member Bob Dean explained that UMRWA would only intervene if the RPC could not come to an agreement on a particular item.

Alcott said that the governance structure for the MAC region was reviewed and approved by DWR during the 2009 Region Acceptance Process (RAP), whereby it was deemed to be consistent with the IRWM Guidelines. The MAC governance structure, with the RPC as its foundation, is designed to allow for input from all local agencies, including non-profit organizations.

Other RPC members went on to say that because the MAC governance structure is more successful than structures in place in other regions they have been involved with, they

often recommend this structure to others. Preece commented that he sees no issue with the structure.

Impacts and Benefits, and Finance Plan Sections

RMC will resend the electronic sections of the impacts and benefits and finance sections to the RPC for review and comment.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Determine if Tamarack Spring Mutual Water Company is within the MAC Region. If so, evaluate project using finalized project review process.
- Finalize project summary spreadsheet and mail hard copies to RPC members for review.
- Update project score sheets and upload to MAC documents webpage.

The RPC is asked to complete the following items in advance of the next meeting.

- Review the meeting notes.
- Provide comments on the Implementing Projects and Programs, Impacts and Benefits, and Financing Plan sections of the Plan Update. Provide comments by July 10, 2012.

The next RPC meeting is scheduled for Wednesday, August 29, 2012 at the Amador County Administration Building at 1:00 p.m. in the upstairs conference room.

The meeting concluded at approximately 3:30 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 10
August 29, 2012; 1:05 pm to 3:35 pm
Amador County Administration Building, Conference Room C, Jackson, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell	X		Foothill Conservancy
(Joaquin Cruz)		X	East Bay Municipal Utility District
Mike Daly	X		City of Jackson
(Katherine Evatt)		X	Foothill Conservancy
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner	X		City of Plymouth
(Rick Hopson)		X	US Forest Service
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo	X		Amador Water Agency
Teresa McClung		X	US Forest Service
Jeff Meyer	X		Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
(Don Stump)	X		Calaveras County Water District
(Art Toy)	X		Amador Water Agency
Hank Willy	X		Jackson Valley Irrigation District
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece	X		Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Ed Pattison	X		City of Ione
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson		X	Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Purpose of RPC Meeting #10

The tenth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Alyson Watson at 1:05pm in Conference Room C at the Amador County Administration Building, in Jackson, California, on Wednesday, August 29, 2012.

Watson began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #10. The primary purposes of the meeting were to discuss the approach to resolve RPC member comments on the project evaluation, and discuss comments on the Goals and Objectives, Impacts and Benefits, and Financing Plan Sections of the Plan Update.

Ed Pattison, who is now the City Manager of the City of Ione, requested joining the RPC to represent the City. After discussion, the RPC agreed to have Ed become an RPC member.

During discussion of approval of the RPC Meeting #9 notes, two errors were identified in the attendance table on page 1. The group agreed to approve the notes with the noted corrections.

MAC Plan Update Schedule

There are three RPC meetings scheduled after this meeting. At the next RPC meeting, scheduled for September 24th, the following items will be discussed:

- Implementing Projects and Programs section including project List and evaluation
- Plan Performance and Monitoring and Data Management, Technical Analysis
- Proposed Governance Changes
- Projects to include in implementation grant application

There currently is not an October RPC meeting scheduled. At the November RPC meeting, the following will be on the agenda:

- Endorse Plan Performance and Monitoring and Data Management, Technical Analysis
- Discuss Climate Change and Coordination with Land Use Agencies
- Endorse implementation grant projects

Then, at the January 2013 meeting, the RPC will endorse the Draft MAC Plan Update.

After the last RPC meeting, RPC members raised concerns over the project list which had been endorsed. In order to have a Plan Update and associated list of projects that all RPC members have reached a consensus on, concerned RPC members requested meetings with CCWD and AWA to discuss specific the prioritization scoring of projects, comments, and concerns. The FC and others met with AWA on August 21st and with CCWD on August 23rd. Not all of the projects were discussed so additional meetings have been scheduled.

In order to meet the schedule requirements and have sufficient time to discuss projects to be included in the Proposition 84 Round 2 Implementation Grant Application (Round 2 Application), the region must have an endorsed project list by the September meeting. If all of the projects are not discussed prior to the September RPC meeting, the MAC Plan Update will note that there is a subset of the project list which will require further vetting to confirm that the project scoring and evaluation is satisfactory to all RPC members. The vetted list, excluding the projects requiring further discussion, will serve as the list of potential projects for inclusion in the Round 2 Application. Comment meetings may continue to be held to discuss the non-vetted list. The MAC Plan Update will be revised prior to the November RPC meeting to reflect additional work complete, and the RPC will be asked to re-endorse the list at that time. No changes to the project list will be made following the November RPC meeting. In case all of AWA's projects cannot be discussed prior to the September 19 comment discussion, Gene Mancebo will prioritize the remaining AWA projects for discussion to ensure the projects he may want considered for inclusion in the Round 2 Application are discussed.

If there are comments or concerns that cannot be resolved during the comment discussion meetings, they will be brought to the RPC for discussion.

While the need to discuss specific projects in detail and conduct separate meetings was not anticipated, it was agreed that it will benefit the Plan and improve overall quality of the projects, plan, and process.

RPC members also commented on the governance structure at a previous meeting. Specifically, the question arose as to whether the MAC Region's governance structure is consistent with DWR requirements. Consistent with the Governing Procedures, RPC members Infusino and Bell will develop potential alternatives to the currently endorsed governance structure for discussion at the September RPC meeting. If agreed upon by the RPC, the proposed changes to the existing governance structure would be recommended to the UMRWA Board to be implemented during the next MAC Plan Update.

CARWSP Update

The RPC was updated on the status of the Camanche Area Regional Water Supply Plan (CARWSP) effort. The purpose of the Plan is to develop a mutually agreeable preferred project description, preliminary engineering documents and preliminary project plan which collectively meet the documented needs of the 3 project partners – AWA, CCWD, and EBMUD. The tasks that will be completed were briefly described; currently the participating agencies are in the process of developing water demands and the potential areas that could be served by the project. The participating agencies identified the

following critical success factors (CSFs) for the project (i.e. conditions that must be met for the project to be viewed as successful):

1. Meet Current and Future Demands in the Wallace Area
2. Maintain or Reduce Operating Costs to Provide an Affordable Supply
3. Provide a System that is Easy to Operate
4. Provide Reliable Supply Year-Round
5. Clear and Fairly Resolve Water Rights
6. Build Regional Partnerships
7. Garner Local Community Support
8. Transfer Responsibility for Local Residents
9. Meet All Applicable Regulatory Requirements
10. Beneficially Impact Water Treatment-Related Wastewater Discharges
11. Maximize Ability to Secure Outside Funding
12. Improve Water Supply and Quality in the Lake Camanche Village Area
13. Provide an Affordable Supply
14. Minimize Capacity Impacts to the Mokelumne Aqueduct

RPC member comments included:

- CSF number 1 is unclear because it suggests that future (unplanned / unapproved) development may be served. Through discussions with CCWD the RPC member thought that future demands would not be served. Watson clarified stating that the project will serve existing and approved development and agreed that the wording may not be clear. Until CSFs 4, 5, 6, and 13 are figured out, public participation will not matter because there will be no project.

RPC members commented that they would like to discuss the CARWSP project with representatives from Burson. The participating agencies requested the information stay within the RPC for now. It is possible that serving Burson from the Camanche-area plant may not be feasible and / or may not be the most cost-effective option; those details have not yet been resolved. The map included in the presentation shows potential areas to serve, but it is believed the demands for the areas that could be served may exceed the amount of water that would be available from the project. Infusino contended that Burson should be invited to discuss project development and that the role of the public gets diminished in water planning exercises. While there was discussion that public should be involved, the RPC determined that they should not put information forward if questions will be asked and the only answer is "I don't know." The goal is to fine-tune demands, supplies, and potential areas to be served prior to the September public workshop so that the information can be presented there for discussion.

RPC members pointed out that CSFs were developed without public input and Watson clarified that they are intended to clarify the needs of the participating agencies, and are not intended to reflect the input of other entities at this time.

CARWSP-specific outreach has been and will continue to be performed by the participating agencies prior to endorsement of the MAC Plan update. In addition, a CARWSP update will be provided at the September 24th MAC Plan Update Community Workshop.

Goals and Objectives

The policies, goals, objectives, and performance measures were endorsed by the RPC at Meeting #8 on May 22nd. Prior to Meeting #10 the RPC was provided a revised Goals and Objectives section that incorporated their agreed-upon changes.

RPC members suggested improvements to the policies, goals, objectives, and performance measures, but agreed that they have been endorsed and meet the needs of the region presently. It was suggested that more environmental enhancement and groundwater considerations be incorporated in the future.

Other comments on the policies, goals, objectives, and performance measure section were discussed, and changes will be made to reflect the comments.

RPC members discussed whether the use of the word "collaborative" was appropriate to characterize the RPC process. The RPC determined, in concurrence with Jason Preece of DWR, that the process has been collaborative, and the terminology is appropriate.

The RPC also discussed the use of the word "broad" to characterize RPC membership. Because the outreach effort to identify RPC members was significant, and the representation is relatively varied, including representatives from disadvantaged communities, governmental and non-governmental agencies, City and County representatives, and other interests, representation can be accurately described as broad. In addition, while no Native American representatives are currently on the RPC, it is because they declined to participate.

RPC members discussed that although there are 4 identified, overarching policies, there isn't one 'big picture' policy stating the overall benefit to the watershed within the boundaries of MAC. It was noted that the policies, goals, and objectives form the tapestry that is the overall regional policy.

Impacts and Benefits, and Finance Plan Sections

Watson provided an overview of the Impact and Benefit and Finance Plan standards as defined in the DWR Prop 84 & 1E Guidelines. RMC will resend the electronic sections of the impacts and benefits and finance sections to the RPC for review and comment, and preparation for endorsement/discussion at the next RPC meeting. Comments on the sections are due to RMC by September 10th.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Make corrections to the Meeting #9 notes.
- Email MS Word versions of the Impacts, Benefits, and Financing sections to the RPC for review.
- Finalize Implementing Projects and Programs section.
- Draft Plan Performance and Monitoring, Data Management, and Technical Analysis sections.

The RPC is asked to review the meeting notes prior to the next meeting.

AWA will prioritize the list of projects to discuss with commenters, in case not all of the projects can be discussed during their next scheduled meeting.

RPC members with concerns related to projects and scoring will set up meetings with project sponsors to discuss project-specific comments.

Infusino and Bell will also develop a list of suggested improvements to the governance structure. The list will be provided to Watson on or before September 17th.

Dean will prepare a list of suggestions to the policies, goals, and objectives for future consideration and possibly inclusion in the MAC Plan Update.

The RPC will review the Impacts, Benefits, and Finance sections and provide comments to RMC by September 10th.

The next RPC meeting is scheduled for Monday, September 24th, 2012 at the Amador County Administration Building from 3:00 p.m. to 5:30 p.m. in the upstairs conference room. After the RPC meeting, the MAC Plan Update public workshop will be conducted in the same building in the Board Chambers from 6:00 p.m. to 7:00 p.m.

The meeting concluded at approximately 3:30 p.m.

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 11
September 24, 2012; 3:10 pm to 5:35 pm
Amador County Administration Building, Conference Room C, Jackson, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell	X		Foothill Conservancy
(Joaquin Cruz)		X	East Bay Municipal Utility District
Mike Daly		X	City of Jackson
(Katherine Evatt)		X	Foothill Conservancy
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner	X		City of Plymouth
(Rick Hopson)		X	US Forest Service
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo	X		Amador Water Agency
Teresa McClung		X	US Forest Service
Jeff Meyer		X	Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
(Don Stump)	X		Calaveras County Water District
(Art Toy)	X		Amador Water Agency
Hank Willy	X		Jackson Valley Irrigation District
Ed Pattison		X	City of Ione
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece		X	Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Purpose of RPC Meeting #11

The eleventh meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Alyson Watson at 3:10pm in Conference Room C at the Amador County Administration Building, in Jackson, California, on Monday, September 24, 2012.

Watson began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #11. The primary purposes of the meeting were to endorse the revised Implementing Projects and Programs section, project list, and project evaluation; endorse the Impacts and Benefits and Financing sections; discuss the Plan Performance and Monitoring, Data Management, and Technical Analysis sections; discuss an approach to resolving RPC member comments on Governance; and review the Proposition 84, Round 2 Implementation Grant scoring criteria and discuss potential projects for inclusion in a grant application.

MAC Plan Update Schedule

There are two RPC meetings scheduled after this meeting; there is no October RPC meeting scheduled. The following items are currently planned for the November RPC meeting:

- Endorse Plan Performance and Monitoring and Data Management, Technical Analysis
- Discuss Climate Change and Coordination with Land Use Agencies
- Endorse implementation grant projects

At the January 2013 meeting, the RPC will be asked to endorse the Draft MAC Plan Update. Bell wondered when hard copies of the Plan could be distributed for review. Bell and Infusino noted that they will each need to bring the MAC Plan Update document to their governing boards prior to stating endorsement. The Foothill Conservancy (FC) Board meetings are the last Tuesday of each month (so there may not be one in December) and the Calaveras County Planning Coalition has meetings on November 26th and January 21st. Public comments on the portions of the Plan completed to-date will be due to RMC by October 3rd. RMC will incorporate comments and prepare a compiled Draft Plan for RPC review on December 7th. CARWSP (the Camanche Area Regional Water Supply Plan) is an effort currently being implemented in parallel to the MAC Plan Update. Upon completion of the CARWSP study, it will be incorporated into the MAC Plan Update. As such, the December 7th Draft MAC IRWM Plan Update will not include the CARWSP material. RMC will release the draft CARWSP portion of the MAC Plan Update on January 3, 2013. AWA and CCWD will present CARWSP updates to their respective Boards on October 24th and 25th, and RPC members and interested members of the public are encouraged to attend these meetings to get an overview of the project and what to expect in the January 3rd chapter. The RPC has seen the majority of the MAC Plan Update so the hope is that there will not be significant comments prior to the January endorsement date.

Implementing Projects and Programs Section, Project List, and Project Evaluation

RMC revised the Implementing Projects and Programs section based on RPC comments and input provided at RPC Meeting No. 10 on August 29, 2012. The key components included in this section are the procedure for submitting projects, a summary of the project evaluation process, an explanation of the vetting process currently underway, a list of the projects not fully vetted, a summary of resource management strategies integrated by the MAC projects, and identification of considerations for future Plan updates. An RPC member noted that this version of the Plan is much more thorough than the previous version so it may not require extensive revisions/rewriting in future updates.

The RPC unanimously endorsed the Implementing Projects and Programs section, recognizing that additional projects may be moved to the "vetted" list prior to the November 7, 2012 RPC meeting. If this occurs, the section will be submitted for re-endorsement at the November RPC meeting.

After RPC Meeting No. 9, RPC members raised concerns over the project list which had been endorsed. In order to have a Plan Update and associated list of projects that all RPC members are comfortable with, concerned RPC members requested meetings with Calaveras County Water District (CCWD) and Amador Water Agency (AWA) to discuss the prioritization and scoring of projects, comments, and concerns. The FHC, Ratepayer Protection Alliance (RPA), Infusino, and Muriel Zeller met with AWA on August 21st and with CCWD on August 23rd. Not all of the projects were discussed, so additional meetings have been scheduled to address remaining comments. If there are comments or concerns that cannot be resolved during the comment discussion meetings, they will be brought to the RPC for discussion.

Changes discussed and agreed upon at the two August meetings were made in the project evaluation; the revised project list and evaluation were provided to the RPC. The RPC endorsed the revised project list unanimously. The projects requiring further vetting will be discussed in separate meetings in October and updated prior to the November meeting. The results from those separate meetings shall be documented by October 31st to allow for project evaluation revisions prior to November 7th.

Impacts and Benefits, and Finance Plan Sections

Watson provided an overview of the Impact and Benefit and Finance Plan standards as defined in the DWR Prop 84 & 1E Guidelines. RMC sent electronic sections of the impacts and benefits and finance sections to the RPC for review and comment.

Bob Dean commented that while there are no federally recognized tribes in the Region, there are state-recognized tribes (or portions of tribes). He suggested that state-recognized tribes be mentioned in the impacts and benefits section.

Infusino suggested 'economic benefits' in Table 4-2 be changed to 'local prosperity.' He noted that while projects may provide local prosperity benefits, they could carry long-term fiscal impacts that would actually cause economic impacts, and the use of the term "economic benefit" could therefore be misleading. In addition, he noted that the discussion of impacts is not as robust as that of benefits, and recommended that the impacts discussion be expanded to the same level of detail as the benefits.

The RPC provided tentative endorsement of the Impacts and Benefits section with the suggested changes noted above. The section will be revised and re-submitted for full endorsement at the November 7 RPC meeting.

Infusino pointed out that page 59 of the Prop 84 Guidelines includes a more detailed finance table than that provided in the draft Finance section of the MAC Plan Update. RMC will revise the table in the Financing Plan section of the MAC Plan Update to more closely resemble DWR's example. Specific changes include:

- Add a column for O&M costs
- Add a footnote indicating that percent of funding by source will be added over time as it is identified
- Add a footnote that longevity and certainty of funding sources will be added over time as this information is identified

Bell suggested that water agencies consider adding an option on monthly water bills to give customers the option to donate money to maintain projects.

The RPC tentatively endorsed the Financing section with the suggested changes above.

Plan Performance and Monitoring, Data Management, and Technical Analysis Sections

Watson explained that according to the Prop 84 Guidelines IRWMPs must contain performance measures and monitoring methods to ensure the objectives of the Plan are met. As described in the draft Plan Performance and Monitoring section, a MAC Plan Performance Review would be completed every three years. Infusino did not think this was sufficient and would like to see it completed more often. Alcott explained that financing is the limiting factor, and the frequency was limited because of the costs associated with performing the Plan performance monitoring. Alcott will develop a cost estimate for Plan Performance Monitoring to be presented to the UMRWA Board in

January when it is scheduled to adopt the updated Plan. A committee member noted it may be possible to request funding through the IRWM program to complete this.

An RPC member suggested adding the creation of a DMS to the considerations for future updates in Section 4. Don Stump noted that DWR will provide technical assistance for data management.

The Technical Analysis section was not discussed in detail. The RPC will send comments on this section to RMC by 10/3/12.

Governance

RPC members previously commented that in their view the MAC Region's governance structure is not consistent with DWR requirements. Consistent with the Governing Procedures, RPC members Infusino and Bell (with Watson's assistance) developed potential alternatives to the currently endorsed governance structure for discussion at the September RPC meeting. Infusino summarized his issues with the governance structure and suggested changes for improvement.

- Need to improve public outreach. The Plan states that electric companies, Native American communities, business representatives and others on the RPC, but there currently are none from these groups. [Alcott noted that they have been invited but declined to participate.]
- Conduct workshops to invite specific people/groups that may not be able to commit to being on the RPC, but would still like to contribute more than just through a public comment period. This would be an intermediate level of participation between public workshops and the RPC.
- Establish a RPC policy for information collection (e.g. water supplies and demands).
- Include public comments in the MAC Plan verbatim.
- Allow stakeholders to participate in Plan development regardless of their ability to contribute financially to the IRWM planning process, consistent with IRWM plan guidelines.
- Formalize the roles of the RPC, UMRWA Board, etc in the Governance section.

The governance input provided by Watson to Infusino and Bell will be transmitted separately to the RPC for review and input.

Due to a community workshop following the RPC meeting, the discussion was not concluded. It will be readdressed at the November RPC meeting.

If agreed upon by the RPC, the proposed changes to the existing governance structure would be recommended to the UMRWA Board to be implemented during the next MAC Plan Update.

Implementation Grant Preparation

This item on the agenda was not discussed due to time constraints. This will be discussed via email and revisited at the next meeting.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Revise Implementing Projects and Programs section.
- Revise the Impacts and Benefits, and Financing sections.
- Revise Plan Performance and Monitoring, Data Management, and Technical Analysis sections.
- Send governance input previously sent to Bell and Infusino to the rest of the RPC.
- Send the Draft Plan Update (minus the CARWSP portion) to the RPC on December 7th.
- Send the CARWSP chapter by January 3rd.
- Alcott to develop estimate of costs to perform Plan Performance Monitoring for the January 25 UMRWA Board meeting.

The RPC is asked to complete the following.

- Review the meeting notes prior to the next meeting.
- Send comments on the Plan Performance & Monitoring, Data Management, and Technical Analysis sections to RMC (by 10/3/12).
- RPC members with concerns related to projects and scoring will set up meetings with project sponsors to discuss project-specific comments, prior to October 31st.

The next RPC meeting is scheduled for Wednesday, November 7, 2012 at the Amador County Administration Building from 1:00 p.m. to 3:30 p.m. in the upstairs conference room.

The meeting concluded at approximately 5:35 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 12
November 7, 2012; 1:00 pm to 5:15 pm
Amador County Administration Building, Conference Room C, Jackson, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell	X		Foothill Conservancy
(Joaquin Cruz)		X	East Bay Municipal Utility District
Mike Daly		X	City of Jackson
(Katherine Evatt)		X	Foothill Conservancy
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner		X	City of Plymouth
(Rick Hopson)		X	US Forest Service
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo		X	Amador Water Agency
Teresa McClung		X	US Forest Service
Jeff Meyer	X		Calaveras County Water District
Rod Schuler	X		Retired Amador County PW Director
(Don Stump)	X		Calaveras County Water District
(Art Toy)		X	Amador Water Agency
Hank Willy	X		Jackson Valley Irrigation District
Ed Pattison		X	City of Ione
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece	X		Department of Water Resources
Bob Dean	X		Upper Mokelumne River Watershed Authority, Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment
Leslie Dumas	X		RMC Water and Environment

Purpose of RPC Meeting #12

The twelfth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Alyson Watson at 1:00pm in Conference Room C at the Amador County Administration Building, in Jackson, California, on Wednesday, November 7, 2012.

Watson began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #12. The primary purposes of the meeting were to discuss RPC and public comments on the MAC Plan sections and proposed responses; endorse revised Plan sections (Implementing Project and Programs, including project list and evaluation; Impacts and Benefits; Financing Plan; Plan Performance and Monitoring; Data Management; and Technical Analysis); discuss comments on draft Climate Change section and prioritize vulnerabilities; tentatively endorse the Climate Change section; and establish the Proposition 84, Round 2 Implementation Grant candidate project list.

Minutes from RPC Meeting #11 and MAC Plan Update Schedule to Completion

Tom Infusino requested a few changes be made to the notes for Meeting #11. Upon the incorporation of these changes, the notes will be considered approved by the RPC.

There is only one RPC meeting scheduled after this meeting; there is no December RPC meeting scheduled at this point. At the January 2013 meeting, the RPC will be asked to endorse the Draft MAC Plan Update. RMC will incorporate RPC and public comments received to date and prepare a compiled Draft Plan for RPC review on December 7th. CARWSP (the Camanche Area Regional Water Supply Project) is currently underway and being implemented in parallel to the MAC Plan Update. Upon completion of the CARWSP study, it will be incorporated into the MAC Plan Update. As such, the December 7th Draft MAC IRWM Plan Update will not include the CARWSP material. RMC will release the draft CARWSP portion of the MAC Plan Update on January 3, 2013. The RPC will provide comments on the Draft Plan Update by January 7th, 2013. Comments on the CARWSP Report will be accepted until January 17th, 2013. RMC will finalize the Plan Update prior to the January 2013 RPC meeting.

RPC and Public Comments

The following draft sections of the MAC Plan Update were uploaded to the UMRWA website and provided as hard copies to allow for public review.

- 1 – Region Description
- 2 – Governance
- 3 – Goals, Objectives, Strategies, and Performance Measures
- 4 – Implementing Projects and Programs

Public comments were provided by Colleen Platt (MyValleySprings.com). Tom Infusino provided additional comments on behalf of the Calaveras Planning Coalition. Watson provided an overview of the range of comments submitted. RMC prepared a comments matrix with a proposed response to the comments for RPC endorsement. When asked if the RPC wished to discuss any specific comments, Infusino said he responded to the proposed responses to comments via email so there is no need to discuss verbally. When asked if the RPC endorsed the approach to addressing comments (i.e. developing the matrix and responding to each comment), Infusino responded that he does not feel comfortable with the Plan at this point, so he plans to go to the UMRWA Board meeting. He felt that rather than discussing every comment at the RPC meeting, he would prefer to voice his concern to the Board. He endorsed the approach to responding to comments with that caveat.

Some specific comments were discussed:

- Public outreach process and the process for addressing comments will be addressed by updating the Outreach and Communications Plan as part of the next MAC Plan Update.
    - Pete Bell wanted clarification that that meant no additional outreach would be done until the next Plan Update (which could be in ~5 years). Watson responded that because this Plan Update is almost complete, there is not much more public outreach that can be completed. We will add this as a suggested improvement in Section 4.1.5 of the Plan to be implemented during the next Update.
    - Tom Infusino pointed out that DWR may require IRWMPs be compliant with 2012 Guidelines in order to be eligible for Round 3 Implementation Grants. The MAC Plan Update currently underway should comply with the 2012 Prop 84 & 1E Guidelines. The Draft 2012 Guidelines released by the California Department of Water Resources (DWR) in July 2012 have been used during the planning process. DWR does not anticipate significant changes from the Draft to the Final Guidelines.
- Governance –RPC members previously commented that in their view the MAC Region's governance structure is not consistent with DWR requirements. Currently, the governance structure includes UMRWA as the Regional Water Management Group, the Regional Participants Committee, and the Board Advisory Committee (made of directors from AWA, CCWD, and EBMUD). If consensus cannot be reached by the RPC on a particular item, the issue is brought to the Board Advisory Committee; if they cannot reach consensus then it goes to the Board. Infusino summarized his issues with the governance structure at the September RPC meeting, but no conclusions were reached. Infusino also included governance-specific comments in his Calaveras Planning Coalition comment letter for the Draft MAC Plan Update sections. Watson developed draft modifications to the governance as options for consideration by the RPC.
    - (1) Eliminate the Board Advisory Committee role and communicate directly with the Board. (2) Designate a subcommittee of the full RPC to resolve disagreements. (3) Request re-consideration by Board.

    - Although RPC members agreed some or all of the options could be implemented, Infusino and Bell noted that they would not solve the problem. Bell noted that although the RPC represents a broad group of people, dispute resolutions go to water agencies (i.e. the Board Advisory Committee or Board). He believes the decision making body needs to be larger than the Board.
    - UMRWA is a joint powers authority, made up of agency members and as required by the DWR Guidelines, the RWMG must be made of at least 3 local agencies. Stump commented that because the Plan Update will be finalized in January 2013 (just 2 months away) it seemed late to be trying to modify the governance structure. He also said it seemed as though Bell and Infusino would not be happy unless the RWMG is more than just UMRWA.
    - Dean wants to move forward with the governance discussion, but perhaps after January because right now we need to focus on finalizing the Plan Update. Bell agreed, but wanted some assurance that it would actually be revisited.
    - No RPC member objected to having continued conversations to address the ongoing governance concerns. This will also be added to Section 4.1.5 – Considerations for Future Updates.
- Infusino was told he could go directly to the Board to discuss his comments, rather than to the Board Advisory Committee first.

RPC Endorsement of Sections

The following were revised based on RPC input from the September RPC meeting: Section 4.1 – Project Review Process, the project evaluation, Section 4.3 – Impact and Benefit Analysis, Section 4.3 – Financing Plan, Section 4.5 – Technical Analysis, Section 5.1 – Plan Performance and Monitoring, Section 5.2 – Data Management.

- Section 4.1 – Project Review Process
    - Comments from the RPC and from the meetings between Infusino, the Foothill Conservancy, the Ratepayer Protection Alliance, and Muriel Zeller were incorporated.
    - As discussed during the September meeting, RMC reviewed the climate change and DAC scoring and adjusted the scores accordingly.
    - After revising the scores, there ended up being 26 projects that had a final result as "High" and 9 with a final result of "Medium" (and no "Low" priority projects). Infusino wondered if there would be a way to get a more normal distribution. Because all of the projects included in the Plan Update are high priorities to the entities that submitted them, having all Highs and Mediums could be viewed as appropriate. Preece noted that the overall result is just a tool to tell you how well the projects could

meet the Plan objectives and other criteria. The RPC agreed to leave the scores as they were, but to also check with Gene Mancebo since he was unable to attend the meeting and has numerous projects included in the Plan Update.
    - All RPC members endorsed Section 4.1, except for Infusino – see his responses to the proposed responses to comments.
- Section 4.3 – Impact and Benefit Analysis
    - All RPC members endorsed the section.
- Section 4.4 – Financing Plan
    - Infusino noted that capacity fees are a major issue of the Ratepayers Protection Alliance. He requested that something be added to the section to acknowledge that capacity fees can be very controversial should they not be structured to achieve equity. See Comment 67 in RPC and Public Comment matrix.
    - All RPC members endorsed the section; Infusino said that with the change regarding capacity fees, he endorses the section. Then, after discussion of the Plan Performance and Monitoring section, as described below, Infusino revoked his endorsement because of the addition of the discussion of limited funding.
- Section 5.1 – Plan Performance and Monitoring
    - Infusino and Bell said they could not endorse the section because there is no commitment to fund Plan performance monitoring. The section says that a Plan performance review will be done every three years or as deemed appropriate by the RWMG.
    - Preece said that it's important that agencies commit funds to implement the Plan which includes the Plan performance monitoring piece. He noted that funding should be discussed in the Financing Plan section, Section 4.4. He noted that most groups that do not have resource do not have to commit funds, but at least update the Plan to meet minimum standards every 5 years.
    - Infusino asked if the MAC Region goes after Round 3 implementation funds, would they be at a disadvantage if they do not have Plan performance monitoring data/information. Preece replied no.
    - Alcott plans to present next steps and an estimated level of effort for Plan performance monitoring to the UMRWA Board at the 1/25/13 meeting.
    - Preece said some IRWM regions have membership fees that cover the cost of things such as Plan performance monitoring. He noted that it's important to be committed to Plan implementation, but you do not have to say where the funding is coming from.

- Discussion regarding UMRWA's commitment will be added to this section and describe what has been completed over the years. References to limited funding will be added to Section 4.4. – Financing Plan. Because of this change, Infusino will not endorse Section 4.4.
    - On page 6, add to the list of items that project-specific monitoring plans must include "a process for measuring success of projects based on Plan objectives…" Any project that receives grant funding commits to developing a project monitoring plan for 10 years following project completion. This helps evaluate how the projects are meeting Plan objectives.
    - Also add to Section 4.5 that the RPC will discuss and evaluate project monitoring data as part of the MAC Plan Update process to evaluate its usefulness for updating Table 5-1.
    - All RPC members endorsed the section.
- Section 4.5 – Technical Analysis
    - All RPC members endorsed the section, except Infusino.
- Section 5.2 – Data Management
    - All RPC members endorsed the section, except Infusino.

Climate Change Section

A climate change section was drafted and introduced in October 2011 at RPC Meeting #3. Dumas provided an overview of the updated Climate Change section.

- RMC updated the climate change section to comply with the Draft 2012 Guidelines.
- The section includes an introduction, background regarding climate change, summary of statewide observations and projections, the legislative and policy context, potential regional impacts due to climate change, regional vulnerabilities to climate change, adaptation and mitigation strategies, and a plan for gathering data.
- The EBMUD 2040 Water Supply Management Plan (WSMP) was used as a starting point for identifying potential climate change impacts (Mokelumne River Watershed focused), as well as a study completed by UC Davis that looked at all of the Sierra Nevada watersheds (including Calaveras River Watershed).
- Vulnerabilities were identified based on the potential regional climate change impacts.
    - For example, flood management is a vulnerability because climate change may create more severe/flashier storm events, and earlier springtime runoff could lead to increased flooding; there may also be a reduction in meadows which help to reduce floods in the winter.

    - Bell noted that the vast majority of meadows in the Region do not provide filtering now, but restoration has begun which will improve absorption. Dumas added that while restoration is underway, they will continue to be stressed as temperature increases due to climate change.
    - A discussion regarding prioritizing the vulnerabilities followed.
        - A matrix was shown summarizing which vulnerabilities may be more impacted by the numerous potential climate change impacts.
        - Water Supply and Quality, Ecosystem and Habitat, and Hydropower may be more impacted than Water Demand and Flood Management in the Region. Based on discussion, the these were identified as highest priorities while the remaining two were considered secondary.
- Infusino thought that greenhouse gas (GHG) emissions needed to be considered as part of the Climate Change requirements in the Guidelines. Watson explained that GHG emissions were evaluated as part of the project review process, and per Tracie Billington at DWR, a qualitative analysis is appropriate for the Plan.
- Questions regarding who would gather the data shown in Table 10: Data Collection and Management for Vulnerability Assessment arose.
    - Could identify the near-term strategies that agencies are already implementing.
    - RMC will reevaluate the methodology for data collection and a plan for further data gathering to ensure a realistic plan is identified.

Implementation Grant Preparation

DWR plans to release the Final 2012 Prop 84 & 1E IRWM Guidelines and the Final Prop 84, Round 2 Implementation Grant Proposal Solicitation Package (PSP) in November 2012. Approximately $8.3 million will be available for implementation grants in the San Joaquin funding area. The anticipated application due date is March 2013. Because the San Joaquin Funding area will be highly competitive and only $8 million is available, a grant request of approximately $2 million would be ideal.

A table showing projects with the highest scoring potential (based on number of goals, statewide priorities, resource management strategies, and whether the project has targeted benefits to disadvantaged communities, and its project status) was distributed via email. AWA, the Foothill Conservancy, Infusino, EBMUD, and Rod Schuler provided input on the list. A matrix showing which projects were considered high priorities by these entities was distributed at this RPC meeting. Because CARWSP was identified as a high scoring project and is a priority of AWA, EBMUD, and Schuler, an update on the project was provided.

- Burson will not be served.

- Lake Camanche and Camanche North Shore Recreation Area (CANS) are both disadvantaged communities.
- The project would consist of a regional water treatment plant (WTP) delivering water in phases. The wells in the east of Lake Camanche Village have quality/quantity issues, but the wells in the west could continue to be operated in a conjunctive use arrangement.
- Infusino wondered if the project would impact groundwater, because if it does, the entities would need groundwater management plans (GWMPs) in place. Preece noted that AWA just finished a GWMP.
- Infusino commented that he thinks a less controversial project should be included in the grant application.
- Watson explained that the comments brought up regarding CARWSP have been addressed. There was concern about serving Burson; the project would not serve Burson. There was concern about the project being growth-inducing; the project would only serve parcels that are on approved and tentatively approved maps and is therefore not serving future unplanned growth. There was concern that CARWSP was related to Duck Creek Reservoir; the project partners confirmed that it is not. The project partners do not understand why the project is controversial if all the comments and concerns have been addressed.
- Stump said that CARWSP would provide an opportunity to serve Wallace with a high quality, reliable water supply. Francis also approves inclusion of the project in the grant application and Schuler agrees. Infusino commented that no one asked Wallace if they wanted the project. Stump replied that CCWD is annexing Wallace and is obligated to provide Wallace water. He also added that CCWD would not and could not implement a project without grant funding, which would significantly limit impacts to ratepayers.
- Phase 1 of CARWSP, which could be included in an implementation grant application, would include a 12-inch raw water pipeline from the Mokelumne Aqueduct to a WTP, a cross-lake pipeline to deliver treated water to CANS and Lake Camanche Village, and conservation measures.
- EBMUD is moving forward with a WTP and associated pipeline (i.e. Phase 1) regardless of whether AWA or CCWD participate.

Other projects on the list were also discussed.

- Bell said that the East Panther Creek Restoration Project is going to be funded by CDFG so it does not need to be included in the implementation grant application.
- The Ponderosa Way would be a good project to include as it would benefit all of Calaveras County.
- The Amador Household Water Efficiency Project has a low project status so it may not score well in the technical justification portion of the application.

- Prior to the RPC meeting, Mancebo said that his priorities are CARWSP and the Lake Camanche Water Service Replacement –Phase II. He noted that the latter would not need to go into the grant application as $1.2 million, that a smaller phase could be included instead.

All RPC members agreed that the Ponderosa Way and Lake Camanche Water Service Replacement –Phase II projects would be good candidates for funding. All RPC members except Pete Bell and Tom Infusino also supported including CARWSP in the funding application.

Next Steps and Adjournment

The project team will complete the following items in advance of the next meeting.

- Revise Meeting #11 notes based on Infusino's comments.
- Distribute the land use planning section for RPC review 11/26/12.
- Check with Gene regarding the score revisions in the project evaluation.
- Revise the Draft IRWM Plan Update sections and send the Draft Plan Update (minus the CARWSP portion) to the RPC 12/7/12.
- Send the CARWSP chapter by 1/3/13.
- Alcott to develop estimate of costs to perform Plan Performance Monitoring for the January 25 UMRWA Board meeting.

The RPC is asked to complete the following.

- Review the meeting notes prior to the next meeting.
- Send comments electronically (in track changes) on the land use planning section by 12/3/12.
- Provide comments on the Draft MAC Plan Update (in track changes) by 1/7/13.
- Provide comments on the Draft CARWSP Report (in track changes) by 1/17/13.

The next in person RPC meeting is scheduled for Wednesday, January 23, 2013 at the Amador County Administration Building from 1:00 p.m. to 3:30 p.m. in the upstairs conference room. The RPC meeting will be followed by a community workshop.

The meeting concluded at approximately 5:15 p.m.

Upper Mokelumne River Watershed Authority's MAC Plan Update

MEETING SUMMARY

Regional Participants Committee (RPC) Meeting No. 14
January 23, 2013; 2:00 pm to 4:15 pm
Amador County Administration Building, Conference Room C, Jackson, California

Attendance and Introductions

RPC Members (Alternates)	Present	Absent	Affiliation
Pete Bell	X		Foothill Conservancy
(Joaquin Cruz)		X	East Bay Municipal Utility District
Mike Daly		X	City of Jackson
(Katherine Evatt)		X	Foothill Conservancy
Tom Francis	X		East Bay Municipal Utility District
Jeff Gardner		X	City of Plymouth
(Rick Hopson)		X	US Forest Service
Tom Infusino	X		Calaveras Planning Coalition
Donna Leatherman		X	Calaveras Public Utility District
Gene Mancebo	X		Amador Water Agency
Teresa McClung		X	US Forest Service
Jeff Meyer		X	Calaveras County Water District
Rod Schuler		X	Retired Amador County PW Director
(Don Stump)		X	Calaveras County Water District
(Art Toy)	X		Amador Water Agency
Hank Willy	X		Jackson Valley Irrigation District
Ed Pattison	X		City of Ione
Observers	**Present**	**Absent**	**Affiliation**
Jason Preece		X	Department of Water Resources
Bob Dean		X	Upper Mokelumne River Watershed Authority, Calaveras County Water District
Project Team	**Present**	**Absent**	**Affiliation**
Rob Alcott	X		Upper Mokelumne River Watershed Authority (UMRWA)
Karen Johnson	X		Water Resources Planning
Alyson Watson	X		RMC Water and Environment
Lindsey Clark	X		RMC Water and Environment

Purpose of RPC Meeting #14

The fourteenth meeting of the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan (MAC IRWMP) Regional Participants Committee (RPC) was initiated by Alyson Watson at approximately 2:05pm in Conference Room C at the

Amador County Administration Building, in Jackson, California, on Wednesday, January 23, 2013.

Watson noted that this is the last RPC meeting for the MAC Plan Update and began walking through a PowerPoint presentation outlining the purpose and agenda for RPC Meeting #14. The primary purposes of the meeting were to discuss RPC and public comments on the Draft MAC Plan Update and CARWSP Report and proposed responses; endorse the MAC Plan Update; and recommend that the UMRWA Board of Directors adopt the MAC Plan Update.

Minutes from RPC Meeting #12 and MAC Plan Update Schedule to Completion

The RPC approved the meeting notes from RPC Meeting #12. An optional RPC meeting was conducted on January 10, 2013 to discuss the CARWSP Report; notes were not prepared.

The MAC Plan Update is on schedule. This being the last meeting, the RPC will be asked to endorse the MAC Plan Update and recommend that the UMRWA Board adopt it. RMC will make any necessary revisions based on RPC Meeting #14 to finalize the MAC Plan Update and an UMRWA Board meeting will be held on Friday, January 25th.

RPC and Public Comments

The Draft MAC Plan Update and Draft CARWSP Report were made available for public review on December 7, 2012 and January 7, 2013, respectively. Comments on the Draft MAC Plan Update were provided by:

- MyValleySprings.com (Colleen Platt)
- Tom Infusino (Calaveras Planning Coalition)

The comments were submitted on the Draft sections of the Draft MAC Plan Update released in September 2012. The comments were summarized in a matrix and responses were prepared to each comment (comment numbers 1 through 99). The matrix was discussed during the RPC Meeting #12 and revisions to the MAC Plan Update were made accordingly. The following changes were made since Meeting #12:

- Incorporated comments as discussed during the November 2012 RPC Meeting and as summarized in the comments matrix
- Added the CARWSP integration section to Section 4 of the MAC Plan Update
- Clarified process for updating the project list

Comments on the CARWSP Report were provided by:

- MyValleySprings.com
- Muriel Zeller
- Foothill Conservancy
- Others during the September 2012 community workshop

The following changes were made to the CARWSP Report based on comments:

- Burson South and Burson North are no longer referenced
- Burson is not included in the area to be served
- Only approved development is included in the demands to be served
- The project will be phased to allow for:
  - Additional studies to refine demands and groundwater-related items for Lake Camanche Village and Wallace
  - Further evaluation of project costs and potential rate impacts
  - Evaluation of additional alternatives to serve Lake Camanche Village and Wallace

The comments submitted in January 2013 were added to the comments matrix and discussed (comments 100 and above). A summary of the comments that were discussed in more detail by the RPC is as follows.

- Comment 102, Muriel Zeller, mentioned existing units and 400 units for Wallace. Tom Infusino is not comfortable with those numbers.
  - A sentence will be added to the CARWSP Report that notes the number of units is in dispute.
- Comment 105, Katherine Evatt, did not find where Burson was dropped from CARWSP.
  - A clarifying sentence will be added to the CARWSP report.
- Comment 106, Katherine Evatt, concerned about piping water to Wallace. This is related to the future number of units in Wallace.
  - The response to the comment will refer back to the response for comment 102 (noting the number is in dispute).
- Comment 108, Katherine Evatt, suggests AWA put a conservation easement on some of its undeveloped land.
  - Discussion of undeveloped land ensued. Gene Mancebo noted that there are existing lots and some homes scattered throughout, as well as infrastructure and water lines. Units 5 and 7 in Lake Camanche Village that do not have maps or plans for development are not included in the CARWSP service area.
  - This can be considered in the future and will be noted in the CARWSP Report. It will need to involve both AWA and the Planning Department.

Infusino is comfortable with the responses to the new comments (100 and on), but noted issues with some of the other comments, as discussed in greater detail in the meeting notes for Meeting #12.

Infusino provided a handout that summarized what he viewed as the fatal flaws of the MAC Plan Update and ideas for addressing the issues. He said that he would not endorse the MAC Plan Update if the RPC did not agree to recommend UMRWA adopt the Plan along with the recommendations in his handout.

The RPC and, specifically, the water agencies present (EBMUD and AWA) indicated that they are open to continuing to meet after adoption of the MAC Plan Update. If CCWD also agrees to continue to meet (every few months for the next year or so), Pete Bell said that he would endorse the Plan. *(Note: Following the RPC meeting, CCWD did agree to continue to meet, as indicated at the UMRWA Board meeting, held on January 25, 2013)*

Gene Mancebo said that he recognizes that there is room for improvement, but does not want to be locked in specifically to the recommendations in Infusino's handout. He thought it could provide a good basis for talking points prior to the Round 3 grant applications and for the meetings that the agencies, Calaveras Planning Coalition, and Foothill Conservancy participate in. Other RPC members agreed.

Watson asked Infusino if he was flexible in his recommendations because the RPC was willing to compromise, continue to meet, and reach out to stakeholders. Infusino said no. He will not endorse the MAC Plan Update and will bring his concerns to the UMRWA Board meeting on the 25th.

RPC Endorsement of Sections

All RPC members, except Tom Infusino, endorsed the MAC Plan Update and recommended that the UMRWA Board of Directors adopt the Plan Update on Friday. Bell indicated that his endorsement was conditional, and only if CCWD agreed to continue meet following plan adoption, similar to AWA and EBMUD, would he endorse adoption. *(Note: At the UMRWA Board meeting held on January 25, 2013, CCWD indicated a willingness to continue to meet, and Bell endorsed Plan adoption and indicated that he would bring it to his Board for adoption as well)*

Implementation Grant Preparation

Proposition 84, Round 2 implementation grant applications are due on March 29, 2013. The MAC Region is submitting an application that will seek grant funding for the Lake Camanche Water Service Replacement – Phase II, CARWSP, and the Ponderosa Way Restoration Project. UMRWA and the lead agencies (EBMUD, AWA, and Calaveras County) are coordinating to develop a $2 million grant application for the 3 projects.

Next Steps and Adjournment

The Project Team will:

- Finalize the MAC Plan Update
- Finalize the CARWSP Report
- Prepare the MAC implementation grant application

The RPC members will:

- Attend the January 25th UMRWA Board of Directors meeting

The meeting concluded at approximately 4:15 p.m.

Appendix C- Project Summary and Evaluation

MAC IRWMP

Project Review Process Results

	General Project Information			Tier 1, Step 1 Screening			Tier 1, Step 2 Screening												Tier 2, Step 2 Prioritization
#	Entity	Type of Project[1]	Project Name	Total Goals	Total State-wide Priors.	Result	Total RMS	Result	Econ. Benefit	Goals Addressed[4]	RMS Integrated	Multi-Agency Benefits	DAC or Native American Benefits / EJ Impacts	Technical Feasibility	Climate Change Adaptation or Mitigation Benefit	Impl. Risk	Best Project for Intended Purpose	Project Status / Readiness	Result[5]
1	AWA	Supply	CAWP & AWS Intertie	4	2	PASS	5	PASS	Medium	Medium	Medium	Low	High	Medium	Medium	Medium	High	Low	Medium
2	AWA	Supply	CAWP Gravity Supply Line	5	1	PASS	7	PASS	High	High	High	Low	High	High	Medium	High	High	High	High
3	AWA	WQ	Upper Amador Canal – Treated Pipeline Conversion	5	2	PASS	4	PASS	High	High	Medium	Low	High	High	Medium	High	High	Low	High
4	AWA	WQ	Lake Camanche Wastewater Improvement Program	7	5	PASS	13	PASS	High	High	High	Medium	High	Low	Medium	High	High	Low	High
5	AWA	Supply	Upper Amador Canal – Untreated Pipeline Conversion	7	3	PASS	5	PASS	High	High	Medium	Low	High	Medium	Medium	High	High	High	High
6	AWA	Supply	Inter-Regional Conjunctive Use Project	0	0	FAIL													
7	AWA	WQ	AWS Regional Water Treatment Plant	7	4	PASS	7	PASS	Medium	High	High	High	High	Low	Medium	Medium	High	Medium	High
8	AWA	Supply	Lower Amador Canal Project	4	3	PASS	7	PASS	High	Medium	High	Low	Low	Low	Medium	High	High	Medium	Medium
9	AWA	WQ	Backwash Water Reuse Project	10	5	PASS	10	PASS	High	High	High	High	High	Medium	Medium	High	High	Medium	High
10	AWA	Supply	CAWP Fire Storage	5	2	PASS	3	PASS	High	High	Medium	High	High	Medium	Medium	High	High	Low	High
11	AWA	WQ	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	6	3	PASS	5	PASS	High	High	Medium	High	High	Low	Medium	High	High	Low	High
13	AWA	WQ	Regional Wastewater Project	7	3	PASS	6	PASS	Medium	High	High	High	High	Medium	Medium	Low	High	Low	High
14	AWA	Supply	New York Ranch Reservoir Conservation and Management	10	5	PASS	7	PASS	High	High	High	High	High	High	Medium	High	High	Low	High
15	AWA	Supply/WQ	AWA Low Pressure Flow Improvements	4	1	PASS	2	PASS	High	Medium	Low	High	High	Low	Medium	High	High	Low	High
16	AWA	Supply	Lake Camanche Water Storage Tank & Transmission Main	6	2	PASS	3	PASS	Medium	High	Medium	Low	High	High	Low	High	High	High	High
17	AWA	Supply	Lake Camanche Water Service Replacement-Phase II	5	3	PASS	3	PASS	High	High	Medium	Low	High	Medium	Medium	High	High	High	High
19	AWA	WQ	Wildwood Leachfield Replacement	2	1	PASS	3	PASS	Low	Medium	Medium	Low	Low	Low	Low	High	High	Medium	Medium
20	AWA	Supply	Bear River Reservoir Expansion Project	4	5	PASS	7	PASS	Low	Medium	High	High	High	High	High	Low	Medium	Low	High
21	UMRWA	WQ	Septic System Management Program	4	1	PASS	2	PASS	High	Medium	Low	Medium	Low	Medium	Low	High	High	Low	Medium
22	CCWD	Supply	Leak Testing and Repair Program	8	6	PASS	3	PASS	High	High	Medium	Medium	High	Medium	High	High	High	Low	High
23	CCWD	Supply	New Hogan Reservoir Pumping Project	7	5	PASS	9	PASS	Medium	High	High	Low	Low	High	Medium	Medium	High	Low	Medium
24	CCWD	WQ	New Hogan Phase II Water Distribution Loop Project	7	7	PASS	13	PASS	High	High	High	High	Low	Medium	Medium	Medium	High	Low	High
25	CCWD	WQ	Sheep Ranch WTP Compliance Project	3	3	PASS	2	PASS	High	Medium	Low	Low	High	High	Low	High	High	High	High
26	AWA-CCWD-EBMUD	WQ	Camanche Area Regional Water Supply Project	8	3	PASS	6	PASS	High	High	High	High	High	High	High	High	High	High	High
27	CCWD	WQ	West Point WTP Drinking Water Compliance Project	3	3	PASS	3	PASS	High	Medium	Medium	Low	High	High	Low	High	High	High	High
28	Foothill Conservancy	Resource	East Panther Creek Restoration Project	5	2	PASS	5	PASS	High	High	Medium	High	Medium	High	Low	High	High	High	High
29	Foothill Conservancy	Resource	Restoring the Upper Mokelumne's Anadromous Fish	5	3	PASS	4	PASS	High	High	Medium	High	High	High	Medium	Medium	High	Low	High
30	Foothill Conservancy	Supply	Amador Household Water Efficiency Project	7	5	PASS	2	PASS	High	High	Low	Low	High	High	High	High	High	Low	High
31	Stanislaus National Forest, Calaveras Ranger District	Resource	Hemlock Landscape Restoration	6	3	PASS	4	PASS	Medium	High	Medium	High	Low	High	High	High	High	Low	High
32	City of Jackson	WQ	City of Jackson Wastewater Treatment and Disposal Project	5	2	PASS	2	PASS	High	High	Low	Low	High	High	Medium	0	0	High	High
33	Calaveras County Administrative Office	Resource	Ponderosa Way Restoration Project	7	2	PASS	5	PASS	High	High	Medium	High	High	High	Low	High	High	High	High
34	AWA	WQ	Ione Clearwell Cover Replacement	3	1	PASS	2	PASS	High	Medium	Low	Low	High	High	Low	High	High	Medium	High
35	AWA	Supply/WQ	CAWP Tanks Replacement Project	3	2	PASS	4	PASS	High	Medium	Medium	Low	High	Medium	Medium	High	High	Low	Medium
36	AWA	WQ	Camanche Wastewater System Improvements	3	1	PASS	2	PASS	High	Medium	Low	Low	High	Medium	Low	High	High	Medium	Medium
37	AWA	Supply	CAWP Retail Distribution Domestic and Fire Protection Improvements	2	2	PASS	8	PASS	Low	Medium	High	Low	High	Medium	Medium	High	High	Low	Medium
38	AWA	WQ	CAWP Disinfection By-Product Reduction Project	3	2	PASS	5	PASS	High	Medium	Medium	Low	High	Medium	Low	High	High	Low	Medium

1. Type of project reflects Plan policies
2. Score derived from groupings of costs and benefits based on comparison of projects
3. Score based on goals divided by cost grouping compared to criteria
4. Prioritized based on number of goals addressed: 3 or more goals = High; 1 to 2 goals = Medium; Less than 2 goals = Low.
5. Prioritized based on number of high scores on evaluation criteria received: 5 or more Highs = High; 1 to 4 Highs = Medium; no High scores = Low

Tier 1 - Screening
Step 1 - Reflect Goals and Statewide Priorities

				Policies and Goals																				
				Policy 1		*Policy 2*				*Policy 3*				*Policy 4*										
				Maintain & Improve WQ		*Improve Water Supply Reliability & Ensure Long-term Balance of Supply and Demand*				*Practice Resource Stewardship*				*Focus on Areas of Common Ground & Avoid Prolonged Conflict*	Statewide Priorities (SPs)									
Project No.	Submitted by	Project Name	Project Status	Reduce sources of contaminants	Manage stormwater flows and transport of sediment and contaminants	Ensure sufficient firm yield water supply	Maintain and improve water infrastructure reliability	Promote water conservation, recycling, and reuse for urban and agricultural uses	Develop appropriate drought mitigation measures	Protect, conserve, enhance and restore the region's natural resources	Maintain or improve watershed ecosystem health and function	Minimize adverse effects on cultural resources	Identify opportunities for public access, open spaces, and other appropriate recreational benefits and avoid harm to existing or planned recreational uses	Prioritize projects that have the best likelihood of being completed in the planning horizon	Drought Preparedness	Use & Reuse Water More Efficiently	Climate Change Response Actions	Expand Environmental Stewardship	Practice Integrated Flood Management	Protect Surface Water & Groundwater Quality	Improve Tribal Water and Natural Resources	Ensure Equitable Distribution of Benefits	TOTAL GOALS	TOTAL SPs
1	AWA	CAWP & AWS Intertie	conceptual design			✓	✓		✓					✓			✓				✓		4	2
2	AWA	CAWP Gravity Supply Line	design complete	✓		✓	✓					✓		✓			✓						5	1
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	conceptual design	✓			✓	✓				✓		✓	✓	✓							5	2
4	AWA	Lake Camanche Wastewater Improvement Program	conceptual design	✓	✓			✓		✓	✓	✓		✓		✓	✓	✓		✓	✓		7	5
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	design complete			✓	✓	✓	✓	✓		✓		✓	✓	✓				✓			7	3
6	AWA	Inter-Regional Conjunctive Use Project	conceptual design																				0	0
7	AWA	AWS Regional Water Treatment Plant	in design			✓	✓	✓	✓		✓	✓		✓	✓	✓				✓		✓	7	4
8	AWA	Lower Amador Canal Project	in design				✓	✓				✓		✓	✓	✓				✓			4	3
9	AWA	Backwash Water Reuse Project	design complete	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓			10	5
10	AWA	CAWP Fire Storage	conceptual design				✓		✓		✓	✓		✓	✓							✓	5	2
11	AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	conceptual design	✓				✓		✓	✓	✓		✓		✓		✓		✓			6	3
13	AWA	Regional Wastewater Project	conceptual design	✓		✓		✓	✓	✓		✓		✓	✓	✓				✓			7	3
14	AWA	New York Ranch Reservoir Conservation and Management	pre-design		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			10	5
15	AWA	AWA Low Pressure Flow Improvements	conceptual design				✓	✓				✓		✓		✓							4	1
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	design complete			✓	✓		✓	✓		✓		✓	✓					✓			6	2
17	AWA	Lake Camanche Water Service Replacement-Phase II	design complete				✓	✓	✓	✓				✓	✓	✓						✓	5	3
19	AWA	Wildwood Leachfield Replacement	pre-design	✓										✓						✓			2	1
20	AWA	Bear River Reservoir Expansion Project	pre-design			✓	✓		✓	✓					✓		✓	✓	✓	✓			4	5
21	UMRWA	Septic System Management Program	planning	✓						✓	✓	✓								✓			4	1
22	CCWD	Leak Testing and Repair Program	in design			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	8	6
23	CCWD	New Hogan Reservoir Pumping Project	pre-design			✓	✓	✓	✓	✓			✓	✓	✓	✓	✓				✓	✓	7	5
24	CCWD	New Hogan Phase II Water Distribution Loop Project	conceptual design			✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	7	7
25	CCWD	Sheep Ranch WTP Compliance Project	design complete			✓	✓							✓	✓						✓	✓	3	3
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	planning	✓		✓	✓		✓	✓	✓	✓		✓	✓					✓		✓	8	3
27	CCWD	West Point WTP Drinking Water Compliance Project	design complete			✓	✓							✓	✓						✓	✓	3	3
28	Foothill Conservancy	East Panther Creek Restoration Project	design complete	✓	✓						✓	✓		✓				✓		✓			5	2
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	conceptual design							✓	✓	✓	✓	✓			✓	✓				✓	5	3
30	Foothill Conservancy	Amador Household Water Efficiency Project	conceptual design			✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓				✓	7	5
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	planning		✓					✓	✓	✓	✓	✓			✓	✓		✓			6	3
32	City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	in design	✓				✓			✓	✓		✓		✓				✓			5	2
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	design complete	✓	✓					✓	✓	✓	✓	✓				✓		✓			7	2
34	AWA	Ione Clearwell Cover Replacement	in design	✓			✓							✓		✓							3	1
35	AWA	CAWP Tanks Replacement Project	conceptual design	✓			✓							✓		✓						✓	3	2
36	AWA	Camanche Wastewater System Improvements	in design	✓			✓							✓						✓			3	1
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	planning				✓							✓		✓						✓	2	2
38	AWA	CAWP Disinfection By-Product Reduction Project	conceptual design	✓				✓						✓		✓				✓			3	2

Tier 1 - Screening
Step 2 - Resource Management Strategies Incorporated
(Display Includes Capital Costs, Status, and Overall Result)

Project No.	Submitted by	Project Name	Project Status	Agricultural Water Use Efficiency	Urban Water Use Efficiency	Conveyance - Delta	Conveyance - Regional / local	System Reoperation	Water Transfers	Conjunctive Management & Groundwater Storage	Desalination	Precipitation Enhancement	Recycled Municipal Water	Surface Storage - CALFED	Surface Storage - Regional / local	Drinking Water Treatment & Distribution	Groundwater Remediation / Aquifer Remediation	Matching Quality to Use	Pollution Prevention	Salt & Salinity Planning	Urban Runoff Management	Flood Risk Management	Agricultural Lands Stewardship	Economic Incentives (Loans, Grants and Water Pricing)	Ecosystem Restoration	Forest Management	Recharge Area Protection	Water-Dependent Recreation	Watershed Management	Crop Idling for Water Transfers	Dewvaporation or Atmospheric Pressure Desalination	Fog Collection	Irrigated Land Retirement	Rainfed Agriculture	Waterbag Transport / Storage Technology	TOTAL RMS	Capital Costs	Project Status / Readiness	Overall Result
1	AWA	CAWP & AWS Intertie	conceptual design				✓	✓	✓							✓								✓												5	$5,400,000	Low	Medium
2	AWA	CAWP Gravity Supply Line	design complete		✓		✓	✓	✓						✓	✓								✓												7	$13,500,000	High	High
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	conceptual design	✓	✓		✓									✓																				4	$3,870,087	Low	High
4	AWA	Lake Camanche Wastewater Improvement Program	conceptual design		✓		✓	✓		✓			✓		✓		✓		✓	✓	✓				✓		✓		✓							13	$14,000,000	Low	High
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	design complete	✓	✓		✓																		✓				✓							5	$3,500,000	High	High
6	AWA	Inter-Regional Conjunctive Use Project	conceptual design																																				
7	AWA	AWS Regional Water Treatment Plant	in design	✓	✓		✓		✓						✓	✓													✓							7	$20,000,000	Medium	High
8	AWA	Lower Amador Canal Project	in design	✓	✓		✓						✓						✓						✓				✓							7	$1,500,000	Medium	Medium
9	AWA	Backwash Water Reuse Project	design complete	✓	✓		✓			✓			✓		✓	✓			✓			✓							✓							10		Medium	High
10	AWA	CAWP Fire Storage	conceptual design				✓								✓	✓																				3	$5,000,000	Low	High
11	AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	conceptual design		✓								✓						✓	✓							✓									5	$10,000,000	Low	High
13	AWA	Regional Wastewater Project	conceptual design	✓	✓		✓						✓						✓								✓									6	$20,000,000	Low	High
14	AWA	New York Ranch Reservoir Conservation and Management	pre-design	✓	✓		✓								✓				✓						✓			✓								7	$600,000	Low	High
15	AWA	AWA Low Pressure Flow Improvements	conceptual design				✓									✓																				2	$500,000	Low	High
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	design complete		✓		✓									✓																				3	$41,000,000	High	High
17	AWA	Lake Camanche Water Service Replacement-Phase II	design complete		✓		✓									✓																				3	$1,200,000	High	High
19	AWA	Wildwood Leachfield Replacement	pre-design														✓		✓										✓							3	$2,200,000	Medium	Medium
20	AWA	Bear River Reservoir Expansion Project	pre-design		✓		✓		✓	✓					✓												✓		✓							7	$50,000,000	Low	High
21	UMRWA	Septic System Management Program	planning																✓										✓							2	$260,000	Low	Medium
22	CCWD	Leak Testing and Repair Program	in design		✓			✓								✓																				3	$0	Low	High
23	CCWD	New Hogan Reservoir Pumping Project	pre-design	✓	✓		✓	✓	✓	✓					✓		✓										✓									9	$22,000,000	Low	Medium
24	CCWD	New Hogan Phase II Water Distribution Loop Project	conceptual design	✓	✓	✓	✓	✓	✓	✓					✓		✓					✓		✓	✓		✓									13	$3,000,000	Low	High
25	CCWD	Sheep Ranch WTP Compliance Project	design complete		✓			✓																												2	$200,000	High	High
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	in design		✓		✓			✓					✓	✓								✓												6	$1,200,000	High	High
27	CCWD	West Point WTP Drinking Water Compliance Project	design complete		✓			✓								✓																				3	$600,000	High	High
28	Foothill Conservancy	East Panther Creek Restoration Project	design complete															✓	✓						✓	✓			✓							5	$200,000	High	High
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	conceptual design																		✓				✓	✓			✓							4	$1,000,000	Low	High
30	Foothill Conservancy	Amador Household Water Efficiency Project	conceptual design		✓																✓															2	$692,000	Low	High
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	planning																✓						✓	✓			✓							4		Low	High
32	City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	in design	✓															✓																	2	$5,747,000	High	High
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	design complete															✓	✓						✓	✓			✓							5	$223,000	High	High
34	AWA	Ione Clearwell Cover Replacement	in design													✓			✓																	2	$71,376	Medium	High
35	AWA	CAWP Tanks Replacement Project	conceptual design				✓	✓								✓			✓																	4	$305,000	Low	Medium
36	AWA	Camanche Wastewater System Improvements	in design				✓												✓																	2	$720,243	Medium	Medium
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	planning	✓	✓		✓								✓	✓		✓						✓				✓								8	$2,633,861	Low	Medium
38	AWA	CAWP Disinfection By-Product Reduction Project	conceptual design				✓	✓					✓			✓		✓																		5	$500,000	Low	Medium

Tier 2 - Evaluation
Step 1 - Apply Evaluation Criteria

Project No.	Submitted by	Project Name	Project Status	TOTAL GOALS	TOTAL STATEWIDE PRIOIRTIES	TOTAL RMS	Economic Benefit	Goals Addressed	RMS Integrated	Multi-Agency Benefits	DAC or Native American Benefits / EJ Impacts	Technical Feasibility	Climate Change Adaptation or Mitigation Benefit	Minimize Implementation Risk	Best Project for Intended Purpose
1	AWA	CAWP & AWS Intertie	conceptual design	4	2	5	Medium	Medium	Medium	Low	High	Medium	Medium	Medium	High
2	AWA	CAWP Gravity Supply Line	design complete	5	1	7	High	High	High	Low	High	High	Medium	High	High
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	conceptual design	5	2	4	High	High	Medium	Low	High	High	Medium	High	High
4	AWA	Lake Camanche Wastewater Improvement Program	conceptual design	7	5	13	High	High	High	Medium	High	Low	Medium	High	High
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	design complete	7	3	5	High	High	Medium	Low	High	Medium	Medium	High	High
6	AWA	Inter-Regional Conjunctive Use Project	conceptual design	0	0	0	Low	Low	Low	High	Low	Medium	Low		
7	AWA	AWS Regional Water Treatment Plant	in design	7	4	7	Medium	High	High	High	High	Low	Medium	Medium	High
8	AWA	Lower Amador Canal Project	in design	4	3	7	High	Medium	High	Low	Low	Low	Medium	High	High
9	AWA	Backwash Water Reuse Project	design complete	10	5	10	High	High	High	High	High	Medium	Medium	High	High
10	AWA	CAWP Fire Storage	conceptual design	5	2	3	High	High	Medium	High	High	Medium	Medium	High	High
11	AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	conceptual design	6	3	5	High	High	Medium	High	High	Low	Medium	High	High
13	AWA	Regional Wastewater Project	conceptual design	7	3	6	Medium	High	High	High	High	Medium	Medium	Low	High
14	AWA	New York Ranch Reservoir Conservation and Management	pre-design	10	5	7	High	High	High	High	High	High	Medium	High	High
15	AWA	AWA Low Pressure Flow Improvements	conceptual design	4	1	2	High	Medium	Low	High	High	Low	Medium	High	High
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	design complete	6	2	3	Medium	High	Medium	Low	High	High	Low	High	High
17	AWA	Lake Camanche Water Service Replacement-Phase II	design complete	5	3	3	High	High	Medium	Low	High	Medium	Medium	High	High
19	AWA	Wildwood Leachfield Replacement	pre-design	2	1	3	Low	Medium	Medium	Low	Low	Low	Low	High	High
20	AWA	Bear River Reservoir Expansion Project	pre-design	4	5	7	Low	Medium	High	High	High	High	High	Low	Medium
21	UMRWA	Septic System Management Program	planning	4	1	2	High	Medium	Low	Medium	Low	Medium	Low	High	High
22	CCWD	Leak Testing & Repair Program	in design	8	6	3	High	High	Medium	Medium	High	Medium	High	High	High
23	CCWD	New Hogan Reservoir Pumping Project	pre-design	7	5	9	Medium	High	High	Low	Low	High	Medium	Medium	High
24	CCWD	New Hogan Phase II Water Distribution Loop Project	conceptual design	7	7	13	High	High	High	High	Low	Medium	Medium	Medium	High
25	CCWD	Sheep Ranch WTP Compliance Project	design complete	3	3	2	High	Medium	Low	Low	High	High	Low	High	High
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	planning	8	3	6	High	High	High	High	High	High	High	High	High
27	CCWD	West Point WTP Drinking Water Compliance Project	design complete	3	3	3	High	Medium	Medium	Low	High	High	Low	High	High
28	Foothill Conservancy	East Panther Creek Restoration Project	design complete	5	2	5	High	High	Medium	High	Medium	High	Low	High	High
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	conceptual design	5	3	4	High	High	Medium	High	High	High	Medium	Medium	High
30	Foothill Conservancy	Amador Household Water Efficiency Project	conceptual design	7	5	2	High	High	Low	Low	High	High	High	High	High
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	planning	6	3	4	Medium	High	Medium	High	Low	High	High	High	High
32	City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	in design	5	2	2	High	High	Low	Low	High	High	Medium		
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	design complete	7	2	5	High	High	Medium	High	High	High	Low	High	High
34	AWA	Ione Clearwell Cover Replacement	in design	3	1	2	High	Medium	Low	Low	High	High	Low	High	High
35	AWA	CAWP Tanks Replacement Project	conceptual design	3	2	4	High	Medium	Medium	Low	High	Medium	Medium	High	High
36	AWA	Camanche Wastewater System Improvements	in design	3	1	2	High	Medium	Low	Low	High	Medium	Low	High	High
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	planning	2	2	8	Low	Medium	High	Low	High	Medium	Medium	High	High
38	AWA	CAWP Disinfection By-Product Reduction Project	conceptual design	3	2	5	High	Medium	Medium	Low	High	Medium	Low	High	High

Tier 2 - Evaluation
Step 2 - Prioritize Projects

Project No.	Submitted by	Project Name	Project Status	RESULT
1	AWA	CAWP & AWS Intertie	conceptual design	Low
2	AWA	CAWP Gravity Supply Line	design complete	High
3	AWA	Upper Amador Canal – Treated Pipeline Conversion	conceptual design	High
4	AWA	Lake Camanche Wastewater Improvement Program	conceptual design	High
5	AWA	Upper Amador Canal – Untreated Pipeline Conversion	design complete	High
6	AWA	Inter-Regional Conjunctive Use Project	conceptual design	Low
7	AWA	AWS Regional Water Treatment Plant	in design	High
8	AWA	Lower Amador Canal Project	in design	Medium
9	AWA	Backwash Water Reuse Project	design complete	High
10	AWA	CAWP Fire Storage	conceptual design	High
11	AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	conceptual design	High
13	AWA	Regional Wastewater Project	conceptual design	High
14	AWA	New York Ranch Reservoir Conservation and Management	pre-design	High
15	AWA	AWA Low Pressure Flow Improvements	conceptual design	High
16	AWA	Lake Camanche Water Storage Tank & Transmission Main	design complete	High
17	AWA	Lake Camanche Water Service Replacement-Phase II	design complete	High
19	AWA	Wildwood Leachfield Replacement	pre-design	Low
20	AWA	Bear River Reservoir Expansion Project	pre-design	High
21	UMRWA	Septic System Management Program	planning	Low
22	CCWD	Leak Testing and Repair Program	in design	High
23	CCWD	New Hogan Reservoir Pumping Project	pre-design	High
24	CCWD	New Hogan Phase II Water Distribution Loop Project	conceptual design	High
25	CCWD	Sheep Ranch WTP Compliance Project	design complete	High
26	AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	planning	High
27	CCWD	West Point WTP Drinking Water Compliance Project	design complete	High
28	Foothill Conservancy	East Panther Creek Restoration Project	design complete	High
29	Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	conceptual design	High
30	Foothill Conservancy	Amador Household Water Efficiency Project	conceptual design	High
31	Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	planning	High
32	City of Jackson	City of Jackson Wasteater Treatment and Disposal Project	in design	High
33	Calaveras County Administrative Office	Ponderosa Way Restoration Project	design complete	High
34	AWA	Ione Clearwell Cover Replacement	in design	High
35	AWA	CAWP Tanks Replacement Project	conceptual design	Medium
36	AWA	Camanche Wastewater System Improvements	in design	Medium
37	AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	planning	Medium
38	AWA	CAWP Disinfection By-Product Reduction Project	conceptual design	Medium

Appendix D – Project Type and Financing Summary

Appendix D Project Summary

Project Proponent	Project Name	Project Type	Capital Cost	Annual O&M Cost [1]	Primary Funding Source(s) for Capital Cost [2]	Primary Funding Source(s) for O&M Costs [2]
AWA	CAWP & AWS Intertie	Potable Water Supply Project – Conveyance Facilities	$5,400,000	TBD	TBD	TBD
AWA	CAWP Gravity Supply Line	Potable Water Supply Project – Conveyance Facilities	$13,500,000	$5,700	PG&E, United States Department of Agriculture (USDA) Rural Services	Rates
AWA	Upper Amador Canal – Treated Pipeline Conversion	Potable Water Supply Project – Conveyance Facilities	$3,870,087	$3,060	State Revolving Fund	Rates
AWA	Lake Camanche Wastewater Improvement Program	Wastewater Project – Conveyance and Treatment Facilities	$14,000,000	TBD	SWRCB- Small County Wastewater Grant Program, State Revolving Fund and Rate/Fees	Rates
AWA	Upper Amador Canal – Untreated Pipeline Conversion	Potable Water Supply Project – Conveyance Facilities	$3,500,000	TBD	TBD	TBD
AWA	AWS Regional Water Treatment Plant	Potable Water Supply Project – Treatment Facilities	$20,000,000	TBD	TBD	TBD
AWA	Lower Amador Canal Project	Potable Water Supply Project – Conveyance Facilities	$1,500,000	TBD	Rates, Private Developers, Utility Cooperation, State, Federal and Grants	Rates
AWA	Backwash Water Reuse Project	Recycled Water Project – Conveyance Facilities		TBD	Buckhorn-rate recovery, City of Lone-local developer and AWA, Tanner-rate recovery.	Rates
AWA	CAWP Fire Storage	Potable Water Project – Conveyance and Storage Facilities	$5,000,000	TBD	TBD	TBD
AWA	Highway 88 Corridor Wastewater Treatment, Transportation, Disposal	Wastewater Project – Septic to Sewer	$10,000,000	TBD	TBD	TBD
AWA	Regional Wastewater Project	Wastewater Project – Treatment Facilities	$20,000,000	TBD	TBD	TBD
AWA	New York Ranch Reservoir Conservation and Management	Ecosystem Restoration and Protection Project – Land Conservation	$600,000	TBD	TBD	TBD
AWA	AWA Low Pressure Flow Improvements	Potable Water Supply Project – Conveyance Facilities	$500,000	TBD	TBD	TBD
AWA	Lake Camanche Water Storage Tank & Transmission Main	Potable Water Supply Project – Conveyance and Storage Facilities	$41,000,000	TBD	Rates, Private Developers, Utility Cooperation, State, Federal and Grants	Rates
AWA	Lake Camanche Water Service Replacement-Phase II	Potable Water Supply Project – Conveyance Facilities	$1,200,000	TBD	Rates, Private Developers, Utility Cooperation, State, Federal and Grants	Rates
AWA	Wildwood Leachfield Replacement	Wastewater Project – Treatment	$2,200,000	TBD	Rates, Private Developers, Utility Cooperation, State, Federal and Grants	Rates
AWA	Bear River Reservoir Expansion Project	Potable Water Supply Project – Storage Facilities	$50,000,000	TBD	Rates, Private Developers, Utility Cooperation, State, Federal and Grants	Rates
UMRWA	Septic System Management Program	Wastewater Project – Treatment and Conveyance Facilities	$260,000	$0	Grants	Not applicable
CCWD	Leak Testing and Repair Program	Potable Water Supply Project – Conveyance and Storage Facilities	$0	$250,000	Grant Funds	Rates
CCWD	New Hogan Reservoir Pumping Project	Potable Water Supply Project – Conveyance Facilities and Storage Operations	$22,000,000	TBD	TBD	TBD

CCWD	New Hogan Phase II Water Distribution Loop Project	Potable Water Supply Project – Conveyance Facilities	$3,000,000	TBD	TBD	TBD
CCWD	Sheep Ranch WTP Compliance Project	Potable Water Supply Project – Treatment Facilities	$200,000	TBD	Grant Funding	Rates
AWA-CCWD-EBMUD	Camanche Area Regional Water Supply Project	Potable Water Supply Project – Treatment and Conveyance Facilities	$0	TBD	Agency funding, loans, grants, user connection fees	Not applicable
CCWD	West Point WTP Drinking Water Compliance Project	Potable Water Supply Project – Treatment Facilities	$600,000	TBD	State and Federal grants	Rates
Foothill Conservancy	East Panther Creek Restoration Project	Ecosystem Restoration and Protection Project – Restoration	$200,000	TBD	CA Dept of Fish and Game, PG&E FERC project environmental enhancement funds	Rates
Foothill Conservancy	Restoring the Upper Mokelumne's Anadromous Fish	Ecosystem Restoration and Protection Project – Restoration	$1,000,000	$50,000	IRWM funding, EPA grants, foundation grants, Nat'l Fish & Wildlife Foundation, Ecosystems Services programs, EBMUD, volunteer labor	Rates
Foothill Conservancy	Amador Household Water Efficiency Project	Conservation - Economic Incentives and Outreach and Education	$692,000	$35,000	IRWM funding, EPA grants, foundation grants	Rates
Stanislaus National Forest, Calaveras Ranger District	Hemlock Landscape Restoration	Ecosystem Restoration and Protection Project – Restoration	$0	TBD	Grants, Cornerstone, and/or Forest Service Appropriated	Not applicable
City of Jackson	City of Jackson Wastewater Treatment and Disposal Project	Wastewater Project – Treatment	$5,747,000	TBD	SWRCB, USDA- Rural Development	Rates
Calaveras County Administrative Office	Ponderosa Way Restoration Project	Ecosystem Restoration and Protection Project – Restoration	$223,000	$2,000	Calaveras County, BLM, Cal Fire, CalTrans, PG&E FERC project env. Enhancement funds, Dept. of Boating and Waterways	Rates
AWA	Ione Clearwell Cover Replacement	Potable Water Project - Storage Facilities	$71,376	TBD	Rates, low-interest loans or grants	Rates
AWA	CAWP Tanks Replacement Project	Potable Water Project - Storage Facilities	$305,000	TBD	TBD	TBD
AWA	Camanche Wastewater System Improvements	Wastewater Project - Conveyance Facilities	$720,243	TBD	TBD	TBD
AWA	CAWP Retail Distribution Domestic and Fire Protection Improvements	Potable Water Supply Project - Storage and Conveyance Facilities	$2,633,861	TBD	Grants, Loans, Participation Fees and rates	Rates
AWA	CAWP Disinfection By-Product Reduction Project	Potable Water Supply Project – Treatment Facilities	$500,000	TBD	TBD	TBD

1. As O&M costs are developed for projects, it will be added to future Plan Updates.
2. The percent of total cost to be paid by each funding source will be added as information becomes available, and the longevity and certainty of project-specific funding sources will be assessed moving forward and prior to project implementation. This information is provided at a programmatic level in Table 4-3.

Appendix E– Camanche Area Regional Water Supply Project Report

Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject:	**Camanche Area Regional Water Supply Plan (CARWSP) Feasibility Study and Conceptual Design**
Prepared For:	Project Partners Committee (PPC)
Prepared by:	Lindsey Wilcox
Reviewed by:	Alyson Watson, P.E.
Date:	January 24, 2013
Reference:	0122-004

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1 Introduction

Water management stakeholders in Amador and Calaveras Counties are in the process of updating the Mokelumne/Amador/Calaveras (MAC) Integrated Regional Water Management (IRWM) Plan. This process includes evaluating potential integrated, regional approaches to addressing critical water supply and water quality needs of disadvantaged communities, which are communities with median household incomes of less than 80 percent of the statewide median. As part of the MAC IRWM Plan Update, the Camanche Area Regional Water Supply Project (CARWSP) was identified as a project that – if implemented - could potentially engage multiple water suppliers in the MAC region in developing a regional solution to address critical water supply and water quality needs of select disadvantaged communities in the region. The potential project partners, East Bay Municipal Utility District (EBMUD), Amador Water Agency (AWA), and Calaveras County Water District (CCWD), undertook an evaluation to define project objectives and operating parameters, identify a preferred alternative to address existing water supply issues, and - if CARWSP is determined to be feasible - prepare conceptual design documents that could potentially be used to support project implementation. The evaluation proceeded through implementation of the following steps and evaluations:

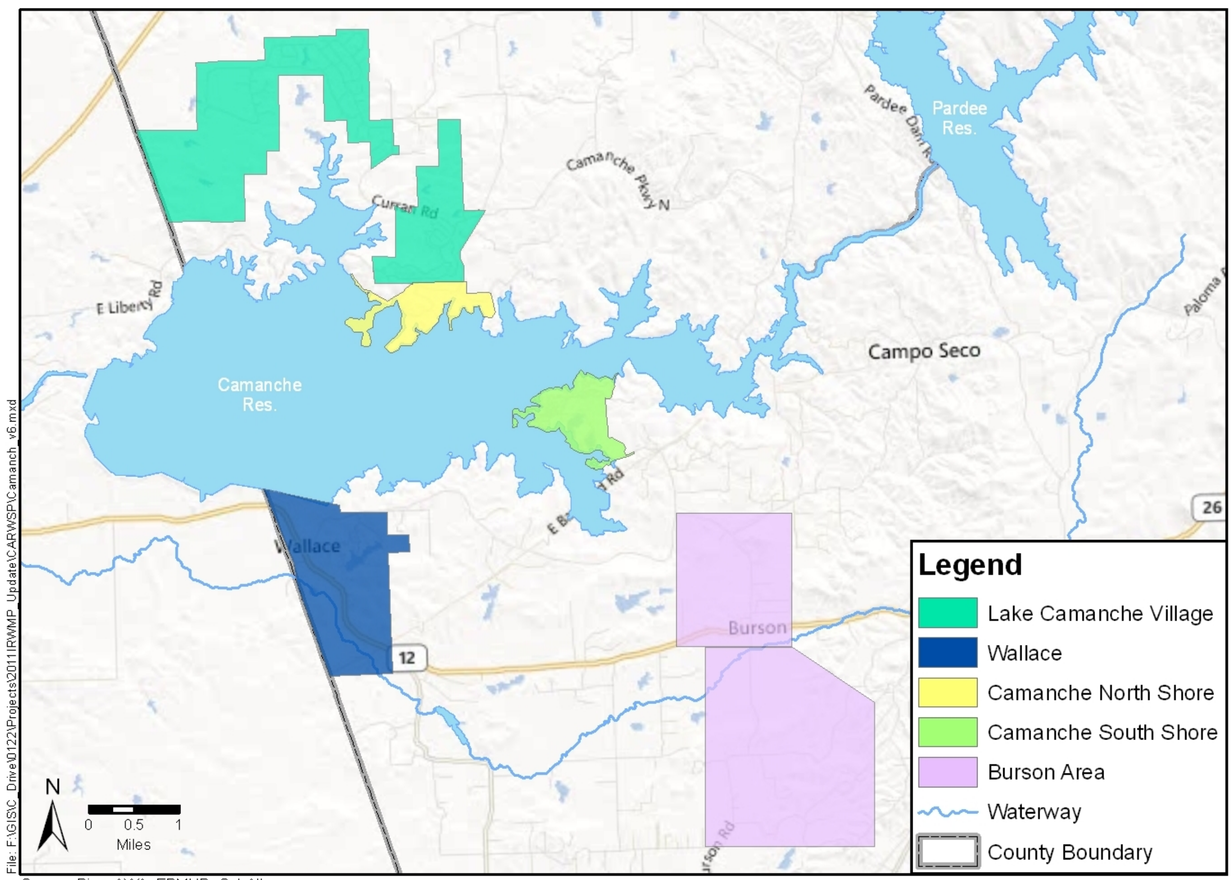
- Task 1: Organization and Objectives: communication and decision-making protocols were developed and objectives identified;
- Task 2: Water Demand Analysis: water demands in the project area were evaluated;
- Task 3: Water Supply Alternatives Analysis: potential water supplies were identified and evaluated for suitability in meeting Camanche area demands;
- Task 4: Preferred CARWSP Alternative: alternative means of meeting Camanche area demands with preferred supplies were evaluated and conceptual design drawings developed;
- Task 5: Preliminary CARWSP Project Plan: a preliminary assessment was performed to identify project financing (with agency costs based on benefits received), project ownership, water rights and water accounting, and operations and maintenance;
- Task 6: Integration into the MAC IRWM Plan: CARWSP elements that integrate with the MAC IRWM Plan Update were summarized;
- Task 7: Stakeholder Committee Meetings: meetings of the potential project partners were convened throughout the process.

This report summarizes the results of the CARWSP Feasibility Evaluation and Conceptual Design undertaken as part of the MAC IRWM Plan Update. Summary technical memoranda (TMs) were prepared documenting the evaluations performed in support of Tasks 1 through 5. These TMs are provided as Appendices A through F to this report. Task 6 resulted in preparation of the Integration chapter of this report. Task 7 involved a series of meetings among potential project partners.

2 Project Setting

The Camanche Area covers approximately 20-square-miles in the vicinity of Lake Camanche, as shown in Figure 1. The area includes Lake Camanche Village and the Camanche Area North Shore (CANS) Recreation Area in Amador County; and the communities of Wallace, Burson, and the Camanche Area South Shore (CASS) Recreation Area in Calaveras County. The area is predominantly rolling foothill grasslands with blue oaks and Foothill pines; elevations range from about 200 to 700 feet. Lake Camanche Village water supplies are currently provided by AWA, and CANS and CASS water supplies are provided by EBMUD. The community of Wallace is in the process of being annexed to the CCWD water supply system. The community of Burson is not part of a larger water supply system and operates as a network of private wells. Burson was initially evaluated in the CARWSP planning process. However, on further evaluation, it became evident to CCWD staff that it would likely be more cost effective to serve demands in the Burson area from the Jenny Lind Water Treatment Plant, rather than from a regional project in the Camanche area. As such, Burson was not carried forward for further evaluation.

Figure 1: Camanche Area



Source: Bing, AWA, EBMUD, Cal-Atlas

The primary water supply source in the Camanche area is groundwater. Groundwater quantity and quality in the Camanche area vary considerably among well sites due to the region's geology and the small and unpredictable yields of groundwater system that typifies this area of the Sierra foothills. Wells serving areas in Amador County north of Lake Camanche are located within the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin, while wells serving areas south of Lake Camanche are located in the Eastern San Joaquin Subbasin. Located on the eastern fringe of the San Joaquin Valley Groundwater Basin, groundwater resources in the Camanche area originate in fractured rock systems typical of the foothills as well as the alluvial systems characteristic of the San Joaquin Valley geology to the west. Over the years, groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater supplies have exhibited chronic water quality issues. Based on quarterly sampling in monitoring wells north of Lake Camanche in Amador County, groundwater iron concentrations greatly exceed the secondary maximum contaminant level (MCL) of 300 micrograms per liter (µg/L), reaching concentrations as high as 7,052 µg/L. Additionally, total manganese concentrations in monitoring wells are greater than the secondary MCL of 50 µg/L, reaching concentrations as high as 329 µg/L. Groundwater quantity and quality concerns have prompted EBMUD, AWA, and CCWD to partner in the development of a Camanche Area Regional Water Supply Plan (CARWSP) which identifies solutions to correct the critical drinking water quality issues in the Camanche area.

According to the Proposition 84 & 1E Guidelines finalized in December 2012, a disadvantaged community (DAC) is defined by the State of California as a community with an annual median household income (MHI) that is less than 80 percent of the statewide MHI (Public Resources Code, 75005(g)). The U.S. Census Bureau's American Community Survey (ACS) includes MHI data compiled for the 5-year period from 2006 to 2010. A community with an MHI of $48,706 or less is considered a DAC. The Census collects and compiles data for multiple census geographies including Place, Block Group, and Tract. A census tract is a region defined for the purpose of taking a census and usually coincides with city boundaries, towns, or other administrative areas. The U.S. defines census tracts as "relatively homogeneous units with respect to population characteristics, economic status, and living conditions, census tracts average about 4,000 inhabitants." Census tracts are subdivided into block groups which generally contain between 600 and 3,000 people, with an optimum size of 1,500 people. Census places are designated each decennial census to provide data for settled concentrations of population that are identifiable by name.

Based on the ACS census place data, Camanche North Shore is a DAC with an associated MHI of $41,848. Census data is gathered and compiled at the census tract, census block group, and census designated place (CDP) level and sometimes does not reflect a small enough area or community. Lake Camanche Village and Wallace have associated CDPs, but the places cover a much larger area than the service areas themselves. The Lake Camanche Village CDP is not a DAC, but an income survey completed for Lake Camanche Village service area in 2005 determined that its MHI is less than 80% of the Statewide MHI and therefore a DAC. While the DWR/Census data does not show Camanche South Shore, Wallace, or Burson areas as disadvantaged, it is possible that if an income survey were completed, they may be determined to be disadvantaged. Addressing critical water supply and/or water quality needs of DACs is a DWR IRWM Program Preference. Therefore, projects such as CARWSP that would improve water supply reliability and improve water quality would be favorable to DWR. AWA and CCWD both acknowledge a critical need for a new water supply as well as funding. If grant funding cannot be secured, one or more phases of CARWSP may not be able to be implemented.

3 Communication and Decision Making

In May 2012, EBMUD, AWA, and CCWD (referred to as the project partners committee, or PPC) initiated the CARWSP planning process and began meeting on a monthly basis to develop a potential CARWSP project concept. To ensure a smooth process and shared understanding of project objectives, the PPC agreed at the outset of the planning process on the goal of CARWSP and the procedures by which the PPC governed its discussions and decision-making, as summarized in the Communications and Decision-making TM (RMC, July 2012).

The goal of CARWSP is to develop a mutually agreeable preferred CARWSP project description, preliminary engineering documents, and a preliminary CARWSP Project Plan that collectively meet the documented needs of the three project partners.

Procedures for PPC representation and participation; the PPC meeting schedule and operational functions; the decision-making process; and protocols for interacting and participating with interested non-partner organizations, the public, and the media were defined, discussed, and agreed upon by the PPC. PPC members presented the views of each respective organization, actively participated in the planning process, and worked collaboratively with other PPC members, project staff, and representatives of the Upper Mokelumne River Watershed Authority (UMRWA). The PPC met 8 times over the course of 8 months as shown in the following table.

Table 1: PPC Meetings

Meeting No.	Meeting Topic/Purpose	Meeting Date
1	Introduce the CARWSP planning process, establish ground rules for the PPC, and review and revise the draft Communication and Decision-Making TM	May 29, 2012
2	Review the draft CARWSP Objectives TM	June 27, 2012
3	Review the draft Boundary Map and Demand Projections TM	July 17, 2012
4	Review the draft Water Supply Alternatives Summary TM	August 29, 2012
5	Review the draft Alternatives Evaluation TM	September 24, 2012
6	Establish basic CARWSP Project Plan parameters	October 16, 2012
7	Review the draft Preliminary CARWSP Project Plan	November 7, 2012
8	Review the draft CARWSP	December 18, 2012

To engage the public and MAC IRWM planning region, CARWSP updates were provided at meetings of the MAC IRWM Regional Participants Committee (RPC), as well as at a MAC IRWM Plan public workshop held in September 2012. CARWSP updates were also provided at UMRWA, CCWD, and AWA Board meetings, which are publicly noticed and open to all interested parties. Individual meetings were held with AWA and CCWD, members of the public, the Foothill Conservancy, Ratepayer Protection Alliance, and Calaveras Planning Coalition as part of the MAC Plan Update process in which specific projects were discussed, including CARWSP. CARWSP information, including draft memoranda and PPC meeting notes, were provided to interested parties in December of 2012.

4 Critical Success Factors

In order to develop a CARWSP project concept that would be agreeable to each project partner, it was critical to first understand the needs and objectives of each partner. To this end, project objectives and critical success factors (CSFs) were identified for each PPC member. Objectives and CSFs are defined as follows.

- Objectives are project goals, or CARWSP outcomes that a PPC member would like to see the project achieve.

- CSFs are critical project elements, or minimum project outcomes that a CARWSP project must achieve in order to be viewed as viable by the PPC member.

As described above, CSFs are minimum project outcomes that a project must achieve in order to be viewed as viable by a PPC member, whereas objectives are desired project outcomes that are not necessarily critical for project viability. Once each agency's individual objectives and CSFs had been identified, a consolidated set of CARWSP objectives and CSFs was developed to guide the alternatives evaluation, as shown in Table 2. These are described in more detail in the CARWSP Objectives TM (RMC, July 2012).

Table 2: CARWSP Program Critical Success Factors

	Objective	CSF
Meet Current and Future Demands in the Wallace Area	✓	✓
Meet Current and Future Demands in the Burson Area	✓	
Exercise CCWD's Mokelumne River Water Reservation	✓	
Work Cooperatively to Achieve Water Management Objectives	✓	
Maintain or Reduce Operating Costs to Provide an Affordable Supply	✓	✓
Provide a System that is Easy to Operate	✓	✓
Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible	✓	✓
Provide Reliable Supply Year-Round	✓	✓
Clear and Fairly Resolve Water Rights	✓	✓
Build Regional Partnerships	✓	✓
Garner Local Community Support	✓	✓
Transfer Responsibility for Local Residents	✓	✓
Meet All Applicable Regulatory Requirements	✓	✓
Beneficially Impact Water Treatment-Related Wastewater Discharges	✓	✓
Maximize Ability to Secure Outside Funding	✓	✓
Improve Water Supply and Quality in the Lake Camanche Village Area	✓	✓
Provide Adequate Domestic Pressure and Fire Protection	✓	
Minimize Capacity Impacts to the Mokelumne Aqueduct	✓	✓

5 Boundary Map and Water Demands

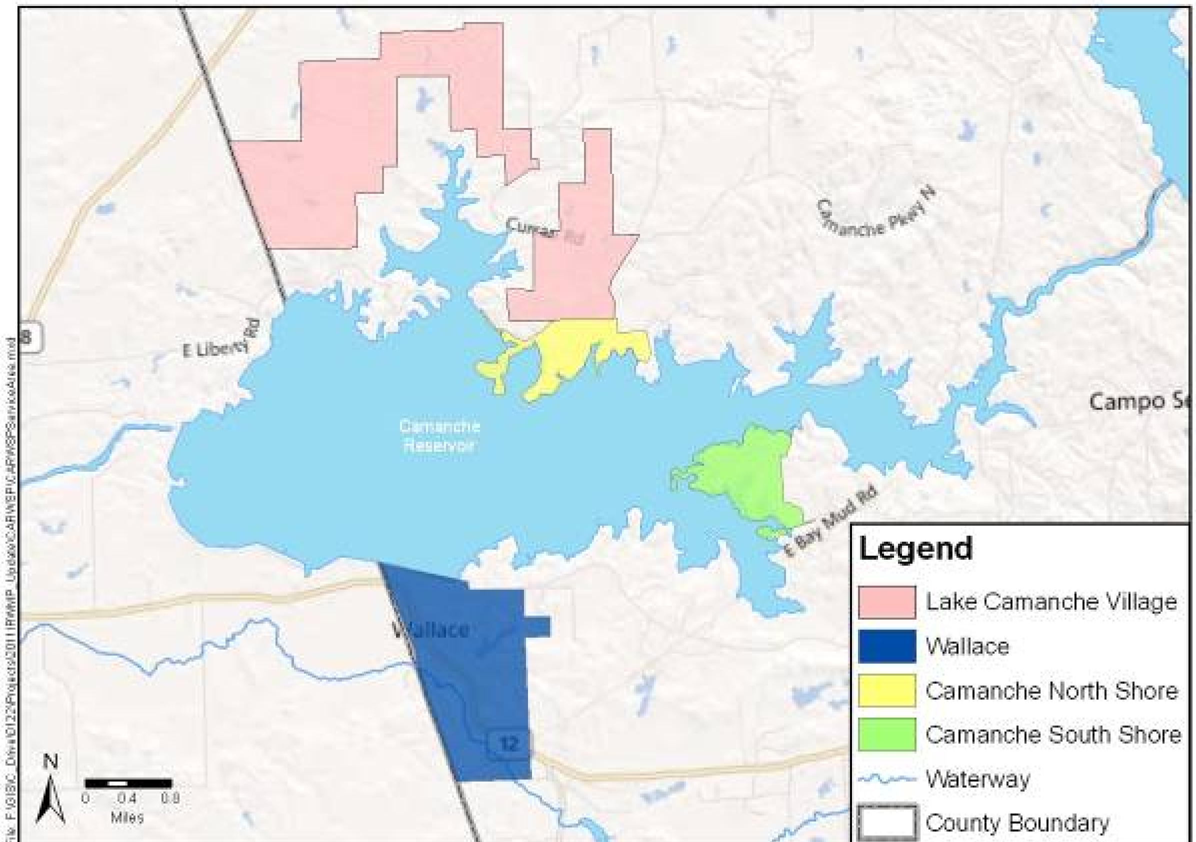
5.1 Areas to be Served

Based on the *Camanche Regional Water System Draft Feasibility Study* (KASL, 1999) and discussions with the PPC, the areas the agencies would serve with the recommended CARWSP project are as follows.

- EBMUD – CANS and CASS
- AWA – Lake Camanche Village (Water Improvement District [WID] #7)
- CCWD – Wallace

These areas are shown in Figure 2. As described previously, Burson was initially included in the project area. However, on further evaluation, it became evident to CCWD staff that it would likely be more cost effective to serve demands in the Burson area from the Jenny Lind Water Treatment Plant, rather than from a regional project in the Camanche area. As such, Burson was not carried forward for further evaluation.

Figure 2: Areas to be Served



Source: Bing, AWA, EBMUD, Cal-Atlas

5.2 Water Demands

Projected demands for the CARWSP service area are presented in Table 3. These projections are based on the *Camanche Regional Water System Draft Feasibility Study* (KASL, 1999), the *Camanche South and North Shore WTPs Evaluation* (EBMUD, May 2003), and data from the participating agencies. Estimated demands are for existing units and approved or tentative approved maps only, and do not include potential future demands that have not yet been approved. The demands are discussed in more detail in the Boundary Map and Demand TM provided in Appendix C (RMC, November 2012).

Table 3: Demand Projections

Service Area	Average Day Demand (ADD)		Maximum Day Treated Water Demand (MDD)	
	Existing (gpd)[1]	Existing (AFY)[2]	Existing Demand (gpd)[1]	Project Demand – 20 year (gpd)[1]
Camanche South Shore[3]	101,300	113	225,800	245,200
Camanche North Shore[4]	187,100	210	276,300	286,300
Lake Camanche Village[5]	267,500	300	560,000	1,000,000
Wallace[6]	40,000	45	161,400	645,700
Total	**595,900**	**667**	**1,223,500**	**2,177,200**

1. gpd = gallons per day
2. AFY = acre-feet per year
3. Existing demands from EBMUD, 2003; Project MDD from KASL, 1999. Project demand is based on max day demands, which are typically not expressed in AFY.
4. Existing MDD from EBMUD, 2003; Project MDD developed by applying same assumption from KASL report to the existing demand. Project demand is based on max day demands, which are typically not expressed in AFY.
5. Existing demands provided by AWA via email July 10, 2012. Existing ADD assumes 365 gpd/unit with 733 existing units; Existing MDD assumes 760 gpd/unit with 733 units. 20 year MDDs will exceed 1 million gallons per day, but for the purposes of CARWSP, this is the demand assumed to be served by the project. Project demand is based on max day demands, which are typically not expressed in AFY.
6. Existing MDD from CCWD via email; data from 2009 through 2011 was averaged. Existing ADD is from KASL, 1999. Project demand is based on max day demands, which are typically not expressed in AFY.

6 Water Supply Alternatives

As described in the Water Supply Alternatives Summary TM in Appendix D (RMC, October 2012) a water supply alternatives evaluation was performed to:

1. Identify alternative water supply sources potentially available to meet the demands described in the Water Demands TM Appendix C.
2. Determine the amount of supply potentially available from each water supply alternative.
3. Identify constraints associated with each supply alternative.

Groundwater, surface water, stormwater, and water conservation were considered as alternative water supplies to meet the critical drinking water quantity and quality issues in the Camanche area. As shown in Table 4, each water supply alternative has constraints. Ultimately, conjunctive management of surface water and groundwater was found to provide the greatest potential benefit, as described in the following sections.

Table 4: Alternatives Summary Matrix

Water Supply Alternative	Parameter: Availability	Parameter: Constraints
Groundwater	Variable depending on location	Water quality and supply issues
Surface Water	Reliable and available, up to 2.8 mgd available[1]	EBMUD operational requirements; potential CCWD supply limitation under low flow conditions
Stormwater	Up to 5,200 gpd[2]	Significant annual and seasonal variability, storage requirements, and cost to end user
Water Conservation	Demand reduction of approximately 58,000 gpd[2]	Relatively small reduction in water demand relative to projected 2.2 mgd need[1]

1. mgd = million gallons per day
2. gpd = gallons per day

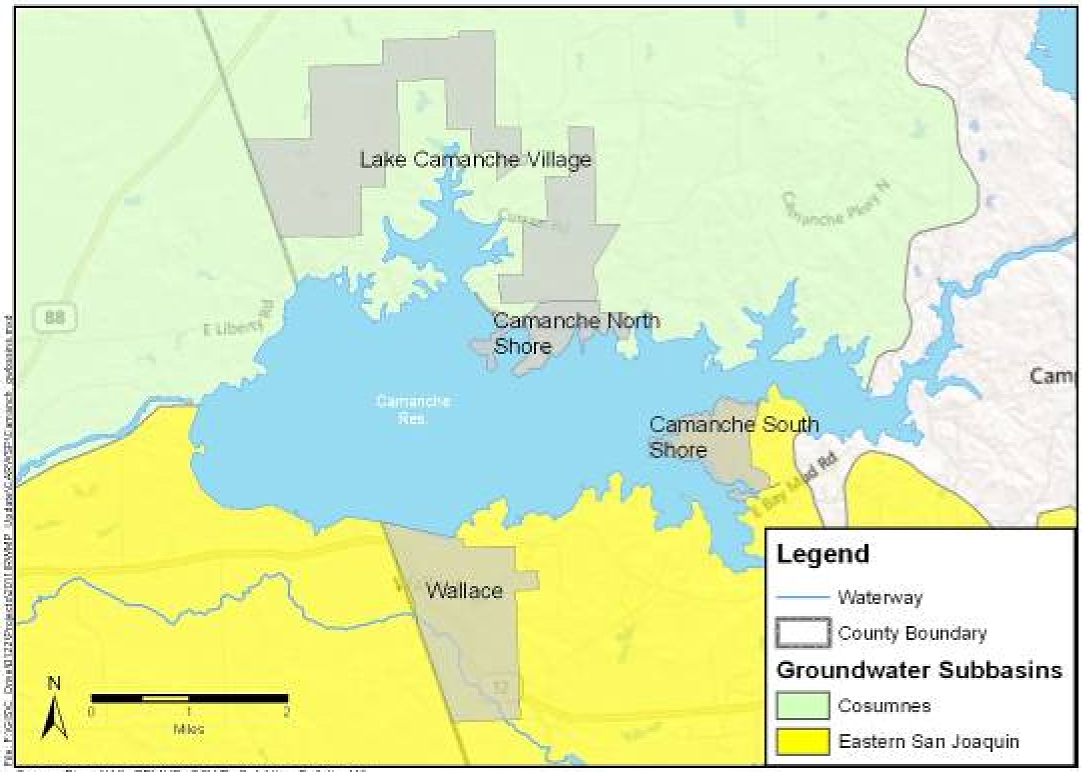
6.1 Groundwater

The primary source of water supply in the Camanche area is groundwater. Groundwater quantity and quality in the area varies considerably among well sites due to the region's geology and the small and unpredictable yields of the groundwater sub-basin(s) in this area of the Sierra foothills. Located on the eastern fringe of the San Joaquin Valley Groundwater Basin, the groundwater resources in the Camanche area are associated with the fractured rock systems typically found in the foothills as well as the alluvial systems characteristic of the San Joaquin Valley geology to the west.

Over the years, groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater quality has also been a chronic issue, as described in the Project Setting. These impaired groundwater quantity and quality conditions have limited water suppliers in their ability to provide a high quality, reliable water supply to the Camanche area.

AWA currently supplies Lake Camanche Village with groundwater using four wells that pump from the Cosumnes Sub-basin portion of the San Joaquin Valley Groundwater Basin (see Figure 3). One of the wells, on the easterly side of the Village, was taken out of operation from September 2010 to July 2011 due to elevated turbidity and odor levels; this well is now being operated at reduced production levels. Additionally, groundwater elevations decreased significantly during the 1960s and 1970s. Although groundwater elevations have rebounded within the last two decades, there is still a slight overdraft. Due to concerns with groundwater quality and quantity, AWA is seeking to reduce the dependence of Lake Camanche Village on groundwater as its primary water supply by introducing an alternative supply to meet a portion of demands. AWA would continue to utilize the existing groundwater system at a reduced rate, enabling conjunctive use and reducing stress on the groundwater basin (AWA, 2011).

Figure 3: Groundwater Basins underlying Study Area



Source: Bing, AWA, EBMUD, CCWD, Cal-Atlas, Bulletin 118

Similarly, the Wallace area overlies the Eastern San Joaquin Subbasin, which is also in an overdraft condition. With its small and unpredictable yields, groundwater has proven to be an unreliable water supply source for the western CCWD service area. The dropping groundwater levels have resulted in a critical overdraft in the Subbasin, which has contributed to deteriorating groundwater quality. The Wallace Community Service District currently uses groundwater supply wells. Unable to remedy its longstanding groundwater supply problems, the Wallace Community Service District has petitioned to be annexed to the CCWD service area. With this annexation, currently underway, CCWD is seeking to assess the potential to improve water supply reliability through CARWSP by providing a reliable, high quality water supply that would be operated conjunctively with the existing groundwater system (CCWD, 2011).

The CANS area has similar groundwater quantity and quality issues. During completion of the *Camanche South and North Shore WTPs Evaluation* (EBMUD, May 2003) multiple water supply sources were evaluated as potential sources for the CANS Water Treatment Plant (WTP), including existing groundwater wells. At the time, three groundwater wells were in use, each with quality issues, as summarized in the following table. All of the wells also had low production rates that could not be sustained, and if the wells were operated without rest periods, production would rapidly drop.

Table 5: CANS Groundwater Quality

Well No.	Date Constructed	Water Quality Issues
1	1948	• Non-potable water supply • Nitrate problems
2	1977 (rebuilt in 2000)	• High in iron and manganese; hydrogen sulfide present; coliform present if too much water is pumped.
3	1979	• High in iron and manganese; hydrogen sulfide present; high heterotrophic plate counts
4	1997	• Was drilled to provide replacement water supply for Well No.2 in 1997 and at the time, tested positive for total coliform • After Well No. 2 was rehabilitated in 2000, Well No. 4 became backup supply • High in iron, manganese, boron and hydrogen sulfide

Source: EBMUD, May 2003

Groundwater is currently the primary source of supply for the Camanche area. The problems described above make groundwater unsuitable as a continued primary source of supply to the area.

6.2 Surface Water

EBMUD owns and operates Pardee and Camanche Reservoirs on the Mokelumne River to meet a number of objectives, including the following.

- Provide water storage for EBMUD municipal, environmental and other purposes
- Comply with downstream senior water rights and fishery flow requirements
- Provide flood protection
- Generate hydroelectric power
- Provide for a variety of recreational activities

Camanche Reservoir is currently the water supply source for the existing CASS WTP. This reservoir is located approximately 10 miles downstream from Pardee Reservoir and has a maximum storage capacity of 417,120 acre-feet (AF).

Pardee Reservoir has a maximum storage capacity of 197,950 AF. Water is conveyed through Pardee tunnel to the Campo Seco flow control facility where it trifurcates to the three Mokelumne Aqueducts and flows by gravity approximately 83 miles to EBMUD's service area in the San Francisco Bay area. Pardee Reservoir water receives pretreatment consisting of lime addition for corrosion control before it enters Mokelumne Aqueduct.

Raw water from either Camanche Reservoir or the Mokelumne Aqueduct could be conveyed to a regional WTP to serve the Camanche area with a high quality, reliable potable water supply. While both the Mokelumne Aqueduct and Camanche Reservoir are of high water quality, the Mokelumne Aqueduct supply is generally of superior quality to the Camanche Reservoir supply. The large number of recreational users of Camanche Reservoir and the continual increase in motorized watercraft use pose potential future impacts to Camanche Reservoir water quality. The primary drawbacks to using Camanche Reservoir as a water supply source rather than the Mokelumne Aqueduct are as follows.

- Permitted recreational use allows for potential contamination with gasoline and its additives (specifically from motorized watercrafts).
- Body contact recreation is permitted in the reservoir, increasing nutrient and microbial loads which pose a greater risk to water quality and increase operational costs due to monitoring and treatment requirements.
- During severe droughts, the water supply intake in the reservoir may need to be moved to maintain water supply and reservoir water turbidity increases, resulting in limited filter run times that adversely affect plant output. Significant effort and resources are required to move the intake.
- During heavy Mokelumne (storm) flow conditions, high turbidity would limit the WTP's ability to produce acceptable quality water.
- High releases from Pardee reservoir at times increase sedimentation, further promoting algae blooms in the area of the CASS WTP Camanche reservoir intake. The result is limited filter run times that adversely affect plant output.

During the environmental review process for the Camanche WTP Replacement Project, EBMUD determined that the most cost-effective way to serve CASS and CANS with potable water while meeting its objectives would be to convey raw water from Mokelumne Aqueducts Nos. 1 and 2 (EBMUD, 2001). The Mokelumne Aqueducts were also identified as the preferred Camanche area water supply source in the *2003 Camanche South and North Shore Water Treatment Plant Evaluation* (EBMUD, 2003). Based on a recent EBMUD engineering analysis, it was determined that up to 2.8 million gallons per day (mgd) of additional water supply could be available from Pardee Reservoir via the Mokelumne Aqueduct without causing significant impacts to EBMUD supply operations.

6.3 Stormwater

Stormwater capture and reuse was evaluated as a potential alternative source that could offset use of other supplies such as groundwater to improve water supply reliability. Stormwater generation is dependent upon precipitation (rainfall and snowfall) in the Mokelumne River watershed, which is highly variable. Throughout the year, precipitation is seasonal, with most precipitation occurring between November and May and very little occurring from late spring to fall (AWA, 2011). According to the data collected by the Western Regional Climate Center at Camp Pardee weather station from 1926 through 2012, average annual precipitation is 21.48 inches. Assuming two 55-gallon rain barrels were provided to every parcel in CANS, CASS, Wallace, and Lake Camanche Village to capture precipitation to offset outdoor water demands during high demand months, an average of approximately 1.0 million gallons per year (2,800 gallons per day, or gpd, on an annual basis) could be offset by stormwater, increasing to 1.9 million gallons per year (5,200 gpd on an annual basis) in 20 years, based on demands of approved development described in Section 5.

Although captured stormwater could offset use of groundwater supplies, there are several factors which significantly constrain its use:

- Without significant treatment, stormwater could only be used to meet outdoor water demands; however, stormwater would be available primarily during the rainy season, when outdoor water demands are at their lowest.
- Without significant treatment, harvested rainwater would not be suitable for indoor use (or human consumption). As such, these supplies could not be used to offset indoor demands.

- The quantity of stormwater that could be reused would be insufficient to meet the needs of the service areas and therefore would not eliminate the need for additional water supply sources.
- Rainwater exhibits a strong seasonal pattern and annual variability, which makes it an unreliable source. As such, water suppliers would need to be ready with backup supplies in the event rainwater supplies were unavailable. As such, implementing stormwater reuse would not reduce the amount of additional alternative water supplies needed.

Due to the significant cost associated with implementing widespread rainwater harvesting, the unreliability of stormwater supplies, the limited demands that could be met with harvested rainwater (outdoor demands only), and the need to provide complete redundancy for those supplies in the event rainwater supplies are not available, stormwater is not considered to be a viable supply to meet Camanche area demands.

6.4 Water Conservation

Increasing water use efficiency in the communities surrounding Lake Camanche would reduce potable water demands. While EBMUD, AWA, and CCWD all encourage water conservation within their respective service areas and implement various Demand Management Measures (DMMs) and/or Best Management Practices (BMPs) to reduce water use, a targeted water use efficiency element could provide significant water savings. Toilets and showerheads have historically improved in efficiency over time, with a marked improvement in toilet flushing and showerhead efficiency observed beginning in 1992, with implementation of the National Energy Policy Act. This Act reduced the maximum flushing volume of new toilets sold in the United States to 1.6 gallons per flush (gpf) and mandated that new showerhead faucets not exceed a flowrate of 2.5 gallons per minute (gpm). Many units within Lake Camanche Village, CANS, CASS, and Wallace were constructed prior to 1992. As such, many of the existing dwelling units in the service area are expected to have non-conserving water fixtures, including toilets and showerheads. Table 6 summarizes the reduction in water demands that could potentially be achieved through targeted water conservation programs, based on the following assumptions.

- Non-conserving showerheads use 5.5 gpm, while new, low-flow showerheads use 2.5 gpm. Residents were assumed to take an average of 0.5 showers per day with an average duration of 8.2 minutes per shower (AWWA Research Foundation, 1999).
- Non-conserving toilets were estimated to use 7.0 gpf while new, low-flow toilets use 1.6 gpf. People were assumed to flush an average of 5 times per day.

Table 6: Potential Water Savings through Water Conservation

	Existing No. of Units	Units Requiring New Fixtures[1]	Showerhead Replacement Water Savings (gpd)	Toilet Replacement Water Savings (gpd)	Total Water Savings (gpd)
Lake Camanche Village	733	367	11,285	24,773	36,058
CANS	161	113	3,475	7,628	11,103
CASS	111	78	2,399	5,265	7,664
Wallace	100	30	923	2,025	2,948
Total	**1,230**	**588**	**18,082**	**39,691**	**57,773**

1. Based on agency staff knowledge, the following percent of existing units could benefit from fixture replacement: AWA estimated 70% of the existing units in Lake Camanche Village, EBMUD estimated 50% of existing units in CANS and CASS, and CCWD estimated 30% of the existing units in Wallace.

Based on this analysis, water conservation may be a viable alternative to offset a portion of demands currently being met with groundwater supplies in the service area.

6.5 Conjunctive Use

Conjunctive use opportunities may be achieved through coordinated management of surface water supplies and existing groundwater supply facilities. For example, AWA could meet a portion of user demands in Lake Camanche Village area using a combination of water conservation and treated surface water, while still relying on groundwater to meet a portion of baseline demands and / or peak day and peak month demands. Although groundwater in the eastern portion of Lake Camanche Village is impaired by water quality and supply issues, groundwater in the western portion can be used to meet peak demands if necessary. This would allow AWA to reduce its dependence on groundwater with a minimal quantity of surface water by managing demands and optimizing conjunctive use of these supplies.

The groundwater in the areas surrounding CANS and CASS are problematic and would not allow for the extensive application of conjunctive use since, as previously described, the quantity and quality of groundwater has led to the development of the CARWSP study. It would be possible to use existing groundwater facilities to meet outdoor irrigation demands and emergency supply needs.

Similarly, even with a combination of water conservation and surface water supply to the community of Wallace, CCWD would be expected to periodically require additional supplies in years with very low Mokelumne River streamflows (estimated to be approximately 4 months out of every 48 months, based on modeling performed by EBMUD). By using surface water in lieu of groundwater in months when surface water is available, CCWD would allow the groundwater basin to recharge, improving supply and quality for use in years in which surface water is limited.

6.6 Conclusion

Based on the water supply alternatives evaluation, conjunctive management of groundwater and treated surface water diverted from the Mokelumne Aqueduct, combined with a water conservation program is preferred. Water conservation would help offset new potable water supplies required and similarly, relying on groundwater to meet peak demands and provide emergency and/or backup supply, minimizes the size of a surface WTP. Conjunctive management of existing groundwater supplies and surface water provides a reliable, high quality water supply, improved flexibility, and reduces stress on the overdrafted groundwater basins. It is recommended that the preferred project be implemented in a series of three phases.

7 CARWSP Alternatives Evaluation

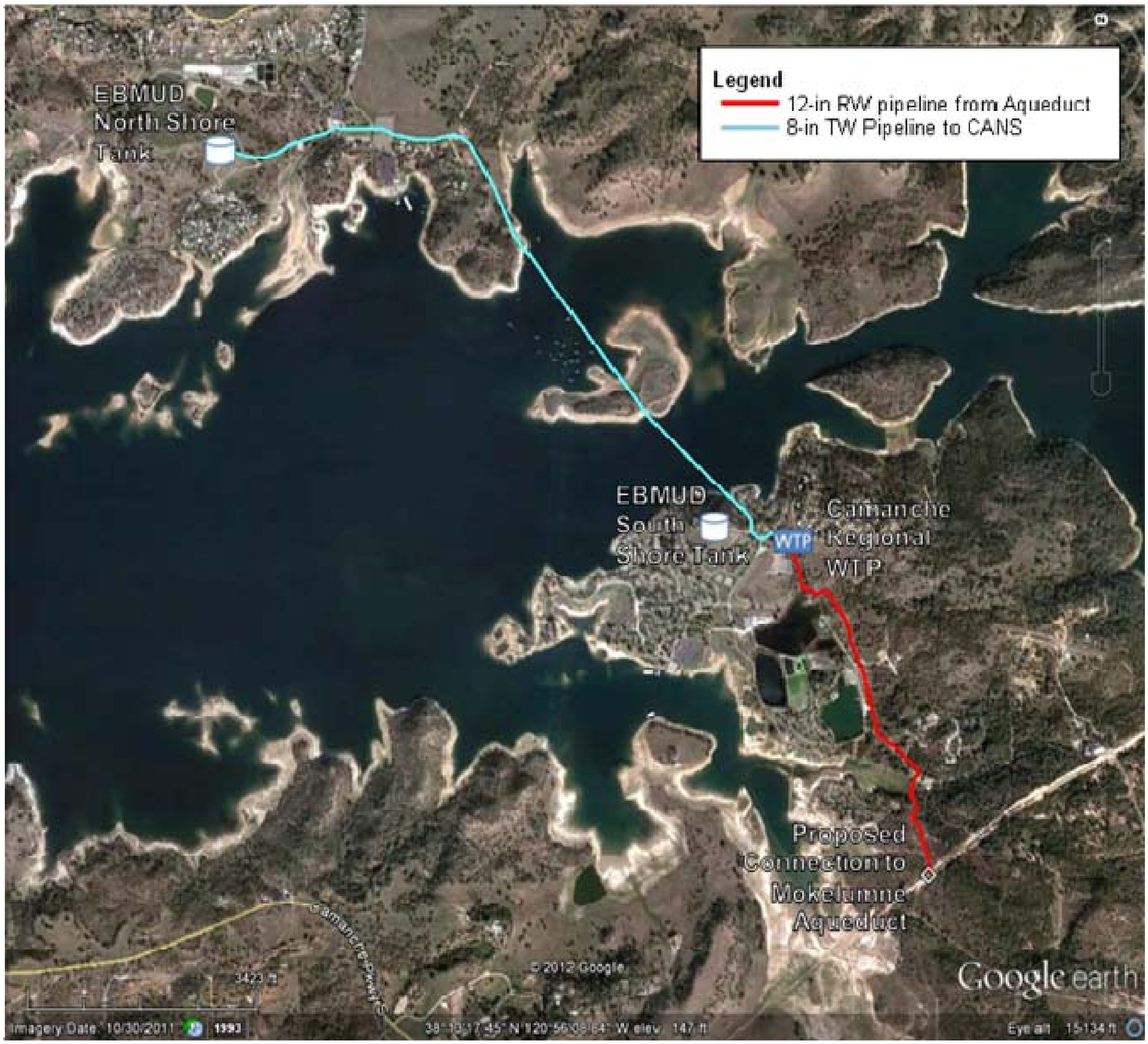
Three alternatives were evaluated to increase water conservation and provide treated water from the Mokelumne Aqueduct to the Camanche area. Alternative 1 would serve the EBMUD service areas of CANS and CASS only, Alternative 2 would serve CANS, CASS, and AWA's Lake Camanche Village, and Alternative 3 would serve the EBMUD, AWA, and CCWD areas, including CANS, CASS, Lake Camanche Village, and Wallace.

For all of the alternatives, the WTP would be located at the site of EBMUD's existing CASS WTP. Other locations were evaluated, as well as treatment processes, in the *Camanche Regional Water System Draft Feasibility Study* (KASL, 1999). Siting the WTP at the existing CASS WTP location would be the most cost effective alternative and would minimize potential environmental impacts. The site is owned by EBMUD, is relatively flat, and there are no plans to construct residential or recreational improvements at the location. There is also adequate space at this location to allow for future plant expansion and it is well situated to serve areas on the north- and south-side of Lake Camanche (KASL, 1999).

Alternative 1, as depicted in Figure 4, would include the following facilities.

- A 0.5 mgd regional WTP, associated pipelines, and appurtenances to serve CANS and CASS only
- The Vintage Home Fixture Retrofit water conservation program (including showerhead rebates and a toilet retrofit program) for the CANS and CASS service areas

Figure 4: Alternative 1

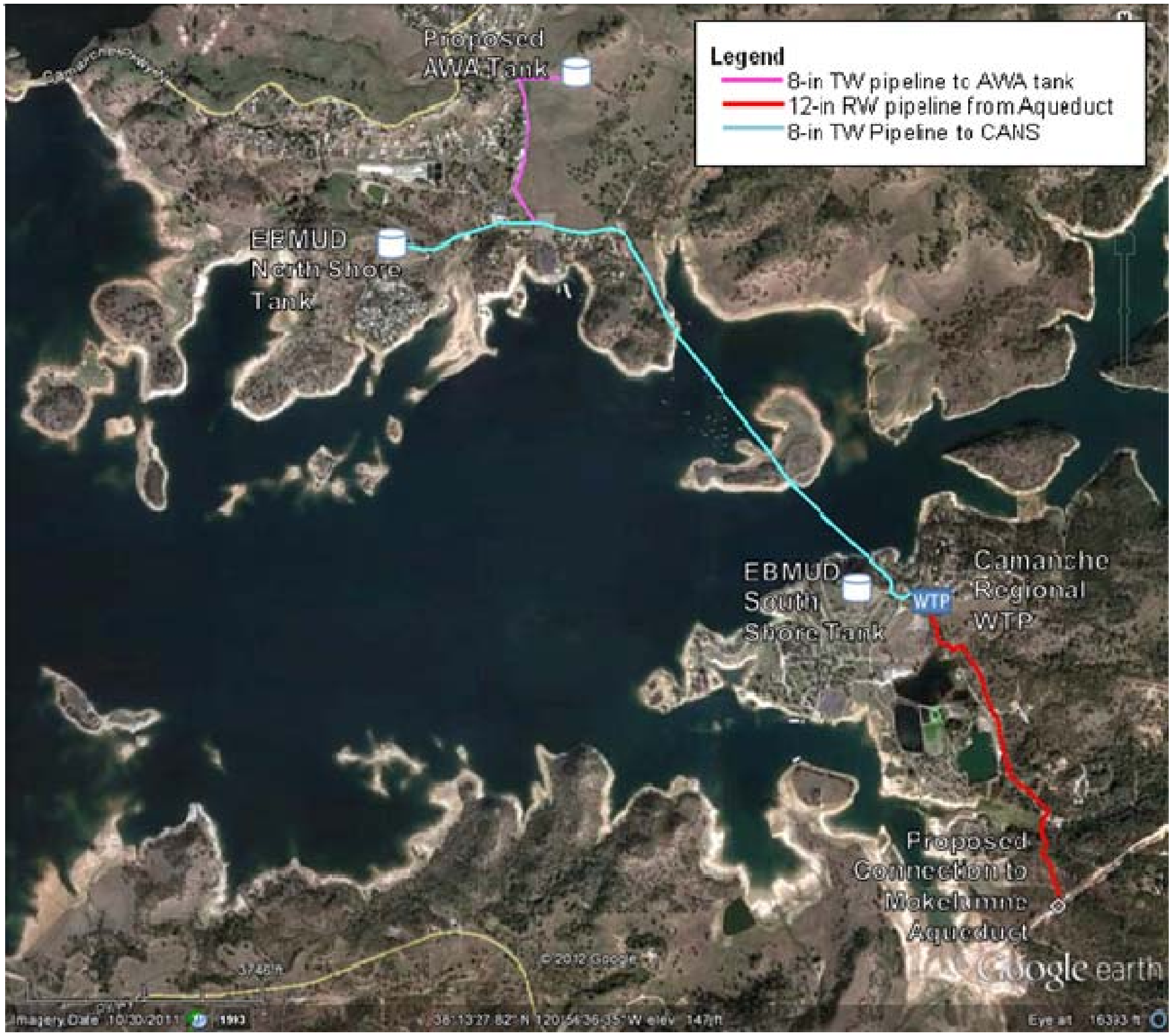


Alternative 2 would include the following facilities (see Figure 5).

- A 1.5 mgd regional WTP, associated pipelines, and appurtenances to serve CANS, CASS, and Lake Camanche Village

- Conjunctive use in the Lake Camanche Village service area
- The Vintage Home Fixture Retrofit water conservation program (including showerhead rebates and a toilet retrofit program) for the CANS and CASS service areas, as well as Lake Camanche Village

Figure 5: Alternative 2



Alternative 3, as shown in Figure 7, would include the following facilities.

- A 2.25 mgd regional WTP, associated pipelines, and appurtenances to serve CANS, CASS, Lake Camanche Village, AND Wallace
- Conjunctive use in the Lake Camanche Village and Wallace service areas
- The Vintage Home Fixture Retrofit water conservation program (including showerhead rebates and a toilet retrofit program) for the CANS and CASS service areas, as well as Lake Camanche Village and Wallace

The facilities and alignments developed in the *Camanche Regional Water System Feasibility Study* (KASL, July 1999) were used for this analysis. Other more direct potential treated water pipeline alternatives were analyzed, but due to potential environmental impacts, the alternative following the road was determined to be most cost-effective because it would minimize potential environmental impacts (as shown in Figure 6). Although a cross-lake pipeline could reduce the total length of pipeline from 6.5 miles to about 4 miles, there were several disadvantages including:

- Need to buy private property/easements.
- Need to make the pipe thicker/add anchors since it is crossing under the reservoir.
- Need to carefully plan pipe placement to not affect boating, beaches, etc.
- A significant number of trees would need to be removed.
- Biological species issues such as the crossing of wetlands, and habitat of California Tiger Salamanders (CTS), fairy shrimp and spadefoot toads would be expected.

Based on the wetlands and CTS population, a pipeline alternative entering these areas could require wetland mitigation, compensation for CTS habitat, and significant best management practices (BMPs) and monitoring. Therefore, although there would be cost savings resulting from a reduction in pipe length, there would most likely be an overall cost increase resulting from the potential environmental mitigation needed for the affected species. The following figure shows the locations of rare plants and special status species surrounding Lake Camanche as identified in the California Natural Diversity Database (CNDDB).

Figure 6: Rare Species Surrounding Lake Camanche

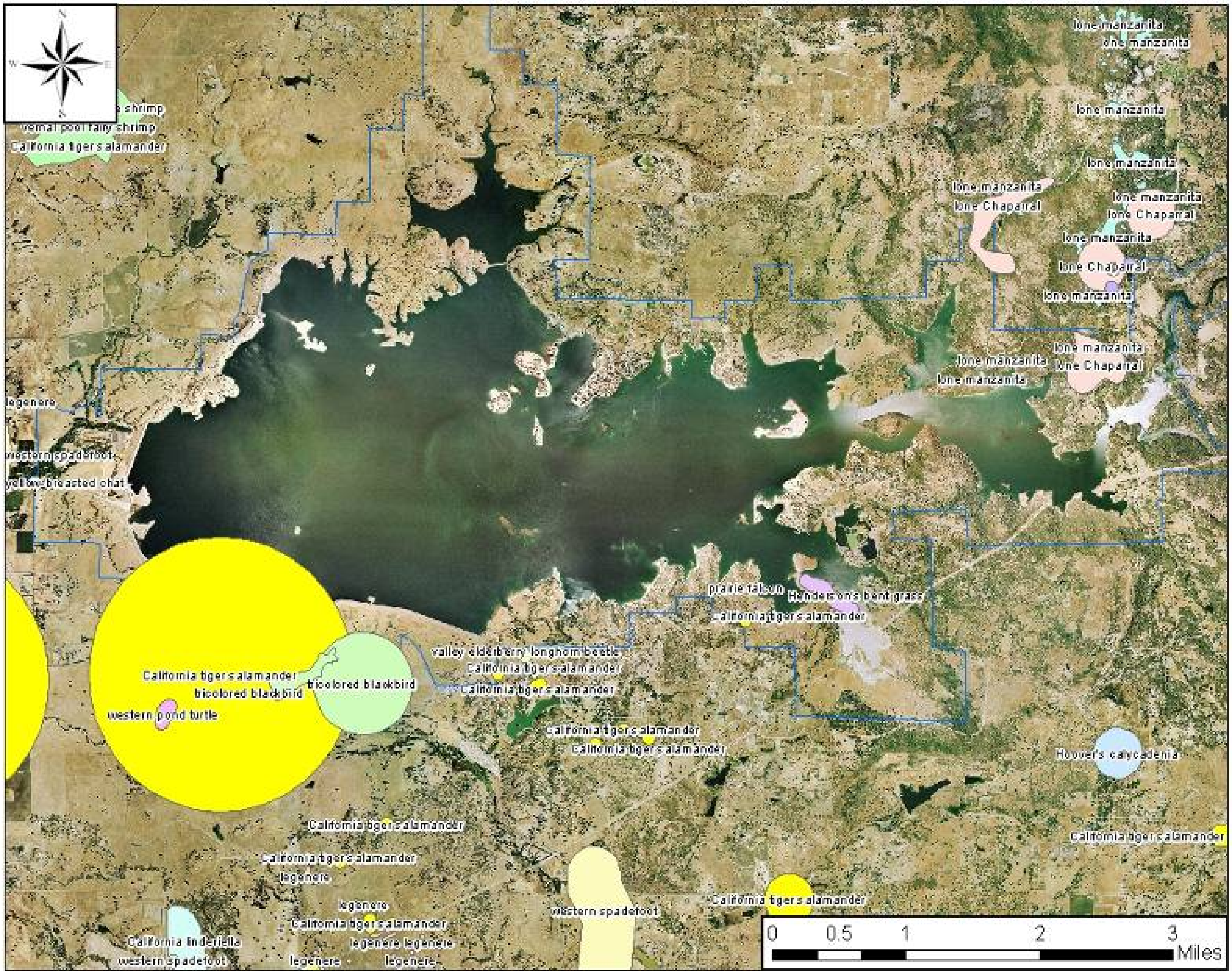


Figure 7: Alternative 3

The costs for each alternative and the associated costs for the project proponents are summarized in the following table. Full cost estimates for each alternative are provided as appendices to the Alternatives Evaluation TM (Appendix E).

Table 4: Project Alternative Costs

	Alternative 1 – CASS & CANS Only		Alternative 2 – CASS, CANS, and Lake Camanche Village		Alternative 3 – CASS, CANS, Lake Camanche Village, and Wallace	
Project Proponents	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost
EBMUD	$3.5 million	$300,000	$2.6 million	$300,000	$2.5 million	$300,000
AWA	$0	$0	$6.0 million	$700,000	$5.9 million	$700,000
CCWD	$0	$0	$0	$0	$8.9 million	$500,000
Total	$3.5 million	$300,000/yr	$8.6 million	$1 million/yr	$17.3 million	$1.5 million/yr

The three project alternatives were scored based on how well they would meet the identified CSFs described in Section 4. The following table shows how each of the alternatives score for identified CSFs.

Table 7: Alternatives' CSF Scores

Critical Success Factor	Alternative 1	Alternative 2	Alternative 3
A. Meet Current and Future Demands in the Wallace Area	○	○	●
B. Maintain or Reduce Operating Costs to Provide an Affordable Supply	●	●	●
C. Provide a System that is Easy to Operate	●	●	●
D. Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible	●	●	●
E. Provide Reliable Supply Year-Round	○	◖	●
F. Clear and Fairly Resolve Water Rights	●	●	●
G. Build Regional Partnerships	○	◖	●
H. Garner Local Community Support	To be determined[1]		
I. Transfer Responsibility for Local Residents	To be determined[2]		
J. Meet All Applicable Regulatory Requirements	●	●	●
K. Beneficially Impact Water Treatment-Related Wastewater Discharges	●	●	●
L. Maximize Ability to Secure Outside Funding	○	◖	●
M. Improve Water Supply and Quality in the Lake Camanche Village Area	○	●	●
N. Provide an Affordable Supply	To be determined[3]		
O. Minimize Capacity Impacts to the Mokelumne Aqueduct	●	●	●

Key:

○ Does not meet criterion.

◖ Partially meets criterion.

● Fully meets criterion.

Notes:
1. Ability to garner local community support will be established by public outreach efforts to be completed if the project moves forward.
2. The potential for transferring responsibility to local residents will continue to be evaluated during project implementation.
3. Ability to provide an affordable supply will depend upon the ability of the project partners to secure outside funding for the project. Without outside funding, one or more phases of the project may not be able to proceed.

Alternative 3 addresses more CSFs than Alternatives 1 or 2 as follows.

- *Meet Current and Future Demands in the Wallace Area:* CCWD is in the process of annexing Wallace Community Services District. Wallace currently consists of 100 units. It has a project demand (maximum day demand, or MDD) of 645,700 gpd for approximately 400 units, all of which are included on approved or tentative approved maps. The estimated number of units is in dispute, and will be resolved in future phases of the Project. Alternative 3 includes facilities required to serve CCWD's Wallace service area and meet the projected demand of 645,700 gpd. Only alternative 3 would achieve this CSF.

- *Maintain or Reduce Operating Costs to Provide an Affordable Supply:* Alternative 3 would likely have operating costs similar to or less than existing operations and maintenance (O&M) costs by replacing multiple wellhead treatment and disposal systems and sharing resources and staff.
- *Provide a System that is Easy to Operate*: EBMUD would operate the WTP and because its staff are already familiar with operating treatment plants, and Alternative 3 would be designed to be easy to operate.
- *Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible:* As previously described, Alternative 3 includes a pipeline to deliver treated water to Wallace, which would follow the road to avoid sensitive species. Additionally, the project would prevent unmitigated environmental impacts and comply with California Environmental Quality Act (CEQA). Finally, by centralizing the water treatment waste stream in one location (as opposed to multiple wellhead treatment units currently in place), potential environmental impacts will be reduced see Beneficially Impact Water Treatment-Related Wastewater Discharges below).
- *Provide Reliable Supply Year-Round:* Alternative 3 would provide a reliable supply year-round to CANS, CASS, Lake Camanche Village, and Wallace. EBMUD projects that the Wallace area will not be able to receive supply from the aqueduct via the CARWSP WTP for about 4 months out of every 48 months. In order to have a consistent, reliable supply to meet peak demands and emergency fire flows during this supply outage period, Alternative 3 includes a conjunctive management component in which Wallace would rely on existing groundwater sources. Use of surface supplies in lieu of groundwater supplies in 44 of every 48 months, on average, would be expected to allow the groundwater basin to adequately recharge, correcting some of the existing supply and quality deficiencies experienced by the system and enabling use during months when surface supply is unavailable. Alternative 3 is the only alternative that achieves this CSF by providing a reliable supply for Wallace.
- *Clear and Fairly Resolve Water Rights:* As part of CARWSP project development, EBMUD, AWA, and CCWD have developed a preliminary Project Plan that discusses the approach to resolving water rights.
- *Build Regional Partnerships:* Alternative 3 would meet the needs of EBMUD, AWA, and CCWD that could only be achieved through the relationships of the three agencies. The participating agencies have built a regional partnership that could lead to implementing mutually beneficial projects in the future. Alternative 3 most fully addresses this CSF by engaging all three project partners.
- *Garner Local Community Support:* The ability to garner local community support will be established once a preferred alternative has been identified and agencies have decided to move forward with implementation. Additional public outreach will be completed at that time.
- *Transfer Responsibility for Local Residents:* EBMUD wishes to transfer responsibility of the mobile home parks to the counties or AWA and CCWD. The potential for transferring responsibility will be discussed among the project partners in the future as part of necessary project agreements.
- *Meet All Applicable Regulatory Requirements:* The project would be designed to meet all applicable local, state, and federal regulatory requirements.

- *Beneficially Impact Water Treatment-Related Wastewater Discharges:* There are multiple permits in place to address backwash from iron and manganese systems in the North Shore system and a stream of backwash at the Camanche South Shore. Alternative 3 would have a single compliance point and discharge permit that could beneficially affect wastewater discharges.
- *Maximize Ability to Secure Outside Funding:* Addressing critical water supply and/or water quality needs of DACs is a DWR IRWM Program Preference. Therefore, because Alternative 3 would improve water supply reliability and improve water quality for Lake Camanche Village and CANs, two DACs in the area, it would be favorable to DWR. CARWSP is also a multi-benefit project that generates efficiencies and would be implemented by multiple project partners. For these reasons, it is well-positioned for outside funding. Alternative 3 maximizes this potential by bringing in CCWD as a third regional partner.
- *Improve Water Supply and Quality in the Lake Camanche Village Area:* Alternative 3 would supply Lake Camanche Village with high quality treated surface water to offset unreliable groundwater supply, thereby improving water supply and quality in the area.
- *Provide an Affordable Supply:* The ability to provide an affordable supply will depend upon the ability of the project partners to secure outside funding for the project. Without outside funding, it is not currently anticipated that AWA or CCWD would proceed with implementation of project Phases 2 or 3.
- *Minimize Capacity Impacts to the Mokelumne Aqueduct:* Up to 2.8 mgd of additional water supply could be available from Pardee Reservoir via the Mokelumne Aqueduct without causing significant impacts to supply operations. Alternative 3 will divert 2.2 mgd and therefore, it minimizes capacity impacts to the Aqueduct. In addition, by only sizing the facility to accommodate approved development and by incorporating water conservation, demands on the Aqueduct are minimized.

8 Preferred CARWSP Alternative

As summarized in the previous section, the preferred CARWSP alternative based on the CSF scoring criteria is Alternative 3, which would be implemented in three phases. Based on discussion among the PPC representatives, EBMUD, AWA, and CCWD are interested in continuing to pursue a regional project that would benefit numerous service areas, take advantage of economies of scale, and eliminate redundancies.

As described in Section 5.2, a total supply of 2,177,200 gpd would be needed to meet the needs of the CANS, CASS, Lake Camanche Village, and Wallace areas. This demand would be met through implementation of a regional WTP, conjunctive use operations, and a conservation program.

8.1 Facilities and Layout

The facilities required for the preferred alternative would include facilities to convey Mokelumne Aqueduct supplies to a new regional WTP, the new regional WTP itself, facilities to convey treated water to the project areas, and Vintage Home Fixture water conservation rebates and retrofits, implemented in a series of three phases. These are summarized in the following sections.

8.1.1 Regional WTP and Appurtenances

The facilities required to convey Mokelumne Aqueduct supply to a new regional WTP, the new regional WTP itself, and facilities to convey treated supply to the Camanche area are shown in Figure 8 and described below.

Figure 8: Preferred CARWSP Alternative Layout

These required facilities include:

- 5,860 LF of 12" raw water pipeline to convey untreated water from the Mokelumne Aqueduct to a new regional WTP located on the same site as the existing EBMUD WTP
- 2.25 mgd regional WTP to treat supplies prior to delivery to the Camanche area
- A 25 hp pump station at the WTP
- 11,700 LF of 8" treated water pipeline crossing reservoir to deliver treated water from the regional WTP to the CANS and Lake Camanche Village areas

- One 500,000 gallon storage tank for Lake Camanche Village to provide for fire flow and pressure regulation
- 3,400 LF of 8” treated water pipeline from CANS tank to new 500,000 gallon AWA tank
- Altitude valve on CASS tank to provide pressure regulation to the CASS system
- Altitude valve on CANS tank to provide pressure regulation to the CANS system
- A pressure reducing valves and a pressure sustaining valves to provide pressure regulation to the Lake Camanche Village system in support of conjunctive use operations
- 4,800 LF of 8” treated water main to convey treated water from the new regional WTP to CASS
- Booster pump station with standby power at park entrance (2 pumps at 20 hp each) to provide pressure needed to deliver supply to Wallace
- 31,500 LF of 10” and 12” treated water main to convey treated water supply from the CASS park entrance to the Wallace area
- 600,000 gallon storage tank in Wallace at elevation suitable for serving most of Wallace area demand, to provide fire flow and emergency supply

8.1.2 Vintage Home Fixture Retrofit

The Vintage Home Fixture Retrofit Program water conservation program is included in the preferred CARWSP alternative. It would consist of providing rebates for low-flow showerheads and replacing existing, non-conserving toilets with low-flow toilets in the CANS and CASS communities, Lake Camanche Village, and the Wallace area. A total of 588 $25 rebates for showerhead replacements will be provided and the same number of toilets will be subsidized at a cost of $225 per toilet (cost of toilet and installation) to homes as shown in Table 6, resulting in a total water savings of almost 58,000 gpd.

8.1.3 Conjunctive Use

Conjunctive use opportunities may be achieved through coordinated management of surface water supplies made available through CARWSP and existing groundwater supply facilities. The supply delivered to Lake Camanche Village would be insufficient to meet all of the area’s planned future demands; as such, AWA would plan to operate the surface and groundwater conjunctively, meeting a portion of demands with treated surface water and the remainder with groundwater to meet a portion of baseline demands and / or peak day and peak month demands. Although groundwater in the eastern portion of Lake Camanche Village is impaired by water quality and supply issues, groundwater in the western portion is more reliable and could be used to meet peak demands if necessary. By reducing dependence on groundwater supplies, AWA could allow the groundwater basin to recover for use during periods of higher demand. The installation of the pressure reducing valves and pressure sustaining valves in Section 8.1.1 would enable AWA to operate conjunctively.

CCWD would also manage surface and groundwater supplies conjunctively. As discussed previously, surface water supplies are not expected to be available in all months. During months when surface supply is available, CCWD could use surface supplies in lieu of groundwater supplies, allowing the basin to recover for use in months when surface water supplies are not available. No new facilities would be required to operate CCWD’s groundwater system in conjunction with surface water supplies from the regional WTP.

8.2 Project Costs

Order-of-magnitude costs were estimated for the preferred CARWSP alternative. Order-of-magnitude costs are generally developed for projects that have 5 to 20 percent design complete, per American National Standards Institute Standard Z94.0 (based on the Association for the Advancement of Cost Engineering (AACE)). The 90% cost estimate prepared by EBMUD in 2002 for its portion of CARWSP was updated, and served as a basis for estimating costs associated with the regional WTP. The ENR 20 Cities Average Construction Cost Index (CCI=6800) was used to increase the 2002 EBMUD costs to 2012 costs (CCI=9359.99).

Construction contingencies and implementation factors were applied to account for unknown or unforeseen costs. Larger contingencies and implementation factors were applied to the AWA and CCWD portions of the project than to the EBMUD portions because EBMUD has advanced design for its portion of the project and there are therefore fewer unknowns. A 10% contingency was applied to the EBMUD portion of CARWSP and a 30% construction contingency was applied to the other portions.

Table 8: Prop. 84 Implementation Cost Factors

		EBMUD Facilities	AWA and CCWD Facilities
(a)	Direct Project Administration Costs	5%	5%
(b)	Land Purchase/Easement	0%	1%
(c)	Planning/Design/Engineering/ Environmental Documentation	0%	10%
(d)	Construction/Implementation	0%	3%
(e)	Environmental Compliance/ Mitigation/Enhancement	0%	3%
(f)	Construction Administration	0%	3%
(g)	Other Costs (Including Legal Costs, Permitting and Licenses)	0%	2%
(h)	Construction/Implementation Contingency	0%	3%
(i)	Grand Total (Sum rows (a) through (h) for each column)	5%*	30%

* Per EBMUD, implementation cost factor for its portion of CARWSP should be 5%.

The full capital cost of CARWSP is estimated to be $17.3 million. The cost of joint facilities would be apportioned based on the quantity of supply provided to each user. The cost of facilities targeted toward a single system would be borne solely by that beneficiary. For example, the raw water pipeline from the Mokelumne Aqueduct to the WTP and the WTP itself are facilities shared by the three agencies; as such, the cost of this pipeline would be apportioned among the three agencies based on the quantity of supply ultimately being conveyed to each agency. EBMUD and AWA would also share the cross-lake pipeline that would deliver treated water from the WTP to Camanche North Shore, and pipeline costs would be split proportionately between EBMUD and AWA based on supply delivered. The capital and O&M costs for each agency are summarized in the following table. A detailed cost estimate for the preferred CARWSP alternative is included in Appendix E.

Table 9: Preferred CARWSP Alternative Cost

Project Proponent	Capital Cost	O&M Cost
EBMUD	$2.5 million	$300,000
AWA	$5.9 million	$700,000
CCWD	$8.9 million	$500,000
Total	$17.3 million	$1.5 million

9 CARWSP Project Plan

A Preliminary Project Plan was developed for the preferred CARWSP alternative. The Plan describes the mutually agreed upon elements of CARWSP related to timing of project phasing, anticipated project development milestones, allocation of project-related costs, financing framework, and project operations and maintenance parameters. The Project Plan also documents the intentions of each Project Partner with respect to project development, the process to be followed to bring the project to fruition, and the roles and responsibilities of each of the three Project Partners in that process. The Plan is summarized in the following sections; more detail is provided in the CARWSP Project Plan included in Appendix F.

9.1 CARWSP Project Components

The following table summarizes the key components of CARWSP and the designated capacities of each component and intended agency owner and operator of the component.

Table 10: Project Components

Component	Designated Capacity	Owner	Operator
Aqueduct connection & raw water pipeline to WTP	2,177,200 gpd	EBMUD	EBMUD
Camanche Regional WTP	2,177,200 gpd	EBMUD	EBMUD
Vintage Home Fixture Retrofit	588 homes	EBMUD – 191 AWA – 367 CCWD – 30	EBMUD – 191 AWA – 367 CCWD – 30
North Shore Pipeline	1,531,500 gpd	EBMUD	EBMUD
Lake Cam. Village Pipeline, Pump Station & Tank (w/conjunctive use conversion)	1,000,000 gpd	AWA	AWA
Wallace Pipeline, Pump Station & Tank (w/conjunctive use conversion)	645,700 gpd	CCWD	CCWD

9.2 Cost Allocation

The capital cost for each shared component of CARWSP is to be based on the designated capacity (expressed as a percent) assigned to each sharing agency. The designated capacity of each project component is displayed in the following table. The capital cost for each component which benefits just one agency is to be borne solely by that agency.

Table 11: Cost Allocation Calculation – Shared Components

Component	Maximum Day Treated Water Capacity (gpd)	Percent Share
Camanche Regional WTP	2,177,200	100%
EBMUD	531,500	24.4%
AWA	1,000,000	45.9%
CCWD	645,700	29.7%
Treated Water Pipeline to the North Shore		100%
EBMUD	531,500	34.7%
AWA	1,000,000	65.3%
Vintage Home Fixture Retrofit		100%
EBMUD	191	32.5%
AWA	367	62.4%
CCWD	30	5.1%

9.3 Project Phasing

The CARWSP project is expected to be developed in three primary phases as funding becomes available. The development role (in terms of design, environmental, permitting and construction/implementation) of each partner agency is shown in the following table for each of the planned project phases. Where two agencies are shown, the first agency is expected to serve as lead agency with the other agency serving in a support role.

Table 12: CARWSP Project Phasing

Phase	Components	Design	CEQA	Permits	Construct/ Implement
1	Aqueduct connection and 12" raw water pipeline to WTP WTP at 0.5 mgd capacity Treated water 8" pipeline (WTP to Camanche North Shore) Lake Cam Village Intertie Vintage Home Fixture Retrofit (CANS, CASS and Lake Cam Village)	EBMUD	EBMUD	EBMUD	EBMUD/ AWA
2	Expand WTP by 1 mgd Lake Camanche Village pipeline Booster pump station Storage tank (500,000 gal) Pressure reducing and sustaining valves (for conjunctive use operations)	AWA/ EBMUD	AWA/ EBMUD	AWA/ EBMUD	AWA/ EBMUD
3	Expand WTP by 0.7 mgd Treated water (8") pipeline (WTP to park entrance) Treated water (8") pipeline (WTP to park entrance) Treated water (12" and 10") pipeline (park entrance to Wallace) Pump station and standby power Storage tank (600,000 gal) Pressure reducing and sustaining valves (for conjunctive use operations) Vintage Home Fixture Retrofit (Wallace)	CCWD/ EBMUD	CCWD/ EBMUD	CCWD/ EBMUD	CCWD/ EBMUD

9.4 Financing

The capital costs for the phased construction of CARWSP are expected to be financed over time using a combination of funding sources, including Project Partner (agency) funds, Proposition 84 grant funding, USDA Rural Development funds, Drinking Water State Revolving Fund loans, and perhaps bonds issued by individual partner agencies and retired by rate revenues.

- Phase 1 - Development of the first phase of CARWSP is planned to be financed in part by EBMUD and in part by grant funding. With Phase 1 facilities directly benefitting two DAC communities, the Project Partners anticipate securing grant funding to finance a significant portion of Phase 1 costs.
- Phase 2 – The facilities to be constructed in Phase 2 will solely serve AWA's Lake Camanche Village, a disadvantaged community. Customers within the Lake Camanche Village service area are unable to absorb the rate increases necessary to pay for the Phase 2 improvements, and therefore AWA has determined grant funding will be

necessary to fund these improvements. Potential grant funding sources include Proposition 84 grant funding and USDA Rural Development funds.

- Phase 3 – The Phase 3 facilities will solely serve CCWD's Wallace service area. Wallace now contains about 100 homes, with an additional 300 approved lots on which homes will likely be built over the coming years. CCWD's ability to fund the costs of Phase 3 is severely limited by the small Wallace rate base. CCWD expects it will be necessary to secure some grant funding to help fund the costs for these Phase 3 facilities. Potential grant funding sources include Proposition 84 grant funding and USDA Rural Development funds.

9.5 Project Operations and Maintenance

All CARWSP Project components, including raw water conveyance, treatment, and transmission facilities will require planned and unplanned maintenance. The costs for maintenance, repair, and replacement will be shared by the Project Partners under an agreement to be developed by the partner agencies. The O&M agreement will include terms dealing with master metering, regional project operations, maintenance and repairs, coordination protocols, annual partner meetings, dispute resolution procedures, and other topics including, if needed, storage and wheeling.

9.6 Water Rights

The parties have sufficient water rights to address the needs of the areas served by CARWSP, as shown in the following table. The surface water source that will supply CARWSP is the Mokelumne River. Project water will be diverted from EBMUD's Mokelumne Aqueduct at a location proximate to Camanche South Shore and conveyed via a 12" pipeline to the Regional Water Treatment Plant for treatment. Once all phases of the project have been constructed, the parties will revisit particular arrangements regarding water rights and agency responsibilities as associated with CARSWP.

Table 13: Anticipated Water Rights for CARWSP

Partner Agency	Area Served (Place of Use)	Anticipated Water Right / Entitlement
EBMUD	Camanche South Shore Camanche North Shore	EBMUD holds water rights to Mokelumne River water supply (Permit #10478 – Pardee / Camanche).
AWA	Lake Camanche Village	AWA has a pre-1914 contractual right from PG&E to 15,000 acre-feet per year (AFY) of Mokelumne River water.
CCWD	Wallace	The State of California has reserved 27,000 AFY of Mokelumne River water for use by water agencies serving Calaveras County.

9.7 Water Accounting

The O&M agreement will include terms addressing raw and treated water metering and accounting. The agreement is expected to define a mutually-accepted method for measuring the amount of raw water delivered to the CARWSP regional treatment plant and the amounts of treated water taken by each Project Partner to serve their respective service areas.

9.8 Costs and Payments

The Project Partners will develop a mutually-acceptable agreement (tentatively called the Project Cost Basis and Payment Agreement) which will establish the basis for assessing CARWSP related costs and the method for Project Partner payments. These costs are expected to be based on cost-of-service principles, with each Project Partner responsible for paying its respective share of all annual costs, both fixed and variable (and financing, if applicable), in accordance with the terms of the agreed upon Project Cost Basis and Payment Agreement.

9.9 Agreements

Listed below are potential Project Partner agreements that will or may be required to achieve a fully operational CARWSP project.

- Operations & Maintenance Agreement
- Project Cost Basis and Payment Agreement
- Emergency response and mutual aid
- Project Financing
- Water Storage and Conveyance
- Others agreements mutually deemed necessary or appropriate

9.10 Project Partner Intentions and Planned Actions

The CARWSP Project represents an opportunity for each Project Partner to address water supply problems within its service area. Each partner agency, however, must overcome a unique set of circumstances and limitations to effectively execute the tasks necessary to complete all elements of CARWSP. Described below are the circumstances and limitations each Project Partner faces, and the intentions of each agency with respect to overcoming those challenges.

Amador Water Agency

Water customers within Lake Camanche Village, the area to be served by CARWSP in AWA's service area, are severely limited in terms of their ability to pay AWA's proportionate costs for developing CARWSP. Because the Village is a disadvantaged community, AWA will aggressively seek funding for its share of CARWSP costs from state and federal grant programs. Without significant financial assistance, AWA will be severely challenged to implement its portions of CARWSP.

Going forward, AWA intends to:

- Work collaboratively with EBMUD to complete Phase 1 design, environmental documentation, permitting and construction documents.
- Pursue grant opportunities to secure funding for Phase 1 facilities.
- Evaluate other options for the Lake Camanche Village area, including considering converting some undeveloped units to a conservation easement to be leased for grazing, sold to a nearby rancher, or donated to the homeowners' association for common use of the members or the Amador County Recreation Agency as a passive park.

- Negotiate with EBMUD to develop mutually-acceptable CARWSP Phase 1 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 1 by the two project Partners.
- Following completion of Phase 1 (or in conjunction with it), complete Phase 2 design, environmental documentation, permitting and construction documents in consultation with EBMUD.
- Pursue grant opportunities to secure funding for Phase 2 facilities.
- Negotiate with EBMUD to develop mutually-acceptable Phase 2 amendments to the O&M Agreement, Cost Basis and Payment Agreement, and any other agreement developed for Phase 1 by AWA and EBMUD.
- Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by both EBMUD and AWA, negotiate a mutually-acceptable agreement to take over service to EBMUD's Camanche North Shore (which is within AWA's service territory).

Calaveras County Water District

The groundwater system that has historically served Wallace (and which was developed and operated by the Wallace Community Services District) has been unable to satisfactorily meet customer demands. Through a series of negotiations, CCWD is annexing the Wallace CSD community into the CCWD service area. Knowing the existing groundwater system is inadequate to meet the community's needs, CCWD is actively exploring alternative water supply options to either replace or supplement the existing groundwater system. CCWD has determined the best approach to addressing the water-related problems repeatedly experienced by Wallace is the one which most cost-effectively resolves, to CCWD's satisfaction, the chronic water quantity and quality problems with which it has repeatedly struggled.

Going forward, CCWD intends to:

- Pursue grant and other potential no or low costs funding opportunities to secure financing for Phase 3 facilities.
- Continue to evaluate other water supply options for the Wallace community in an effort to identify the most suitable and cost effective alternative.
- Should CCWD elect to proceed with the CARWSP Phase 3:
    - Complete Phase 3 design, environmental documentation, permitting, and construction documents in consultation with EBMUD.
    - Develop and implement an approach to secure water right based on existing reservation.
    - Negotiate with EBMUD to develop mutually-acceptable CARWSP Phase 3 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 3 by CCWD and EBMUD in consultation with AWA.
    - Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by both EBMUD and CCWD, negotiate a mutually-acceptable agreement to take over service to EBMUD's Camanche South Shore (which is within CCWD's service territory).

East Bay Municipal Utility District

EBMUD has served water to the communities of Camanche South Shore and Camanche North Shore since they were initially developed in the 1950s. South Shore is supplied water pumped from Camanche Reservoir, treated at a small water treatment facility originally built in the early 1970's, and distributed to the mobile home community and recreation areas locate along the reservoir's south shore. North Shore is supplied water extracted from groundwater wells which is minimally treated and distributed to the mobile home community and recreation areas located along the reservoir's north shore. Camanche North Shore is a disadvantaged community.

Going forward, EBMUD intends to:

- Work collaboratively with AWA to complete Phase 1 design, environmental documentation, permitting and construction documents.
- Pursue grant funding to secure funding for Phase 1 facilities.
- Negotiate with AWA to develop mutually-acceptable CARWSP Phase 1 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 1 by the two project Partners.
- Following completion of Phase 1 (or in conjunction with it), consult with and support AWA as it completes Phase 2 design, environmental documentation, permitting and construction.
- Negotiate with AWA to develop mutually-acceptable Phase 2 amendments to the O&M Agreement, Cost Basis and Payment Agreement, and any other agreement developed for Phase 1.
- Upon a determination by CCWD to proceed with Phase 3, support CCWD as it completes Phase 3 design, environmental documentation, permitting and construction.
- Negotiate with CCWD to develop mutually-acceptable CARWSP Phase 3 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 3 by CCWD and EBMUD in consultation with AWA.
- Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by the other Project Partners, negotiate agreements with: CCWD to take over service to EBMUD's Camanche South Shore (which is within CCWD's service territory), and AWA to serve Camanche North Shore (which is within AWA's service territory).

10 Integration of CARWSP into MAC Plan Update

The CARWSP planning process was enabled by a Proposition 84 IRWM planning grant received by the MAC IRWM Region from the California Department of Water Resources. Information developed during the CARWSP planning process will be reflected in the following sections of the MAC IRWM Plan Update (currently under development):

- Resource Management Strategies
- Finance
- Relation to Land Use Planning
- Coordination
- Integration

The information that will be integrated into Plan Update is summarized in the following sections.

10.1 Resource Management Strategies

A resource management strategy (RMS), as defined in the *California Water Plan 2009 Update* (DWR, 2009), is a project, program, or policy that helps local agencies and governments manage their water and related resources. A wide range of RMS will be required to achieve the MAC Region's goals and objectives. Table 14 presents the seven categories of RMS included in the CWP Update and considered for the MAC IRWM Plan. The RMS that CARWSP would contribute to achieving are noted, and described below.

Table 14: RMS from the CWP Update 2009

RMS Category	Resource Management Strategy	Apply to CARWSP
Reduce Water Demand	Agricultural Water Use Efficiency	
	Urban Water Use Efficiency	✓
Improve Operational Efficiency and Transfers	Conveyance – Delta	
	Conveyance – Regional/local	✓
	System Reoperation	
	Water Transfers	
Increase Water Supply	Conjunctive Management & Groundwater Storage	✓
	Desalination	
	Precipitation Enhancement	
	Recycled Municipal Water	
	Surface Storage – CALFED	
	Surface Storage – Regional/local	✓
Improve Water Quality	Drinking Water Treatment and Distribution	✓
	Groundwater Remediation / Aquifer Remediation	
	Matching Quality to Use	
	Pollution Prevention	
	Salt & Salinity Management	
	Urban Runoff Management	
Improve Flood Management	Flood Risk Management	
Practice Resources Stewardship	Agricultural Lands Stewardship	
	Economic Incentives (Loans, Grants, Water Pricing)	✓
	Ecosystem Restoration	
	Forest Management	
	Recharge Area Protection	
	Water-Dependent Recreation	
	Watershed Management	
Other Strategies	Crop Idling for Water Transfers	
	Dewvaporation or Atmospheric Pressure Desalination	
	Fog Collection	
	Irrigated Land Retirement	
	Rainfed Agriculture	
	Waterbag Transport / Storage Technology	

- *Urban Water Use Efficiency:* the Vintage Home Fixture Retrofit program included in CARWSP would improve urban water use efficiency in the CANS, CASS, Lake Camanche Village, and Wallace service areas by replacing non-conserving showerheads and toilets with low-flow fixtures.

- *Conveyance – Regional / Local:* CARWSP includes the conveyance system to deliver Mokelumne Aqueduct supplies from the regional WTP to the EBMUD, AWA, and CCWD service areas, improving regional conveyance.
- *Conjunctive Management and Groundwater Storage:* the regional WTP and existing groundwater systems would be managed conjunctively by providing treated surface water to CANS, CASS, Lake Camanche Village, and Wallace, and meeting peak demands and providing a backup emergency supply to Lake Camanche Village and Wallace using groundwater.
- *Surface Storage – Regional / Local:* the preferred alternative includes two local storage facilities; one for the Lake Camanche Village area and one for the Wallace area, to provide pressure regulation and fire protection.
- *Drinking Water Treatment and Distribution:* the regional WTP would treat surface water diverted from the Mokelumne Aqueduct which would allow for distribution of a high quality, reliable water supply to the CARWSP service areas.
- *Economic Incentives (Loans, Grants, Water Pricing):* the Vintage Home Fixture Retrofit would provide rebates for showerhead replacement and subsidize replacement of toilets for residents in the CARWSP service area still relying on non-conserving fixtures. Additionally, grant funding would be pursued for CARWSP through the IRWM grant program and possibly others.

10.2 Finance

To minimize up-front costs, the project would likely be implemented in phases, as described below.

- Phase 1: Implementation of Alternative 1 and Vintage Home Fixture Retrofit Components
    - Phase 1A – Aqueduct connection, raw water pipeline from Mokelumne Aqueduct to WTP, and 0.5 MGD WTP
    - Phase 1B – Treated water pipeline to CANS
    - Phase 1C – Vintage Home Fixture Retrofit for CANS, CASS, Lake Camanche Village, and Wallace
- Phase 2: Implementation of Alternative 2 Components (including Conjunctive Use Components)
    - Phase 2A – Expand WTP by 1 MGD
    - Phase 2B – Treated water pipeline to Lake Camanche Village, pump station and tank, and conjunctive use conversion
- Phase 3: Implementation of Remaining Alternative 3 Components
    - Phase 3A – Expand WTP by 0.7 MGD
    - Phase 3B – Treated water pipeline to Wallace, pump station and tank

Implementing the project in a phased manner provides flexibility in implementing the project and securing required funding. The costs for each phase are summarized below.

Table 15: Costs for CARWSP Phase 1

Project Proponents	Capital Cost
EBMUD	$3.5 million
AWA	$200,000
CCWD	$10,000
Total	$3.7 million

Table 16: Costs for CARWSP Phase 2

Project Proponents	Capital Cost	Cost Reduction from Phase 1 to 2
EBMUD	$0	$900,000
AWA	$5.9 million	N/A
CCWD	$0	N/A
Total	$5.9 million	

Table 17: Costs for CARWSP Phase 3

Project Proponents	Capital Cost	Cost Reduction from Phase 2 to 3
EBMUD	$0	$100,000
AWA	$0	$200,000
CCWD	$8.8 million	N/A
Total	$8.8 million	

EBMUD plans to move forward with Phase 1. The portion of the project that would serve EBMUD's CANS and CASS areas is currently at 90% design and is expected to be constructed in 2013-2014. It should be noted that, while EBMUD currently plans to move forward with Phase 1, Phases 2 and 3 may not proceed if outside funding cannot be secured to offset implementation costs and minimize the burden to ratepayers in the Lake Camanche Village and Wallace areas.

10.3 Relation to Land Use Planning

CARWSP was developed to be consistent with land use planning. The demands identified in Section 5.2 are based solely on existing units and approved or tentatively approved maps. No unapproved demands were considered in developing the demands to be met by CARWSP. In addition, both Amador and Calaveras Counties are in the process of updating their General Plans. CARWSP is consistent with all water-related goals and objectives in the draft Plans.

10.4 Coordination

DWR encourages coordination of water management projects among water agencies and stakeholders to generate efficiencies. CARWSP is an example of a water management project that would be coordinated among multiple water agencies (EBMUD, AWA, and CCWD) to generate efficiencies and cost savings by sharing facilities and minimizing staff requirements through operational agreements. As described in Section 3, Communication and Decision Making, the PPC provided an avenue for efficient coordination among the three project partners and UMRWA. Additionally, stakeholders were informed of CARWSP and asked to provide input to the CARWSP planning process through updates at the MAC IRWM RPC meetings; AWA, CCWD, and UMRWA Board meetings; and MAC IRWM public workshops.

10.5 Integration

CARWSP achieves integration through integration of water management activities and the stakeholders and entities in both Amador and Calaveras counties, as well as through integration of multiple RMS as described in Section 10.1, Resource Management Strategies. CARWSP represents a collaboration that integrates the interests and water management needs of three water suppliers in the MAC Region. In addition, it includes surface water treatment, groundwater, and conservation measures, to create a program that integrates multiple water supplies and demand reduction measures. Conjunctive use is also incorporated through the management of surface and groundwater supplies. In addition to being a multi-benefit project, helping the MAC Region to achieve its IRWM goals and objectives, the project would integrate the following RMS: Urban Water Use Efficiency, Conveyance – Regional / Local, Conjunctive Management and Groundwater Storage, Surface Storage – Regional / Local, Drinking Water Treatment and Distribution, and Economic Incentives (Loans, Grants, Water Pricing).

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Appendix A – Communications and Decision Making Technical Memorandum

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject: **Communications and Decision-making**

Prepared For: Project Partners Committee

Prepared by: Alyson Watson

Reviewed by: Rob Alcott

Date: July 5, 2012

Reference: 0122-004

Contents

1 Introduction

For the CARWSP Project Partners Committee (PPC) process to go smoothly, the potential project partners must agree at the outset of the planning process on the goal of CARWSP and the procedures by which the PPC will govern its discussions and decision-making. This Communication and Decision-Making Procedures Technical Memorandum (TM) is intended to document the CARWSP goal(s) and specify the process and procedures which will enable the PPC to come to agreement on a preferred regional solution to correct the critical drinking water quality issues in the Camanche area, including those faced by two disadvantaged communities (DACs).

The area generally surrounding Lake Camanche in western Amador and Calaveras Counties (the Camanche area) within the Mokelumne/Amador/Calaveras (MAC) Integrated Regional Water Management (IRWM) planning region is recognized for facing water supply reliability and quality problems. The Camanche Area Regional Water Supply Plan (CARWSP) is a multi-agency collaborative effort designed to overcome these reliability and water quality problems. Additionally, completion of CARWSP will help position the region for potential funding opportunities, including grants and low-interest loans, to offset the costs of project implementation.

2 CARWSP Goal

The goal of the CARWSP is to develop a mutually agreeable preferred CARWSP project description, preliminary engineering documents and Preliminary CARWSP Project Plan which collectively meet the documented needs of the three project partners AWA, CCWD and EBMUD.

3 Project Partners Committee Representation and Participation

The PPC is comprised of representatives of the three potential project partner agencies: Amador Water Agency (AWA), Calaveras County Water District (CCWD), and East Bay Municipal Utility District (EBMUD). Members of the PPC are expected to represent the views of their respective organizations, commit time actively participate in the process, and work collaboratively with other PPC members, project staff (e.g., project manager, project consultants), and Upper Mokelumne River Watershed Authority (UMRWA) representatives.

PPC members will provide input related to various aspects of the CARWSP. Member opinions, recommendations, and other contributions will be essential to the success of this project.

1. PPC members are asked and encouraged to participate as follows:

- Designate one lead representative from each agency, and if desired and appropriate one or more additional representatives, to serve on the PPC to ensure effective agency representation at all PPC meetings.
- Attend and participate in all PPC meetings. PPC members who are unable to attend PPC meetings should provide input via alternative communication options (e.g. email, telephone, conference call/web-based meetings).
- Contribute to fulfilling the CARWSP goal by sharing their technical knowledge and representing the interests of their respective organizations (including the specific interests of the DACs lying within the member's service area, where applicable) in the overall project.
- Review and provide timely comments on draft work products.
- Ensure that the PPC member's agency Board of Directors and management are informed of and in agreement with CARWSP policy and financial elements.

2. The goal of the PPC process is to have PPC members effectively engaged in discussion and reach consensus on CARWSP content and recommendations.

3. The PPC will serve as the CARWSP's primary advisory body. In that capacity, the PPC is expected to provide advice, support and constructive criticism. Project staff will incorporate or otherwise reflect the comments and recommendations of the committee members into CARWSP work products.

4. PPC members should respect the budget and schedule constraints that drive the project and ensure their participation is consistent with those constraints.

5. Every member will keep their respective organizations aware of the ongoing PPC process and actions. Input from senior staff and/or governing boards of the PPC members will be communicated back to the PPC at its next meeting. Any dissension from the respective organizations' decision-making bodies that could affect acceptance of PPC recommendations will be clearly communicated at each meeting so a solution can be sought.

6. PPC members are responsible for communicating their agency's position on issues under consideration. It is incumbent upon each committee member to voice their agency's interests in a constructive manner and with the understanding that CARWSP is a partnership project that requires all three potential partners to be satisfactorily met to achieve the project's goal.

4 Project Partners Committee Schedule, Meetings and Operational Functions

1. The PPC will develop a mutually agreeable meeting schedule which will be included with this TM as Attachment A. If a meeting needs to be rescheduled, every attempt will be made to select a date when all PPC members can attend.
2. PPC members will use their best efforts to attend all committee meetings. PPC members will notify the CARWSP project staff in advance if attendance is not possible.
3. Meeting agendas and all written materials to be discussed at PPC meetings will be transmitted by email approximately 7 days before the meeting date. Members agree to review the materials prior to the meeting.
4. The project staff will prepare meeting notes and action items based on discussions and results of PPC meetings. These summaries will be submitted to the PPC members prior to the next meeting.

5 Decision-making Process

1. This PPC is envisioned to be comprised of staff members from AWA, CCWD and EBMUD. The committee representatives of these three agencies will be individually responsible for keeping their respective Board of Directors and management apprised of CARWSP developments so as to ensure that CARWSP final work products reflect their Board's and management's expectations.
2. Final CARWSP work products (e.g. the Preliminary CARWSP Project Plan including Financing, Ownership, Water Rights and Water Accounting, and O&M) will be submitted to each agency's Board of Directors and/or General Manager for endorsement before the documents are finalized.

6 Potentially Interested Non-Partner Organizations and the Public

1. The PPC will discuss and mutually determine when and how to solicit input from non-partner organizations regarding the CARWSP project. Methods that will be employed include:

- The Upper Mokelumne River Watershed Authority (UMRWA) will be apprised of CARWSP progress. At the UMRWA Board meetings, general public will have the opportunity to get the same updates and provide input.
- CARWSP updates will be provided as a standing agenda item at the MAC Regional Participants Committee (RPC) meetings.
- EBMUD, CCWD, and AWA will perform outreach activities within their respective affected areas.
- The RPC community workshops #2 and 3 scheduled for September 2012 and January 2013 will include discussion of and public input on the CARWSP project.

2. Upon agreement by PPC members potentially interested individuals may be invited to attend and observe PPC meetings.

7 Media Contact

1. If approached by the media, members of the PPC will be careful to present only their own views and not those of other members on the PPC. Members are encouraged to suggest that media representatives contact other PPC members who may have different points of view.
2. While the PPC is studying, discussing, or evaluating issues, members will not initiate media contact or make public statements except as mutually agreed by the members.

Appendix B – CARWSP Program Objectives Technical Memorandum

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject: **CARWSP Program Objectives**

Prepared For: Project Partners Committee (PPC)

Prepared by: Alyson Watson

Reviewed by: Rob Alcott

Date: July 5, 2012

Reference: 0122-004

1 Introduction

In order to identify Camanche Area Regional Water Supply Plan (CARWSP) project alternatives that each partner agency can support, it is necessary to first understand each agency's objectives and critical success factors (CSFs) for the recommended project. Specifically, it is critical to understand what agency would ideally like to see in the final project (objectives), as well as those aspects of the project that are absolutely essential and without which the project cannot be viewed as a success (CSFs). Once each agency's objectives and CSFs are understood, they can be reconciled into a set of program objectives and CSFs to guide alternatives development.

This memorandum presents the objectives and CSFs communicated by each agency, as well as a compiled set of objectives and CSFs for the overall program.

2 Agency Objectives

RMC Water and Environment conducted conference calls with representatives from Amador Water Agency (AWA), Calaveras County Water District (CCWD), and East Bay Municipal Utility District (EBMUD) to understand each agency's objectives for the CARWSP project. These discussions are summarized in the following sections.

2.1 Calaveras County Water District

Based on discussions with CCWD staff, the following objectives were identified. These represent CCWD's primary goals for the CARWSP project.

Objectives

1. **Meet Current and Future Demands in the Wallace Area.** CCWD is in the process of taking over the Wallace Community Services District. Currently, demands in this area are met through groundwater supplies. In the future, if groundwater supplies become unreliable, CCWD will be responsible for providing backup supply. Currently, the community of Wallace is home to approximately 100 properties. Buildout projections increase that count to roughly 300 or 400 properties. Should the wells fail, CCWD has sufficient supply to meet current demands; however, CCWD may not have sufficient supply to meet future demands in this area. CCWD would like the CARWSP project to meet current and future demands in this area.
2. **Meet Current and Future Demands in the Burson Area.** The community of Burson similarly relies on groundwater supplies. In some areas, groundwater quality is degraded and supply is unreliable. CCWD currently supplies water at a public spigot, where residents may fill containers

and store them onsite at their homes for a monthly fee. CCWD would ideally like to be able to serve the community of Burson through this project if it can be done cost-effectively.

3. **Exercise Mokelumne River Water Reservation.** CCWD has reservations for 27,000 AFY of Mokelumne River supplies. Currently, CCWD does not use these supplies due to lack of storage and conveyance capabilities. CCWD would like this project to provide a vehicle for using Mokelumne River water, allowing them to exercise their water reservation and reduce demands on the lower quality Calaveras River, potentially freeing up additional Calaveras River supply for transfers and / or banking / storage opportunities.
4. **Work Cooperatively with EBMUD to Achieve Water Management Objectives.** EBMUD has an interest in having CCWD take over management and operations of the mobile home park in the area. CCWD would like to work with EBMUD to find a mutually beneficial solution that may include CCWD taking over the park in exchange for assistance in achieving CCWD's water management objectives through storage capacity in Pardee Reservoir or other mechanisms.
5. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** CCWD would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.

Based on discussions with CCWD staff, the following CSFs wwere identified. If these CSF are not achieved, CCWD will not view the project as a success.

CSFs

1. **Meet Current and Future Demands in the Wallace Area.** CCWD is in the process of taking over the Wallace Community Services District. Currently, demands in this area are met through groundwater supplies. In the future, if groundwater supplies become unreliable, CCWD will be responsible for providing backup supply. Currently, the community of Wallace is home to approximately 100 properties. Buildout projections increase that count to roughly 300 or 400 properties. Should the wells fail, CCWD has sufficient supply to meet current demands; however, CCWD may not have sufficient supply to meet future demands in this area. CCWD would like the CARWSP project to meet current and future demands in this area.
2. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** CCWD would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.

2.2 Amador Water Agency

Based on discussions with AWA staff, the following objectives were identified. These represent AWA's primary goals for the CARWSP project.

Objectives

1. **Improve Water Supply and Quality in the Lake Camanche Village area.** Currently, the Lake Camanche Village area (Water Improvement District [WID] #7) is served by groundwater wells. The wells on the easterly side of the area have historically had supply and quality problems, with production dropping by 50% in the past five years. A new surface water supply could either replace or offset groundwater use in the area, improving reliability. Supplying surface water in the Lake Camanche Village area could replace or offset groundwater supplies. Wells have experienced supply and quality issues in the past. Use of surface water will provide improved supply reliability and water quality for the area.

2. **Provide an Affordable Supply.** The Lake Camanche Village area is a disadvantaged community. The new supply must be affordable for existing residents. Affordability may be improved if the project allows the planned subdivisions to move forward, increasing the rate base.
3. **Provide Adequate Domestic Pressure and Fire Protection.** Currently, pressures in the area vary significantly. Bringing a surface water supply to the easterly portion of the area along with storage could help to stabilize pressures in the area and provide adequate fire protection.
6. **Secure Outside Funding for Project Implementation.** The regional treatment plant project has been considered for more than ten years, but has not moved forward in part because of lack of available funding. Outside funding to offset implementation costs will be critical to moving the project forward.
7. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** AWA would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.

Based on discussions with AWA staff, the following CSFs were identified. If these CSFs are not achieved, AWA will not view the project as a success.

CSFs

1. **Improve Water Supply and Quality in the Lake Camanche Village area.** Supplying surface water in the Lake Camanche Village area could replace or offset unreliable groundwater supplies. Use of surface water will provide improved supply reliability and water quality for the area.
2. **Provide an Affordable Supply.** The Lake Camanche Village area is a disadvantaged community. The new supply must be affordable for existing residents.
3. **Secure Outside Funding for Project Implementation.** The regional treatment plant project has been considered for more than ten years, but has not moved forward in part because of lack of available funding. Outside funding to offset implementation costs will be critical to moving the project forward.
4. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** AWA would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.

2.3 East Bay Municipal Utility District

Based on discussions with EBMUD staff, the following objectives were identified. These represent EBMUD's primary goals for the CARWSP project.

Objectives

1. **Reduce Operating Costs.** The project must identify a solution that either reduces or maintains operating costs at current levels.
2. **Provide a System that is Easy to Operate.** The recommended project should be easy to operate.
3. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** EBMUD would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.
4. **Provide Reliable Supply Year-Round.** The recommended project must provide a reliable supply, year-round, for all of the partners.

5. **Clear and Fairly Resolve Water Rights.** The project must provide a clear determination of water rights.
6. **Build Regional Partnerships.** Achieve a successful operating project in conjunction with AWA and CCWD that assists in building relationships between the agencies and enhances the agencies' ability to work together to implement other mutually beneficial projects in the future.
7. **Garner Local Community Support.** The project must be supported by the local community.
8. **Transfer Responsibility for Local Residents.** EBMUD wishes to see the mobile home parks residents become customers of the counties.
9. **Minimize Environmental Impacts.** EBMUD designs intentionally avoid environmental impacts. EBMUD would like to see similar considerations taken in the design of the preferred alternative.
10. **Maximize Implementability.** The ultimate project should be relatively easy to implement. In order for this to be achieved, the project must be clearly defined, communicated, and agreed upon by all parties.
11. **Maintain Consistency with Local Planning.** Amador and Calaveras Counties are in the process of finalizing their General Plans. The project should be consistent with the General Plans in terms of buildout projections, etc
12. **Identify Appropriate Leads to Address Specific Issues.** There may be specific questions / issues / objections associate with aspects of the project raised by local customers and groups. Each agency should be responsible for working through questions / issues / objections associated with its own local customers and groups.
13. **Beneficially Impact Water Treatment-Related Wastewater Discharges.** The project should provide an improvement over current low-threat and limited-threat permitting requirements. For example, currently, there are multiple permits in place to address backwash from iron and manganese systems in the North Shore system and a stream of backwash at the Camanche South Shore. Having a single compliance point and discharge permit could beneficially affect wastewater discharges.
14. **Meet All Applicable Regulatory Requirements.** The project must be designed to meet all applicable local, state, and federal regulatory requirements.
15. **Maximize Ability to Secure Outside Funding.** The project must be developed in such a way as to maximize the potential for outside funding. Without external support, it will be difficult for the local partners to move the project forward.
16. **Consider Phasing to Prevent Overbuilding.** The project should be designed to accommodate future capacity increases in a phased approach to avoid overbuilding facilities that will not be fully utilized for an extended period of time.
17. **Minimize Capacity Impacts to the Mokelumne Aqueduct.** The project should not adversely impact Mokelumne Aqueduct capacity.

Based on discussions with EBMUD staff, the following CSFs were identified. If these CSFs are not achieved, EBMUD will not view the project as a success.

CSFs

1. **Maintain or Reduce Operating Costs.** The project must identify a solution that either reduces or maintains operating costs at current levels, but does not increase operating costs.
2. **Provide a System that is Easy to Operate.** The recommended project should be easy to operate.
3. **Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible.** EBMUD would like to develop a project that meets the needs of its users while also enhancing surrounding habitat and ecosystem, if possible, and preventing unmitigated environmental impacts.

4. **Provide Reliable Supply Year-Round.** The recommended project must provide a reliable supply, year-round, for all of the partners.
5. **Clear and Fairly Resolve Water Rights.** The project must provide a clear determination of water rights.
6. **Build Regional Partnerships.** Achieve a successful operating project in conjunction with AWA and CCWD that assists in building relationships between the agencies and enhances the agencies' ability to work together to implement other mutually beneficial projects in the future.
7. **Garner Local Community Support.** The project must be supported by the local community.
8. **Transfer Responsibility for Local Residents.** EBMUD wishes to see the mobile home parks residents become customers of the counties.
9. **Meet All Applicable Regulatory Requirements.** The project must be designed to meet all applicable local, state, and federal regulatory requirements.
10. **Beneficially Impact Water Treatment-Related Wastewater Discharges.** The project should provide an improvement over current low-threat and limited-threat permitting requirements. For example, currently, there are multiple permits in place to address backwash from iron and manganese systems in the North Shore system and a stream of backwash at the Camanche South Shore. Having a single compliance point and discharge permit could beneficially affect wastewater discharges.
11. **Maximize Ability to Secure Outside Funding.** The project must be developed in such a way as to maximize the potential for outside funding. Without external support, it will be difficult for the local partners to move the project forward.
12. **Minimize Capacity Impacts to the Mokelumne Aqueduct.** The project should not adversely impact Mokelumne Aqueduct capacity.

3 Program Objectives and Critical Success Factors

Table 1, below, presents the overall program objectives, based on the individual objectives identified by each participating agency. Table 2 presents program CSFs.

Table 1: CARWSP Program Objectives

A. Meet Current and Future Demands in the Wallace Area
B. Meet Current and Future Demands in the Burson Area
C. Exercise CCWD's Mokelumne River Water Reservation
D. Work Cooperatively to Achieve Water Management Objectives
E. Maintain or Reduce Operating Costs to Provide an Affordable Supply
F. Provide a System that is Easy to Operate
G. Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible
H. Provide Reliable Supply Year-Round
I. Clear and Fairly Resolve Water Rights
J. Build Regional Partnerships
K. Garner Local Community Support
L. Transfer Responsibility for Local Residents
M. Meet All Applicable Regulatory Requirements
N. Beneficially Impact Water Treatment-Related Wastewater Discharges
O. Maximize Ability to Secure Outside Funding
P. Improve Water Supply and Quality in the Lake Camanche Village Area
Q. Provide Adequate Domestic Pressure and Fire Protection
R. Minimize Capacity Impacts to the Mokelumne Aqueduct

Table 2: CARWSP Program Critical Success Factors

A. Meet Current and Future Demands in the Wallace Area
B. Maintain or Reduce Operating Costs to Provide an Affordable Supply
C. Provide a System that is Easy to Operate
D. Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible
E. Provide Reliable Supply Year-Round
F. Clear and Fairly Resolve Water Rights
G. Build Regional Partnerships
H. Garner Local Community Support
I. Transfer Responsibility for Local Residents
J. Meet All Applicable Regulatory Requirements
K. Beneficially Impact Water Treatment-Related Wastewater Discharges
L. Maximize Ability to Secure Outside Funding
M. Improve Water Supply and Quality in the Lake Camanche Village Area
N. Provide an Affordable Supply
O. Minimize Capacity Impacts to the Mokelumne Aqueduct

Appendix C – Boundary Map and Demand Projections Technical Memorandum

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject: **Boundary Map and Demand Projections**

Prepared For: Project Partners Committee (PPC)

Prepared by: Lindsey Clark

Reviewed by: Alyson Watson

Date: November 2, 2012

Reference: 0122-004 Task 3

1 Introduction

In order to identify Camanche Area Regional Water Supply Plan (CARWSP) project alternatives, the boundary of the areas in Calaveras and Amador Counties to be served by a CARWSP project must be delineated and the associated water demands projected. This technical memorandum identifies specific areas to be served by the project and projected future demands in the CARWSP project service area.

2 Boundary Map

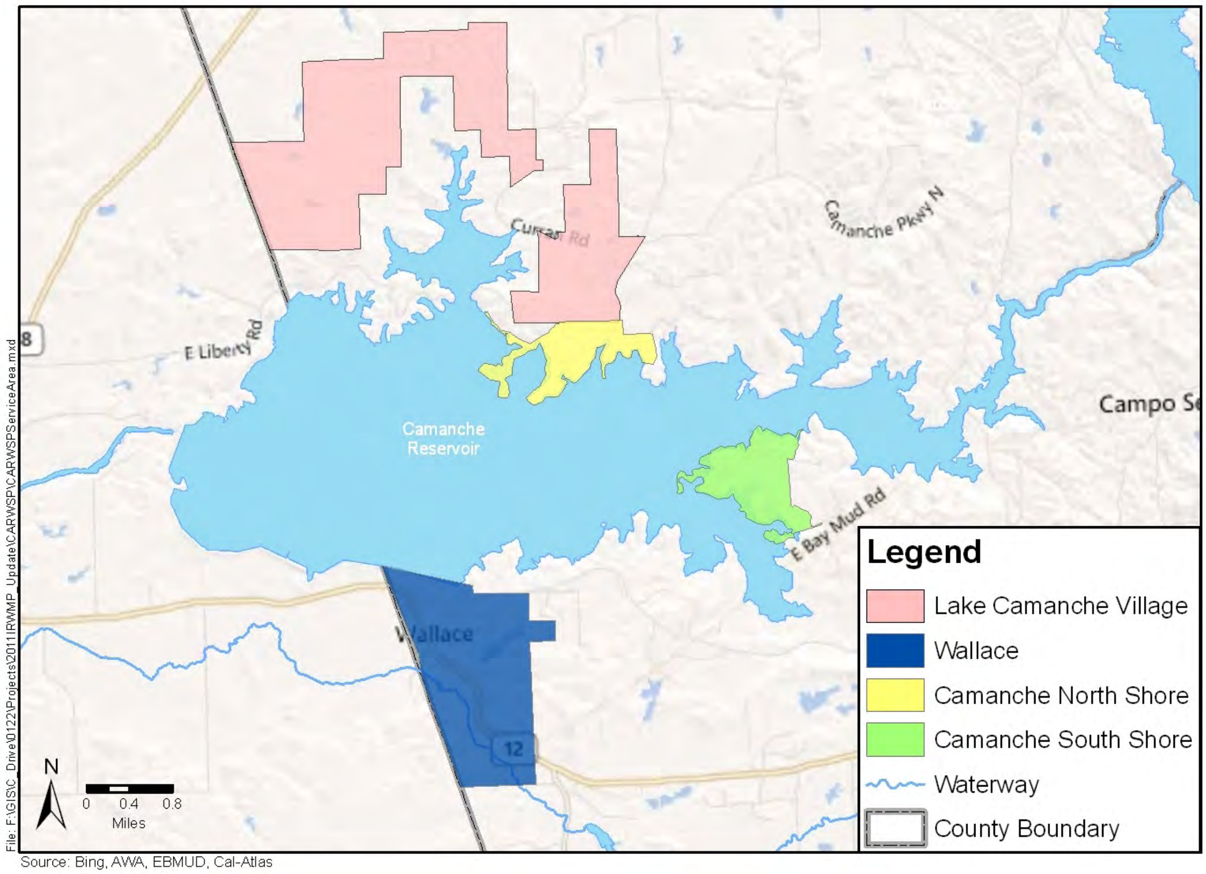
East Bay Municipal Utility District (EBMUD), Calaveras County Water District (CCWD), and Amador Water Agency (AWA) each identified objectives and critical success factors (CSFs) for the Camanche Area Regional Water project, which inform delineation of the regional boundary. One CSF identified by CCWD is to meet current and future demands in the Wallace Area. CCWD also included meeting current and future demands in the Burson Area as an objective. AWA identified improving water supply and quality in the Lake Camanche Village Area as a CSF. These objectives and CSFs are consistent with the *Camanche Regional Water System Feasibility Study* (KASL, July 1999). Based on the 1999 Study and discussions with the participating agencies, the areas the agencies would like to serve with the recommended CARWSP project are as follows.

- EBMUD
  - Camanche North Shore
  - Camanche South Shore
- AWA
  - Lake Camanche Village (Water Improvement District [WID] #7)
- CCWD
  - Wallace

These areas are shown in Figure 1. Burson North and Burson South were initially considered in discussions for the proposed project area, but based on discussions with CCWD staff, it appears that it would be more cost effective to serve those demands from the Jenny Lind Water Treatment Plant. As such, Burson North and South were not carried forward for further evaluation. EBMUD is currently implementing a replacement 0.5 million gallon per day (MGD) water treatment plant (WTP) at Camanche South Shore Recreation Area, a raw water pipeline from the Mokelumne Aqueducts to the WTP, and a treated water pipeline from Camanche South Shore to Camanche North Shore. EBMUD prepared and approved a Negative Declaration in July 2001 and issued a Notice of Determination (NOD) in September

2001. These facilities will serve as the first phase of the CARWSP project, serving the South Shore and allowing for expansion to serve the other identified areas.

Figure 1: Potential Areas to be Served



According to the Public Resources Code §75005 (g), a disadvantaged community (DAC) is defined as a community with an annual median household income (MHI) less than 80% of the Statewide MHI. The California Department of Water Resources (DWR) derived MHI data from the U.S. Census Bureau's American Community Survey (ACS) for the period of 2006 to 2010. If a community has an MHI less than $48,706, it is considered a DAC. Camanche North Shore is a DAC with an associated MHI of $41,848. Census data is gathered and compiled at the census tract, census block group, and census designated place (CDP) level and sometimes does not reflect a small enough area or community. Lake Camanche Village and Wallace have associated CDPs, but the places cover a much larger area than the services areas themselves. The Lake Camanche Village CDP is not a DAC, but an income survey was completed for Lake Camanche Village service area and it was determined that its MHI is less than 80% of the Statewide MHI and therefore a DAC. While the DWR/Census data does not show Camanche South Shore or Wallace as disadvantaged, it is possible that if an income survey is completed, they may be determined to be disadvantaged.

Addressing critical water supply and/or water quality needs of DACs is a DWR Integrated Regional Water Management (IRWM) Program Preference. Therefore, projects such as CARWSP that would improve water supply reliability and improve water quality would be favorable to DWR. It is also important to note DWR has appropriated funds specifically to DAC projects. AWA and CCWD both acknowledge a critical need for a new water supply, but also for funding. If funding, such as an IRWM grant is not secured, it may prove difficult for these agencies to implement a project.

3 Demand Projections

Projected demands for the CARWSP service area are presented in Table 1. These projections are based on the 1999 KASL Feasibility Study, the *Camanche South and North Shore WTPs Evaluation* (EBMUD, May 2003), and data from the participating agencies. The demands are discussed in further detail in the following sections.

Table 1: Demand Projections

Service Area	Average Day Demand (ADD)		Maximum Day Treated Water Demand (MDD)	
	Existing (gpd)	Existing (AFY)	Existing Demand (gpd)	Project Demand – 20 year (gpd)
Camanche South Shore[1]	101,300	113	225,800	245,200
Camanche North Shore[2]	187,100	210	276,300	286,300
Lake Camanche Village[3]	267,500	300	560,000	1,000,000
Wallace[4]	40,000	45	161,400	645,700
Total	**595,900**	**667**	**1,223,500**	**2,177,200**

1. Existing demands from EBMUD, 2003; Project MDD from KASL, 1999. Project demand is based on max day demands, which are typically not expressed in AFY.
2. Existing MDD from EBMUD, 2003; Project MDD developed by applying same assumption from KASL report to the existing demand. Project demand is based on max day demands, which are typically not expressed in AFY.
3. Existing demands provided by AWA via email July 10, 2012. Existing ADD assumes 365 gpd/unit with 733 existing units; Existing MDD assumes 760 gpd/unit with 733 units. 20 year MDDs will exceed 1 mgd, but for the purposes of CARWSP, this is the demand assumed to be served by the project. Project demand is based on max day demands, which are typically not expressed in AFY.
4. Existing MDD from CCWD via email; data from 2009 through 2011 was averaged. Existing ADD is from KASL, 1999. Project demand is based on max day demands, which are typically not expressed in AFY.

3.1.1 Camanche North and South Shores

Based on current records and staff knowledge, with minor adjustments, the KASL study and the WTPs Evaluation are still accurate for the EBMUD properties of Camanche North Shore and Camanche South Shore.

The existing demands for the Camanche North and South Shores are from the 2003 WTPs Evaluation. The existing demand from the 2003 Evaluation are fairly consistent with the existing demand included in the 1999 Feasibility Study, 225,800 gpd and 227,200 gpd, respectively. Because the existing demands are comparable, it was assumed the project demands would be similar. Therefore the project demand for Camanche South Shore included in Table 1 is from the 1999 Feasibility Study.

The existing demand of 276,300 gpd for Camanche North Shore in the 2003 Evaluation was determined by EBMUD staff to be accurate while the project demand was adjusted to account for development described in the 1999 Feasibility Study that has not yet occurred. In the future 50 RV sites and 2 restrooms / shower facilities will be added, increasing demand by approximating 10,000 gpd.

3.1.2 Lake Camanche Village

Through coordination with AWA, the demands for Lake Camanche Village were updated from the 1999 Feasibility Study. Between 1999 and 2008, Lake Camanche Village had a growth rate of approximately 5% annually. The current number of connections, which are mostly residential, total 733. Average day demand (ADD) is 365 gpd/unit, while MDD is 760 gpd/unit. Based on the unit MDD and existing number of connections, existing MDD for Lake Camanche Village is 560,000 gpd. Units 1, 3A, 3B, and 6 of Lake Camanche Village are approved for development and will total 1,987 parcels. Units 5 and 7 do not currently have subdivision maps but there is the potential for up to 1,000 parcels. These parcels are not included in the demand estimates in Table 1. Units 2 and 4 are on individual wells and will not be served by the CARWSP project. Assuming a total of 2,700 parcels in Lake Camanche Village, based on approved maps, the MDD would total 2,052,000 gpd. This amount exceeds what could be supplied by CARWSP, therefore a total project MDD of 1 mgd is assumed. The remaining water needs of Lake Camanche Village would be met by groundwater.

3.1.3 Wallace

Wallace is currently being annexed to the CCWD service area. Existing demands for Wallace are based on available water production data for Wallace Community Services District (CSD) collected since CCWD began operating the system in 2009. In 2009 the MDD was 183,400 gpd, then in 2010 it was 181,200 gpd, and in 2011 it was 134,000 gpd. Demands decreased from over the years due to foreclosures in the area and spring in 2011 was cooler and longer than past years so water use decreased. The existing MDD of 161,400 gpd is an average of the MDDs from 2009 through 2011, assuming the foreclosures remain but water use may increase again depending on summer and spring weather. There are currently 100 units in Wallace; the project demand assumes there will be a total of 400 units. Based on these assumptions, the project demand is645,700 gpd. The MDD equates to 1,614 gpd/unit which is higher than others because the properties in Wallace tend to be larger than properties in the recreation areas and mobile home parks.

Appendix D – Water Supply Alternatives Technical Memorandum

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject:	**Water Supply Alternatives Summary**
Prepared For:	Project Partners Committee (PPC)
Prepared by:	Lindsey Clark
Reviewed by:	Alyson Watson
Date:	October 15, 2012
Reference:	0122-004 Task 3

1 Introduction

East Bay Municipal Utility District (EBMUD), Amador Water Agency (AWA), and Calaveras County Water District (CCWD) have partnered to prepare the Camanche Area Regional Water Supply Plan (CARWSP), which will identify the preferred regional project solution to correct the critical drinking water quality issues in the Camanche area, a disadvantaged community (DAC).

The three agencies have delineated specific areas in Calaveras and Amador counties to be served by the project including Lake Camanche Village, Camanche North Shore (CANS), Camanche South Shore (CASS), and Wallace. To improve water supply reliability for the Camanche area, water supply sources in addition to groundwater, such as surface water, stormwater, and water conservation have been explored for feasibility.

The purpose of this TM is to:

1. Identify alternative water supply sources potentially available to meet the demands described in the Water Demands TM.
2. Determine the amount of supply potentially available from each water supply alternative.
3. Identify the pros and cons of each supply alternative.

2 Alternative Water Supplies

2.1 Groundwater

The primary source of water supply in the Camanche area is groundwater. Groundwater quantity and quality in the area vary considerably among well sites due to the region's geology and the small and unpredictable yields of groundwater system that typifies this area of the Sierra foothills. Located on the eastern fringe of the San Joaquin Valley Groundwater Basin, the groundwater resources in the Camanche area are associated with the fractured rock systems typically found in the foothills as well as the alluvial systems characteristic of the San Joaquin Valley geology to the west.

Over the years, groundwater has proven to be an unreliable and often unsuitable water supply source for the Camanche area. In addition to the highly variable quantities of available groundwater, Camanche area groundwater quality has also been a chronic issue. Based on quarterly sampling in monitoring wells north of Lake Camanche in Amador County, groundwater iron concentrations are much greater than the secondary maximum contaminant level (MCL) of 300 µg/L, reaching concentrations as high as 7,052 µg/L. Additionally, total manganese concentrations in monitoring wells are greater than the secondary

MCL of 50 µg/L, reaching concentrations as high as 329 µg/L. Because of these impaired groundwater quantity and quality conditions, as demonstrated in the following table, the responsible water suppliers have not been able to provide a high quality, reliable water supply to the Camanche area.

Table 1: Historic Groundwater Operations

Agency	Average Occurrences Per Year of Impaired Operations[1]
AWA (Lake Camanche Village)	42
EBMUD (CANS, CASS)	30
CCWD (Wallace)	Continual - 37 people have permits to haul water from CCWD's Jenny Lind WTP due to ongoing impaired groundwater operations[2]

1. Estimates from Agency and District staff.
2. Includes areas of Wallace, Burson, and Campo Seco

AWA currently supplies Lake Camanche Village with groundwater using four wells that pump from the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin (see Figure 1). One of the wells, on the easterly side of the Village, was taken out of operation from September 2010 to July 2011 due to elevated turbidity and odor levels; this well is now being operated at reduced production levels. As shown in Table 2, groundwater levels decreased significantly during the 1960s and 1970s. Although groundwater levels have rebounded within the last two decades, there is still a slight overdraft. Due to concerns with groundwater quality and quantity, AWA is seeking to reduce the dependence of Lake Camanche Village on groundwater as its primary water supply (AWA, 2011).

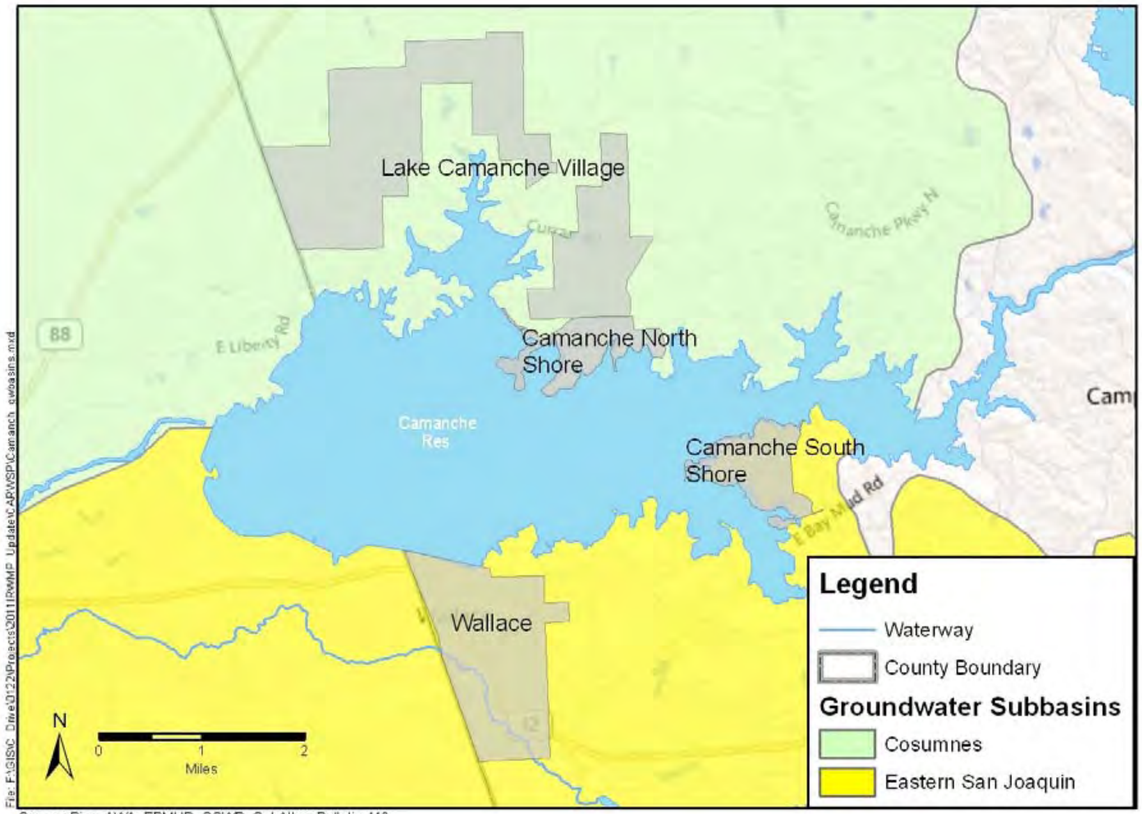
Table 2: Historic Groundwater Levels in Cosumnes Subbasin

Time Period	Change in Level	Change from Reference Level[1]
Mid-1960's	0	0
Mid-1960's to 1980	-20 to -30 feet	-20 to -30 feet
1980 to 1986	5 to 10 feet	-10 to -25 feet
1987 to 1992	-10 to -15 feet	-20 to -40 feet
1993 to 2000	15 to 20 feet	-5 to -20 feet

1. Reference level is taken to be the groundwater level during the mid-1960's. Source: California's Groundwater Bulletin 118, Updated 2003.

Similarly, the Wallace area overlies the Eastern San Joaquin Subbasin, which is also overdrafted. With its small and unpredictable yields, groundwater has proven to be an unreliable water supply source for the western CCWD service area. Because of the dropping groundwater levels there is a critical overdraft in the Subbasin which has contributed to deteriorating groundwater quality. The Wallace Community Service District currently uses groundwater supply wells. Unable to remedy its longtime groundwater supply problems the Wallace Community Service District has petitioned to beannexed to the CCWD service area. With this annexation, CCWD is seeking to improve water supply reliability through CARWSP by providing a surface water supply which is augmented with conjunctive groundwater use and thus achieve a more reliable, higher quality supply (CCWD, 2011).

Figure 1: Groundwater Basins underlying Study Area



Source: Bing, AWA, EBMUD, CCWD, Cal-Atlas, Bulletin 118

2.2 Surface Water

EBMUD owns and operates Pardee and Camanche Reservoirs on the Mokelumne River to meet a number of objectives, including the following.

- Provide water storage for EBMUD municipal, environmental and other purposes
- Comply with downstream senior water rights and fishery flow requirements
- Provide flood protection
- Generate hydroelectric power
- Provide for a variety of recreational activities

Camanche Reservoir is currently the water supply source for the existing Camanche South Shore WTP. This reservoir is located approximately 10 miles downstream from Pardee Reservoir and has a maximum storage capacity of 417,120 acre-feet (AF).

Pardee Reservoir has a maximum storage capacity of 197,950 AF. Water is conveyed through Pardee tunnel to the Campo Seco facility where it trifurcates to the 3 Mokelumne Aqueducts and flows by gravity ~92 miles to EBMUD's service area in the San Francisco Bay area. The water from Pardee Reservoir receives pretreatment consisting of sodium hypochlorite disinfection and lime addition for corrosion control before it enters Mokelumne Aqueduct.

Raw water from either Camanche Reservoir or the Mokelumne Aqueduct could be conveyed to a regional water treatment plant (WTP) to serve the Camanche area with a high quality, reliable potable water supply. And while both the Mokelumne Aqueduct and Camanche Reservoir are of high water quality, the Mokelumne Aqueduct supply is generally of superior quality to the Camanche Reservoir supply. The large number of recreational users of Camanche Reservoir and the continual increase in motorized watercraft use pose potential future impacts to Camanche Reservoir water quality. The primary drawbacks to using Camanche Reservoir as a water supply source rather than the Mokelumne Aqueduct are as follows:

- Permitted recreational use allows for potential contamination with gasoline and its additives (specifically from motorized watercrafts).
- Body contact recreation is permitted in the reservoir, increasing nutrient and microbial loads which pose a greater risk to water quality and increase operational costs due to monitoring requirements.
- During severe droughts the water supply intake in the reservoir may need to be moved to maintain water supply. Significant effort and resources are required to move the intake.
- During heavy Mokelumne (storm) flow conditions high turbidity conditions exist which limit plant ability to produce acceptable quality water.
- During high (cold water) releases from Pardee reservoir at times causes high algae blooms in the area of the CASS WTP Camanche reservoir intake. The result is limited filter run time adversely affecting plant output.

During the environmental review process for the Camanche WTP Replacement Project, EBMUD determined that the most cost-effective way to serve CASS and CANS with potable water while meeting its objectives would be to convey raw water from Mokelumne Aqueducts 1 and 2 (EBMUD, 2001). The Mokelumne Aqueducts were also identified as the preferred Camanche area water supply source in the 2003 Camanche South and North Shore Water Treatment Plant Evaluation (EBMUD, 2003). Based on a recent EBMUD engineering analysis it was determined that up to 2.8 mgd of additional water supply could be available from Pardee Reservoir via the Mokelumne Aqueduct without causing significant impacts to aqueduct supply operations.

2.3 Stormwater

Stormwater capture and reuse was evaluated as a potential alternative source which could offset use of other supplies such as groundwater and improve water supply reliability. Stormwater generation is dependent upon precipitation. Annual precipitation (rainfall and snowfall) in the Mokelumne River watershed is highly variable. Throughout the year, precipitation is seasonal, with most precipitation occurring between November and May and very little occurring from late spring to fall (AWA, 2011). According to the Western Regional Climate Center, Camp Pardee weather station, average annual precipitation, based on data collected from 1926 through 2012, is 21.48 inches. In order to estimate the amount and associated cost for collecting rainwater, the following assumptions were made:

- 2 rain barrels, capable of storing up to 55 gallons, would be placed at every parcel in CANS, CASS, Wallace, and Lake Camanche Village to capture precipitation to offset outdoor water demands. The estimated area per rooftop on each parcel is 1,000 square-feet.
- The cost per rain barrel is $125 (based on current rain barrel costs provided by the Urban Farmer). No appurtenance or maintenance costs were included; it is assumed that the water captured would be used for hand watering only.
- The barrels have a 5 year useful life.
- Rain barrels will only be used during dry months (May through September) to serve outdoor irrigation needs.
- There are currently 1,105 existing units.
- Based on approved, planned development, in 20 years there will be 2,038 units.

Based on these assumptions, an average of approximately 1.0 million gallons per year (2,800 gpd on an annual basis) could be offset by stormwater, increasing to 1.9 million gallons per year (5,200 gpd on an annual basis)in 20 years based on approved development. This would cost the region approximately $276,000, or roughly $510,000, respectively.

Although the stormwater captured could offset use of other supplies, there are several factors which significantly limit is value:

- Without significant treatment, stormwater could only be used to meet outdoor water demands; however, stormwater would be available primarily during the rainy season, when outdoor water demands are at their lowest.
- Without significant treatment, harvested rainwater would not be suitable for indoor use (or human consumption). As such, these supplies could not be used to offset indoor demands.
- The quantity of stormwater that could be reused would be insufficient to meet the needs of the service areas and therefore does not eliminate the need for additional water supply sources.
- Rainwater exhibits a strong seasonal pattern and annual variability, which makes it an unreliable source. As such, water suppliers would need to be ready to provide backup supplies in the event rainwater supplies were unavailable.

Due to the significant cost associated with implementing widespread rainwater harvesting, the unreliability of the supplies, and the limited demands that can be met with harvested rainwater (outdoor demands only), stormwater is not considered to be a viable supply for further consideration.

2.4 Water Conservation

The amount of water to be supplied by CARWSP could be reduced by increasing water use efficiency in the communities to be served by CARWSP. While EBMUD, AWA, and CCWD all encourage water conservation within their respective service areas and implement various Demand Management Measures (DMMs) and / or Best Management Practices (BMPs) to reduce water use, a targeted water use efficiency element has been included in this alternatives analysis. To estimate the potential reductions in water demand that could be achieved through targeted water conservation program within the CARWSP service area, the following assumptions were made:

- Toilets and showerheads have historically improved in efficiency over time, with a marked improvement in toilet flushing efficiency beginning in 1992, with the National Energy Policy Act. This Act reduced the maximum flushing volume of new toilets sold in the United States to 1.6 gallons per flush (gpf). It also mandated that new showerhead faucets not exceed a flowrate of 2.5 gallons per minute (gpm).Because the some units within Lake Camanche Village, CANS, CASS, and Wallace were constructed –prior to 1992, many of existing dwelling units in the service area are estimated have non-conserving water fixtures, including toilets and showerheads.
- Non-conserving showerheads 5.5 gpm while new, low-flow showerheads use 2.5 gallons per minute (gpm). Residents were assumed to take 0.5 showers per day with an average duration of 8.2 minutes per shower.
- Non-conserving toilets were estimated to use 7.0 gpf while new, low-flow toilets use 1.6 gpf. People flush an average of 5 times per day.

Table 3 summarizes the reduction in water demands that could potentially be achieved through targeted water conservation programs, based on the previous assumptions.

Table 3: Potential Water Savings

	Existing No. of Units	Units Requiring New Fixtures[1]	Showerhead Replacement Water Savings (gpd)	Toilet Replacement Water Savings (gpd)	Total Water Savings (gpd)
Lake Camanche Village	733	367	11,285	24,773	36,058
CANS	161	113	3,475	7,628	11,103
CASS	111	78	2,399	5,265	7,664
Wallace	100	30	923	2,025	2,948
Total	**1,230**	**588**	**18,082**	**39,691**	**57,773**

1. Based on agency staff knowledge, the following percent of existing units could benefit from fixture replacement: AWA estimated 70% of the existing units in Lake Camanche Village, EBMUD estimated 50% of existing units in CANS and CASS, and CCWD estimated 30% of the existing units in Wallace.

2.5 Summary

The Alternatives Summary Matrix summarizes the water supplies described in Sections 2.1 through 2.3.

Table 4: Alternatives Summary Matrix

	Parameter	
Water Supply Alternative	**Availability**	**Constraints**
Groundwater	Variable depending on location	Water quality and supply issues
Surface Water	Reliable and available, up to 2.8 mgd available	EBMUD operational requirements
Stormwater	Up to 5,200 gpd	Significant annual and seasonal variability, storage requirements, and cost to end user
Water Conservation	Demand reduction of approximately 100,000 gpd	Relatively small reduction in water demand relative to projected 2.8 MGD need

2.6 Conjunctive Use

Conjunctive use opportunities may be achieved through coordinated management of surface water supplies made available through CARWSP and existing groundwater supply facilities. For example, AWA could meet a portion of user demands in Lake Camanche Village area using treated surface water, while still relying on groundwater to meet a portion of baseline demands and / or peak day and peak month demands. Although groundwater in the eastern portion of Lake Camanche Village is impaired by water quality and supply issues, groundwater in the western portion can be used to meet peak demands if necessary. This would allow AWA to reduce its dependence on groundwater with a minimal quantity of surface water by optimizing conjunctive use of these supplies.

The groundwater in the areas surrounding CANS and CASS are problematic and would not allow for the extensive application of conjunctive use since, as previously described, the quantity and quality of groundwater has led to the development of the CARWSP study. It would be possible to use groundwater for outdoor irrigation and during emergency conditions.

Similarly, with a CARWSP surface water supply to the community of Wallace CCWD could convert existing groundwater facilities for conjunctive operations. Doing so would provide enhanced dry year reliability and emergency backup supply.

3 References

AWA. 2011. *Amador Water Agency Urban Water Management Plan.* September 2011.

CCWD. 2011. *2010 Urban Water Management Plan.* June 2011.

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EBMUD. 2003. *Camanche South and North Shore Water Treatment Plants Evaluation.* May 2003.

EBMUD. 2001. *Camanche Water Treatment Plant Replacement Project Draft Mitigated Negative Declaration.* July 2001.

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Appendix E – Alternatives Evaluation Technical Memorandum

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject:	**Alternatives Evaluation**
Prepared For:	Project Partners Committee (PPC)
Prepared by:	Tammy Qualls, P.E. Lindsey Wilcox
Reviewed by:	Mike Matson, P.E Alyson Watson, P.E.
Date:	October 15, 2012, revised October 31, 2012, December 11, 2012
Reference:	0122-004 Task 3

1 Introduction

The purpose of this technical memorandum (TM) is to present the preliminary evaluation of potential project alternatives for the Camanche Area Regional Water Supply Project (CARWSP) and identify a preferred alternative. As described in the Water Supply Alternatives TM (RMC, October 2012), surface water would provide the most reliable supply, in conjunction with conjunctive management. CARWSP would build upon East Bay Municipal Utility District's (EBMUD's) plans to upgrade the existing water treatment plant (WTP) adjacent to Lake Camanche to serve the Camanche South Shore (CASS) and Camanche North Shore (CANS) areas, which are served by EBMUD. CARWSP would build upon this initial phase by providing regional water supply to portions of the Amador Water Agency (AWA) and Calaveras County Water District (CCWD) service areas. The regional WTP would treat water from the Mokelumne Aqueduct, improving water quality and water supply reliability for regional customers. Treated surface water from the regional treatment plant would be served to existing and approved future customers in CANS and CASS (part of EBMUD's service area), the Lake Camanche Village area (part of the AWA's service area) and the Wallace area (currently being annexed to CCWD's service area).

The purpose of this TM is to present three conceptual alternative water supply configurations for the CARWSP, identify conceptual costs for each alternative, and apportion these costs to the beneficiaries of each CARWSP element. In addition, each conceptual alternative has been evaluated relative to the plan critical success factors (CSFs) developed by the Project Partners Committee (PPC) for use in identifying a preferred alternative. Based on the CSF evaluation and PPC discussion, the phased approach for the preferred CARWSP alternative is presented in this TM.

2 Project Alternatives

Three project alternatives were evaluated for the purposes of this TM. Alternative 1 would serve the EBMUD service areas of CANS and CASS only, Alternative 2 would serve CANS, CASS, and AWA's Lake Camanche Village, and Alternative 3 would serve the EBMUD, AWA, and CCWD areas, including CANS, CASS, Lake Camanche Village, and Wallace.

2.1 Alternative 1: Serve CASS and CANS

2.1.1 Projected Demand

Detailed information on demand projections are provided in the Boundary Map and Demand Projections TM (RMC Water and Environment, September 2012). For the purposes of the project alternatives evaluation, facilities were evaluated using 20-year maximum day treated water demand projections. A total of 528,500 gpd is needed for Alternative 1.

- CASS 20-year maximum day treated water demand projection: 245,200 gpd
- CANS 20-year maximum day treated water demand projection: 286,300 gpd

2.1.2 Facilities and Alignment

EBMUD is currently implementing the replacement of a 0.5 million gallon per day (MGD) WTP with a new 0.5 MGD WTP at Camanche South Shore Recreation Area, a raw water pipeline from the Mokelumne Aqueduct to the WTP, and a treated water pipeline from Camanche South Shore to Camanche North Shore. This project is currently in the 90% design development phase and is expected to be constructed in 2013-2014. EBMUD prepared and approved a Negative Declaration in July 2001 and issued a Notice of Determination (NOD) in September 2001. Figure 1 shows an overview map of Alternative 1.

The facilities and alignments developed in the *Camanche Regional Water System Feasibility Study* (KASL, July 1999) are used here.

Alternative 1 facilities include:

- 0.5 MGD WTP
- 11,700 linear feet (LF) of 8” treated water (TW) pipeline crossing the reservoir to CANS
- 5,860 LF of 12” raw water (RW) pipeline connecting Aqueducts to WTP

2.1.3 Vintage Home Fixture Retrofit

In addition to meeting water demands with the surface WTP, conservation measures will also be implemented to offset potable water supplies. As described in the Water Supply Alternatives Summary TM (RMC, October 2012), replacing existing, non-conserving toilets and showerheads with low-flow toilets and showerheads in the CANS and CASS communities, a total of approximately 19,000 gallons per day (gpd) of water could be conserved. EBMUD estimates 113 homes in CANS and 78 homes in CASS would benefit from fixture replacement. The Vintage Home Fixture Retrofit program will be implemented through a rebate and subsidy program.

Alternative 1 facilities include:

- Approximately 191 $25 showerhead rebates
- Approximately 191 low-flow toilets (cost of the toilet and installation estimated to be $225 per toilet)

Figure 1: Alternative 1

2.2 Alternative 2: Alternative 1 + Serve Lake Camanche Village

2.2.1 Projected Demand

Detailed information on demand projections are provided in the Boundary Map and Demand Projections TM. For the purposes of the project alternatives evaluation, facilities were evaluated using 20-year maximum day treated water demand projections. A total of 1,528,500 gpd is needed for Alternative 2.

- CASS 20-year maximum day treated water demand projection: 245,200 gpd
- CANS 20-year maximum day treated water demand projection: 286,300 gpd
- Lake Camanche Village 20-year maximum day treated water demand projection: 1,000,000 gpd

2.2.2 Facilities and Alignment

Alternative 2 would include all elements of Alternative 1, but would further extend the treated water conveyance system to the north to connect with the Lake Camanche Village distribution system, which is currently supplied by well fields. A new treated water (TW) pipeline would extend north and connect with a proposed AWA tank, as shown in Figure 2.

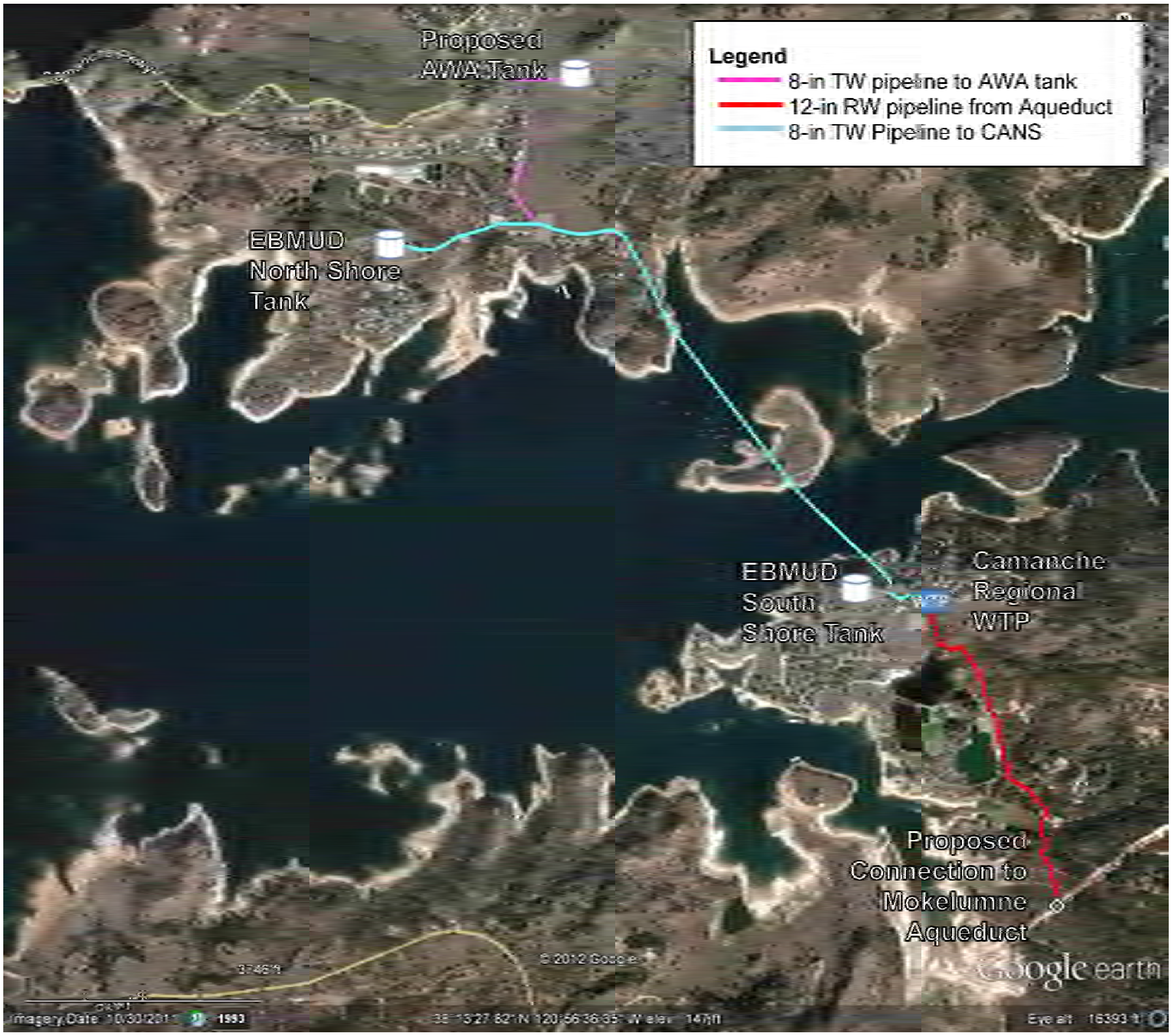
The facilities and alignments developed in the *Camanche Regional Water System Feasibility Study* (KASL, July 1999) are used here.

Alternative 2 key facilities include:

- 1.5 MGD WTP
- Upsize pumps at WTP
- 11,700 LF of 8" TW pipeline crossing reservoir
- 3,400 LF of 8" TW pipeline from CANS tank to proposed AWA tank / existing distribution system
- 5,860 LF of 12" RW pipeline connecting Aqueducts to WTP
- Altitude valve on CASS tank
- Altitude valve on CANS tank
- Pressure reducing valves and pressure sustaining valves (to allow for Conjunctive Use)
- Booster Pump Station
- One tank, totaling 500,000 gallons of treated water storage at Lake Camanche Village

In order to meet fire flow requirements in the AWA area, an additional 500,000 gallon tank will be required in the "back" (northwest) portion of their system. (Alternatively, equivalent groundwater wells/pumps with backup power could be used.) Because these facilities are specific to AWA they are not included in this assessment.

Figure 2: Alternative 2



2.2.3 Vintage Home Fixture Retrofit

Similar to Alternative 1, conservation is also included in this alternative. As described in the Water Supply Alternatives Summary TM (RMC, October 2012), replacing existing, non-conserving toilets and showerheads with low-flow toilets and showerheads in the CANS and CASS communities, as well as Lake Camanche Village, would result in a total water savings of about 55,000 gpd. As previously mentioned, the retrofit program will include rebates and subsidies to residents in the CANS, CASS, and Lake Camanche Village areas. AWA estimates 367 homes require home fixture replacement.

Alternative 2 facilities include:

- An additional 367 $25 showerhead rebates in addition to the approximately 191 rebates identified for the CANS and CASS areas in Alternative 1, for a total of approximately 558 rebates
- Approximately 367 low-flow toilets (cost of the toilet and installation estimated to be $225 per toilet), in addition to the approximately 191 toilets for the CANS and CASS areas in Alternative 1, for a total of approximately 558 toilets

2.2.4 Conjunctive Use

Conjunctive use opportunities may be achieved through coordinated management of surface water supplies made available through CARWSP and existing groundwater supply facilities. AWA will meet a portion of user demands in Lake Camanche Village area using treated surface water, while still relying on groundwater to meet a portion of baseline demands and / or peak day and peak month demands. Although groundwater in the eastern portion of Lake Camanche Village is impaired by water quality and supply issues, groundwater in the western portion can be used to meet peak demands if necessary. This will allow AWA to reduce its dependence on groundwater with a minimal quantity of surface water by optimizing conjunctive use of these supplies. The installation of the pressure reducing valves and pressure sustaining valves in Section 2.2.2 will enable AWA to apply conjunctive use.

Alternative 2 facilities include:

- Pressure reducing valves and pressure sustaining valves (also noted in Section 2.2.2)

2.3 Alternative 3: Alternative 1 + Alternative 2 + Serve Wallace Area

2.3.1 Projected Demand

Detailed information on demand projections are provided in the Boundary Map and Demand Projections TM. For the purposes of the project alternatives evaluation, facilities were evaluated using 20-year maximum day treated water demand projections. A total of 2,177,200 gpd is needed for Alternative 3.

- CASS 20-year maximum day treated water demand projection: 245,200 gpd
- CANS 20-year maximum day treated water demand projection: 286,300 gpd
- Lake Camanche Village 20-year maximum day treated water demand projection: 1,000,000 gpd
- Wallace Area 20-year maximum day treated water demand projection: 645,700 gpd

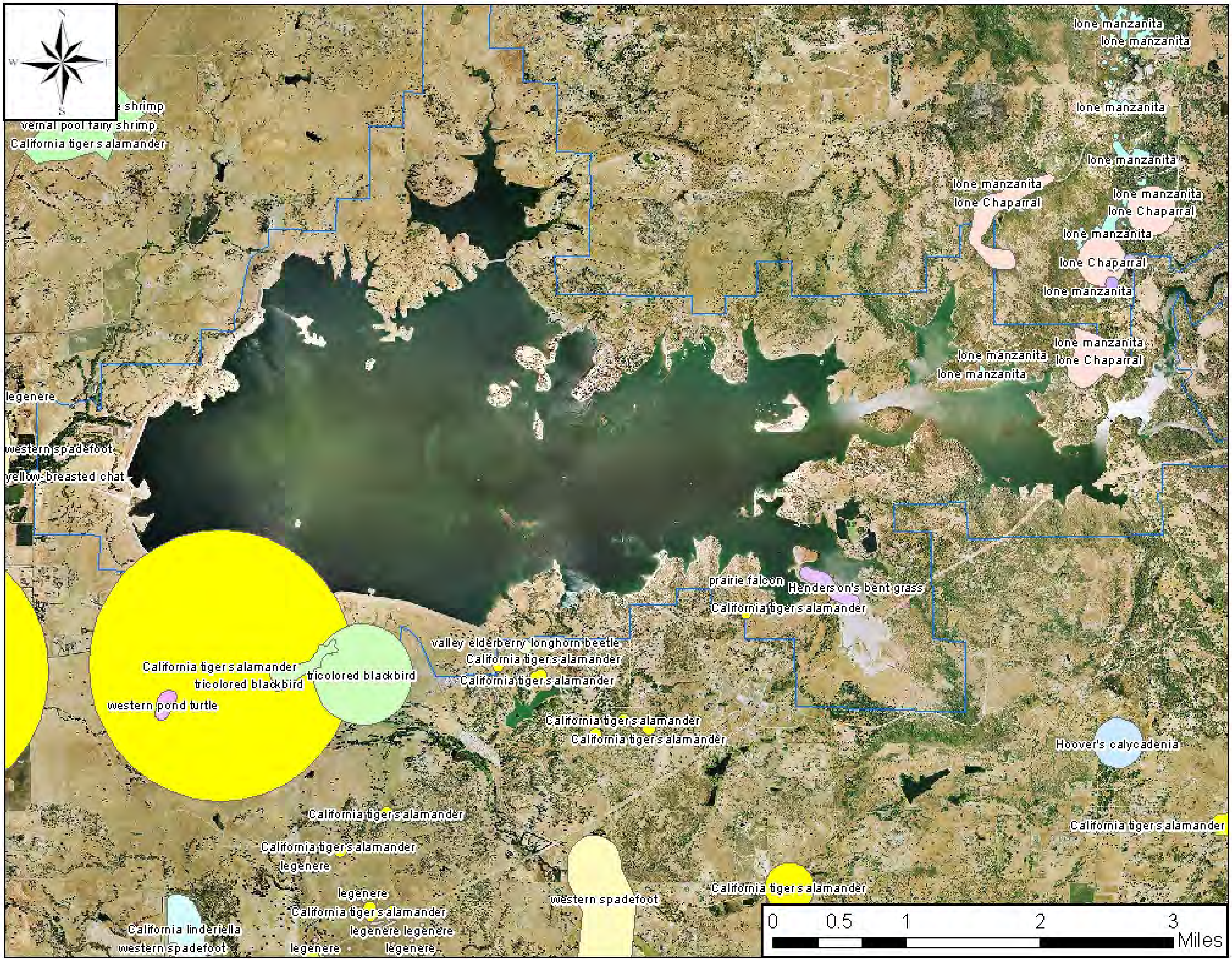
2.3.2 Facilities and Alignment

Alternative 3 includes all elements of Alternatives 1 and 2 and further extends the treated water conveyance system south to the Wallace area as shown in Figure 3. The facilities and alignments developed in the *Camanche Regional Water System Feasibility Study* (KASL, July 1999) are used here. Other treated water pipeline alternatives that would be more direct routes from the WTP to Wallace were analyzed, but because of potential environmental impacts, the alternative following the road (as shown in Figure 4) was determined to be most appropriate while minimizing potential environmental impacts. Although a cross-lake pipeline could reduce the total length of pipeline from 6.5 miles to about 4 miles, there were several disadvantages including:

- Need to buy private property/easements.
- Need to make the pipe thicker/add anchors since it is crossing under the reservoir.
- Need to carefully plan pipe placement to not affect boating, beaches, etc.
- A significant number of trees would need to be removed.
- Biological species issues such as the crossing of wetlands, and habitat of California Tiger Salamanders (CTS), fairy shrimp and spadefoot toads would be expected.

Based on the wetlands and CTS population, a pipeline alternative entering these areas could require wetland mitigation, compensation for CTS habitat, and significant best management practices (BMPs) and monitoring. Therefore, although there would be cost savings through pipe length reduction, there would most likely be an overall cost increase resulting from the potential environmental mitigation needed for the affected species. The following figure shows the locations of rare plants and special status species surrounding Lake Camanche as identified in the California Natural Diversity Database (CNDDB).

Figure 3: Rare Species Surrounding Lake Camanche



EBMUD projects that the Wallace area will not be able to receive supply from the aqueduct via the CARWSP WTP for about 4 months out of every 48 months. In order to have a consistent, reliable supply to meet peak demands and emergency fire flows during this supply outage period, CCWD plans to rely on existing groundwater sources. Use of surface supplies in lieu of groundwater supplies in 44 of every 48 months, on average, is expected to allow the groundwater basin to adequately recharge, correcting some of the existing supply and quality efficiencies experienced by the system and enabling use during months when surface supply is unavailable. This assumption would need to be further evaluated as part of future study.

Alternative 3 key facilities Include:

- 2.25 MGD WTP
- Upsize pumps at WTP
- 11,700 LF of 8” TW pipeline crossing reservoir
- 3,400 LF of 8” TW pipeline from CANS tank to proposed AWA tank / existing distribution system
- 5,860 LF of 12” RW pipeline connecting Aqueducts to WTP
- Altitude valve on CASS tank
- Altitude valve on CANS tank
- Pressure reducing valves and pressure sustaining valves
- One 500,000 gallon storage tanks for Lake Camanche Village
- 4,800 LF of 8” TW main from WTP to Camanche South Shore park entrance
- Booster pump station with standby power at park entrance (2 pumps at 20 hp each)
- 31,500 LF of 10” and 12” TW main from park entrance to Wallace area
- 600,000 gallon storage tank in Wallace at elevation suitable for serving most of Wallace area demand, for fire flow and emergency supply

Figure 4: Alternative 3

2.3.3 Vintage Home Fixture Retrofit

The conservation program included in Alternative 3 will consist of replacing existing, non-conserving toilets and showerheads with low-flow toilets and showerheads in the CANS and CASS communities, Lake Camanche Village, and the Wallace area. Rebates will be provided to approximately 30 homes in the Wallace area for showerhead replacements and toilets will be replaced at a cost of $225 per toilet (cost of toilet and installation). Implementation of the Vintage Home Fixture Retrofit program in the CANS, CASS, Lake Camanche Village, and Wallace areas would result in a total water savings of almost 58,000 gpd, as shown in Table 1.

Table 1: Potential Water Savings

	Existing No. of Units	Units Requiring New Fixtures[1]	Showerhead Replacement Water Savings (gpd)	Toilet Replacement Water Savings (gpd)	Total Water Savings (gpd)
Lake Camanche Village	733	367	11,285	24,773	36,058
CANS	161	113	3,475	7,628	11,103
CASS	111	78	2,399	5,265	7,664
Wallace	100	30	923	2,025	2,948
Total	**1,230**	**588**	**18,082**	**39,691**	**57,773**

1. Based on agency staff knowledge, the following percent of existing units could benefit from fixture replacement: AWA estimated 70% of the existing units in Lake Camanche Village, EBMUD estimated 50% of existing units in CANS and CASS, and CCWD estimated 30% of the existing units in Wallace.

Alternative 3 facilities include:

- An additional 30 $25 showerhead rebates in addition to the approximately 558 rebates identified for the CANS, CASS, and Lake Camanche Village areas in Alternative 2, for a total of approximately 588 rebates
- An additional 30 low-flow toilets (cost of the toilet and installation estimated to be $225 per toilet) in addition to the approximately 558 toilets identified for the CANS, CASS, and Lake Camanche Village areas in Alternative 2, for a total of approximately 588 toilets

2.3.4 Conjunctive Use

With implementation of Alternative 3, providing a surface water supply to the community of Wallace, CCWD will convert existing groundwater facilities for conjunctive operations. Doing so would provide enhanced dry year reliability and emergency backup supply. No new facilities are anticipated to be required for Alternative 3 beyond the pressure reducing valves and pressure sustaining valves required for Alternative 2.

3 Cost Estimates

For the purposes of better understanding the cost of each of the alternatives, an order-of-magnitude[1] cost estimate has been developed. The 90% Cost Estimate for Alternative 1, prepared by EBMUD in 2002, was used as a basis for costs for the alternatives. Unit costs were taken from this EBMUD estimate, while construction contingencies and projects implementation costs were developed separately here. The EBMUD unit costs were increased from 2002 to 2012 values.

3.1 Engineering News Records (ENR) Construction Cost Index (CCI)

The ENR 20 Cities Average Construction Cost Index (CCI=6800) was used to increase the 2002 EBMUD costs to 2012 costs (CCI=9359.99).

[1] Per American National Standards Institute Standard Z94.0 (based on the Association for the Advancement of Cost Engineering (AACE)), this level of estimate represents a design that is 5 to 20 percent complete. In general, actual project costs can be expected to range from 50 percent more to 30 percent less than the order-of-magnitude estimate.

3.2 Construction Contingencies

Project contingencies are defined as unknown or unforeseen costs. Such unknown and risk conditions could include changes in project scope, occurrences of groundwater and dewatering uncertainties, unknown soil conditions, unknown utility locations, etc. For planning studies, typical construction contingencies can range between 20 and 50 percent. Because EBMUD is in the process of implementing its portion of the project, a 10% construction contingency was applied. For the purposes of the Alternative 2 and 3 cost estimates, a construction contingency of 30 percent has been applied to the estimated construction cost subtotal.

3.3 Project Implementation Costs

Implementation factors are included to capture the entire capital cost associated with the implementation of the project. In order to be consistent with funding requirements, the implementation cost categories required for Prop 84 funding were utilized for this cost estimate. Figure 4 shows the percentages used for each of the implementation cost factors. Alternative 1 has fewer implementation costs since the design is at the 90% level—many of the implementation costs have already been incurred. These implementation cost factors were applied to the total construction cost subtotal.

Table 2: Prop. 84 Implementation Cost Factors

		Alternative 1	Alternatives 2&3
(a)	Direct Project Administration Costs	5	5
(b)	Land Purchase/Easement	0	1
(c)	Planning/Design/Engineering/ Environmental Documentation	0	10
(d)	Construction/Implementation	0	3
(e)	Environmental Compliance/ Mitigation/Enhancement	0	3
(f)	Construction Administration	0	3
(g)	Other Costs (Including Legal Costs, Permitting and Licenses)	0	2
(h)	Construction/Implementation Contingency	0	3
(i)	Grand Total (Sum rows (a) through (h) for each column)	5*	30

* Per EBMUD, implementation cost factor for Alternative 1 should be 5%.

3.4 Operations and Maintenance Costs

Operations and Maintenance (O&M) costs are derived from experience on similar projects and standard engineering planning methods and cost curves. These costs should be calibrated using existing EBMUD, AWA, and CCWD data, including data on power costs, labor rates, etc. Operating costs are defined as labor, material, equipment, and outside services necessary for routine operating functions. Outside services include electric power and chemicals. Maintenance expenses include all costs associated with the routine servicing and repair of facilities required on an annual basis.

The following unit costs were used:

- Water treatment plant: $0.54/gallon of treatment capacity
- Pipelines: $0.60/ linear foot of pipeline
- Pump station O&M: $10,000 plus 5% of capital construction cost
- Pump station electricity: $0.12/KW-hr
- Storage Facilities- Distribution System Tanks: $75,000 per tank
- Miscellaneous components (altitude valves, etc): 5% of their capital construction cost

3.5 Cost Allocation for Raw Water Pipeline and WTP

The project partners cost percentage for the raw water pipeline to the Aqueducts and the water treatment plant is summarized in the tables below. This cost allocation is proportional to the amount of water that each partner is expected to use.

Table 3: Percentage of Responsibility for Alternatives

	Percentage responsibility		
Project Proponents	Alternative 1	Alternative 2	Alternative 3
EBMUD	100%	34.7%	24.4%
AWA	0%	65.3%	45.9%
CCWD	0%	0%	29.7%

3.6 Cost for Alternatives

The costs for each alternative and the associated costs for the project proponents are summarized in the following table. The full cost estimate for each alternative is provided in Attachment 1.

Table 4: Project Alternative Costs

	Alternative 1 – CASS & CANS Only		Alternative 2 – CASS, CANS, and Lake Camanche Village		Alternative 3 – CASS, CANNS, Lake Camanche Village, and Wallace	
Project Proponents	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost	Capital Cost	Annual O&M Cost
EBMUD	$3.5 million	$300,000	$2.6 million	$300,000	$2.5 million	$300,000
AWA	$0	$0	$6.0 million	$700,000	$5.9 million	$700,000
CCWD	$0	$0	$0	$0	$8.9 million	$500,000
Total	$3.5 million	$300,000/yr	$8.6 million	$1 million/yr	$17.3 million	$1.5 million/yr

4 Scoring of Critical Success Factors

EBMUD, CCWD, and AWA each identified objectives and critical success factors (CSFs) for CARWSP. As described in the CARWSP Program Objectives TM (RMC, July 2012), objectives represent ideal elements to be included in the CARWSP identified by each PPC member agency. In contrast, critical success factors (CSFs) represent elements of the CARWSP that must be included for the project to be viable from the perspective of the PPC agencies. The three project alternatives are scored based on how well they meet the identified CSFs.

The following table shows how each of the projects score for identified CSFs.

Table 5: Alternatives' CSF Scores

Critical Success Factor	Alternative		
	1	2	3
A. Meet Current and Future Demands in the Wallace Area	○	○	●
B. Maintain or Reduce Operating Costs to Provide an Affordable Supply	●	●	●
C. Provide a System that is Easy to Operate	●	●	●
D. Prevent Unmitigated Environmental Impacts and Provide Environmental Enhancements where Feasible	●	●	●
E. Provide Reliable Supply Year-Round	○	◖	●
F. Clear and Fairly Resolve Water Rights	○	◖	●
G. Build Regional Partnerships	○	◖	●
H. Garner Local Community Support	To be determined[1]		
I. Transfer Responsibility for Local Residents	To be determined[2]		
J. Meet All Applicable Regulatory Requirements	●	●	●
K. Beneficially Impact Water Treatment-Related Wastewater Discharges	●	●	●
L. Maximize Ability to Secure Outside Funding	○	◖	●
M. Improve Water Supply and Quality in the Lake Camanche Village Area	○	●	●
N. Provide an Affordable Supply	To be determined[3]		
O. Minimize Capacity Impacts to the Mokelumne Aqueduct	●	●	●

Key:

○ Does not meet criterion.

◖ Partially meets criterion.

● Fully meets criterion.

Notes:

1. Ability to garner local community support will be established once the preferred alternative has been identified and additional public outreach completed.
2. The potential for transferring responsibility to local residents will be evaluated during completion of the CARWSP Project Plan.
3. Ability to provide an affordable supply will depend upon the ability of the project partners to secure outside funding for the project. Without outside funding, it is not currently anticipated that AWA or CCWD would proceed with project implementation.

5 Preferred CARWSP Alternative

Based on the assessment above, Alternative 3 was determined to be the preferred alternative. Alternative 3 addresses more CSFs than Alternatives 1 or 2, and it would allow the three participating agencies are pursue a regional project that would benefit from economies of scale and eliminate redundant facilities.

A detailed cost estimate for the preferred CARWSP alternative is included as Attachment 2. To minimize up-front costs, the project would likely be implemented in phases, as described below.

- Phase 1: Implementation of Alternative 1 and Vintage Home Fixture Retrofit Components
    - Phase 1A – Aqueduct connection, raw water pipeline from Mokelumne Aqueduct to WTP, and 0.5 MGD WTP
    - Phase 1B – Treated water pipeline to CANS
    - Phase 1C – Vintage Home Fixture Retrofit for CANS, CASS, Lake Camanche Village, and Wallace
- Phase 2: Implementation of Alternative 2 Components (including Conjunctive Use Components)
    - Phase 2A – Expand WTP by 1 MGD
    - Phase 2B – Treated water pipeline to Lake Camanche Village, pump station and tank, and conjunctive use conversion
- Phase 3: Implementation of Remaining Alternative 3 Components
    - Phase 3A – Expand WTP by 0.7 MGD
    - Phase 3B – Treated water pipeline to Wallace, pump station and tank

Implementing the project in a phased manner provides flexibility in implementing the project and securing required funding. The costs for each phase are summarized below.

Table 6: Costs for CARWSP Phase 1

Project Proponents	Capital Cost
EBMUD	$3.5 million
AWA	$200,000
CCWD	$10,000
Total	$3.7 million

Table 7: Costs for CARWSP Phase 2

Project Proponents	Capital Cost	Cost Reduction from Phase 1 to 2
EBMUD	$0	$900,000
AWA	$5.9 million	N/A
CCWD	$0	N/A
Total	$5.9 million	

Table 8: Costs for CARWSP Phase 3

Project Proponents	Capital Cost	Cost Reduction from Phase 2 to 3
EBMUD	$0	$100,000
AWA	$0	$200,000
CCWD	$8.8 million	N/A
Total	$8.8 million	

It should be noted that, while EBMUD currently plans to move forward with Phase 1, Phases 2 and 3 may not proceed if outside funding cannot be secured to offset implementation costs and minimize the burden to ratepayers in the Lake Camanche Village and Wallace areas.

6 Next Steps

Additional projects will be necessary to complete the regional system. Recommended projects and studies to be completed as part of project implementation include:

- Pursuit of outside funding to offset implementation costs, particularly for Phases 2 and 3;
- Hydraulic modeling to confirm sizing of pipelines, storage facilities, pump stations, valves, and appurtenances;
- Identification and assessment of additional potential pipeline alignments to confirm the alignments identified in this study;
- Evaluation of potential environmental impacts and mitigation strategies, and completion of required environmental documentation;
- Final design of the preferred alternative; and
- Identification and pursuit of required permits (including environmental documentation).

Attachment 1 – CARWSP Alternatives Cost Estimates

Alternative 1 Cost Estimate

Description: 0.5 MGD WTP at CSS; 12" raw water pipeline from Mokelumne Aqueduct to WTP; 8" treated water line to CANS							**Cost breakdown- by partner**			Annual O&M Costs
		Quantity	Unit	Unit price	Source	Notes	EBMUD	AWA	CCWD	
Vintage Home Fixture Retrofit										
Rebate Program in CANS and CASS	$50,138	191	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin	$50,138			
Water Treatment										
0.5 MGD WTP to serve CANS and CASS	$1,799,489				EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$1,799,489	$0	$0	$270,000
12" raw water pipeline from Mokelumne Aqueduct to WTP	$558,843	5,800	LF	$96	EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$558,843	$0	$0	$3,480
Conveyance										
8" treated water pipeline from WTP to CANS	$641,669	7,614 4,160	LF	$48 $66 (underwater)	EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$641,669	$0	$0	$7,064
Estimated Construction Cost Total (2012 dollars)	$3,050,138				EBMUD	Based on latest construction cost estimate on Sept 24, 2012 meeting		$0	$0	
Construction Contingency Factor (10%)	$305,014						$305,014			
Total Construction Cost Subtotal	$3,355,152									
Implementation Cost Factor (5% for Alternative 1)	$167,758				EBMUD	Per EBMUD during Sept 24, 2012 meeting	$167,758			
Total Capital Costs	**$3,500,000**						**$3,472,772**	**$0**	**$0**	
Total Annual O&M Costs	**$300,000**									$280,544

Project Proponents Costs (Capital)	
EBMUD	$3,500,000
AWA	$0
CCWD	$0

Project Proponents Costs (Annual O&M)	
EBMUD	$300,000
AWA	$0
CCWD	$0

Alternative 2 Cost Estimate

Description: Alternative 1 + extra 1MGD WTP + connection to AWA Well field No 6 to serve Lake Camanche Village
9359.99 ties Average Construction Cost Index (CCI)
6800 Average CCI from time of EBMUD estimate
1.376469118 Factor to August 2012 Dollars

							Cost breakdown- by partner			Annual O&M Costs
		Quantity	Unit	Unit price	Source	Notes	EBMUD	AWA	CCWD	(see "O&M Assumptions" tab for more info)
Vintage Home Fixture Retrofit										
Rebate Program in Lake Camanche Village	$96,338	367	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin		$96,338		
Water Treatment										
Additional 1 MGD of capacity at WTP to serve Lake Camanche Village	$2,000,000	1,000,000	gal	$2	RMC	Additional treatment capacity assumed to cost approximately $2/gal based on costs associated with similar membrane water treatment plants recently constructed in California.	$0	$2,000,000	$0	$540,000
Conjunctive Use Program										
Altitude valve on CASS and CANS tanks	$55,059	2	EA	$27,529	1999 KASL report, scaled to 2012 dollars		$0	$55,059	$0	$2,753
Pressure reducing valves and pressure sustaining valves	$27,529	1	LS	$27,529	1999 KASL report, scaled to 2012 dollars		$0	$27,529	$0	$1,376
Conveyance										
500,000 gallon storage tank for Lake Camanche Village	$454,235	500,000	LS	$0.91	1999 KASL report, scaled to 2012 dollars	Need 1,000,000 total gallons of storage to cover one full maximum day demand. This is above recommendation of KASL report.	$0	$454,235	$0	$75,000
8" treated water pipeline to AWA tank / existing system	$187,200	3,400	LF	$55	1999 KASL report, scaled to 2012 dollars		$0	$187,200		
Booster Pump station for Lake Camanche Village	$206,470	1	LS	$206,470	1999 KASL report, scaled to 2012 dollars	assume 25hp	$0	$206,470	$0	$39,921
Estimated Construction Cost Total in 2012 dollars	$3,026,831									
Construction Contingency Factor (30%)	$908,049						$0	$908,049	$0	
Total Construction Cost Subtotal	$3,934,880									
Implementation Cost Factor (30% for Alternative 2)	$1,180,464						$0	$1,180,464	$0	
Alternate 1 Costs	$3,500,000						$2,559,557	$905,444	$0	$300,000
Total Capital Costs	**$8,600,000**						**$2,559,557**	**$6,020,787**	**$0**	
Total Annual O&M Costs	$1,000,000									$959,050

Project Proponents Costs (Capital)	
EBMUD	$2,600,000
AWA	$6,000,000
CCWD	$0
Project Proponents Costs (Annual O&M)	
EBMUD	$300,000
AWA	$700,000
CCWD	$0

Alternative 3 Cost Estimate

Description: Alternative 1 + Alternative 2 + extra 0.75 MGD WTP + service to Wallace Area

9359.99	August 2012 ENR 20 Cities Average Construction Cost Index (CCI)
6800	2002/2003 ENR 20 Cities Average CCI from time of EBMUD estimate
1.376469118	Escalation Factor to August 2012 Dollars

		Quantity	Unit	Unit price	Source	Notes
Vintage Home Fixture Retrofit						
Rebate Program in Wallace	$7,875	30	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin
Water Treatment						
Additional 0.75 MGD of capacity at WTP to serve Wallace	$1,500,000	750,000	gal	$2	RMC	Additional treatment capacity assumed to cost approximately $2/gal based on costs associated with similar membrane water treatment plants recently constructed in California.
Conveyance						
8" treated water pipeline from WTP to park entrance	$264,282	4,800	LF	$55	1999 KASL report, scaled to 2012 dollars	
Pump station w/ standby power at park entrance	$206,470	1	LS	$206,470	1999 KASL report, scaled to 2012 dollars	assume 25hp

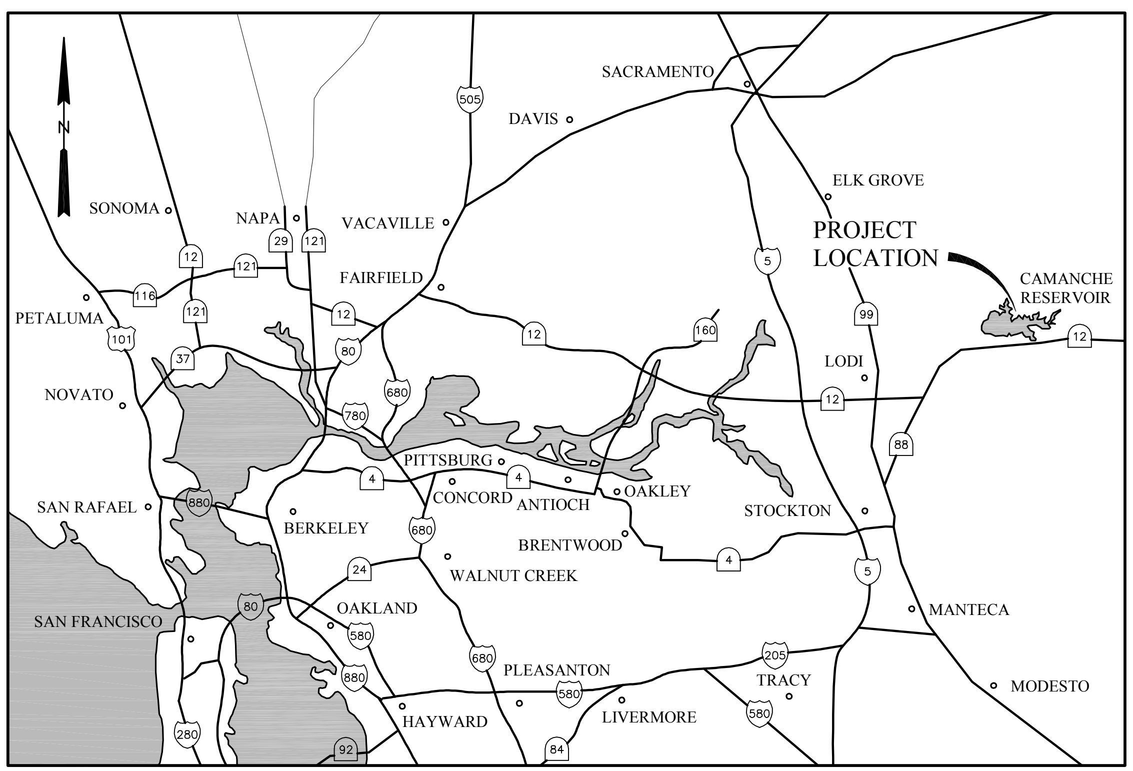
10" and 12" treated water pipeline from park entrance to wallace	$2,601,527	31,500	LF	$83	1999 KASL report, scaled to 2012 dollars	
600,000 gallon storage tank (fire/emergency flows at Wallace)	$545,082	600,000	gal	$0.91	1999 KASL report, scaled to 2012 dollars	
Estimated Construction Cost Total in 2012 dollars	$5,125,236					
Construction Contingency Factor (30%)	$1,537,571					
Total Construction Cost Subtotal	$6,662,807					
Implementation Cost Factor (30% for Alternative 3)	$1,998,842					See "implementation Cost Factors" tab
Alternative 1 Costs	$3,500,000					
Alternative 2 Costs (without Alt 1)	$5,115,344					
Total Capital Costs	**$17,300,000**					
Total Annual O&M Costs	**$1,500,000**					
Project Proponents Costs (Capital)						
EBMUD	$2,500,000					
AWA	$5,900,000					
CCWD	$8,900,000					

Attachment 2 – Preferred CARWSP Alternative Cost Estimate

CAMANCHE AREA REGIONAL WATER SUPPLY PLAN
ALTERNATIVES ANALYSIS

DRAFT SUBMITTAL

October 2012



VICINITY MAP
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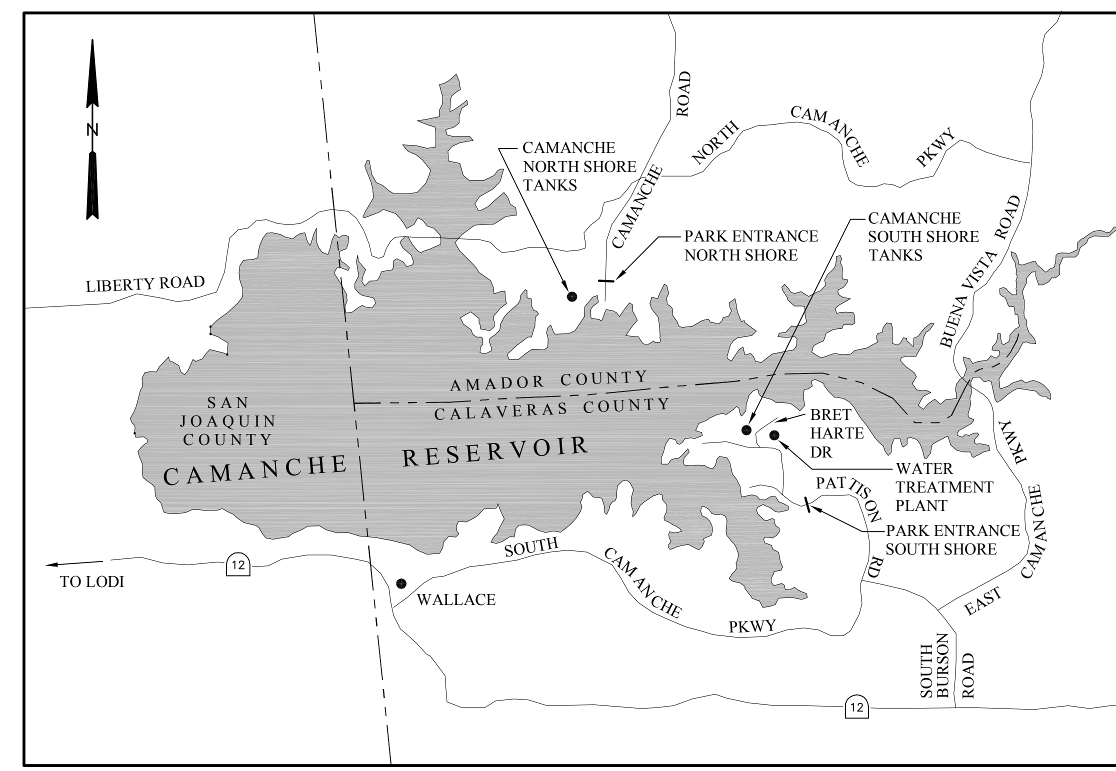
INDEX OF DRAWINGS

Sheet No.	Dwg. No.	Drawing Title
	GENERAL	
1	G–1	COVER SHEET
2	G–2	CAMANCHE AREA REGIONAL WATER SUPPLY PLAN
3	G–3	SERVICE AREA PROFILE

ABBREVIATIONS

AWA	AMADOR WATER AGENCY
CASS	CAMANCHE SOUTH SHORE
CANS	CAMANCHE NORTH SHORE
CCWD	CALAVERAS COUNTY WATER DISTRICT
EBMUD	EAST BAY MUNICIPAL UTILITIES DISTRICT
RW	RAW WATER
TW	TREATED WATER
UF	ULTRAFILTRATION

RMC
Water and Environment



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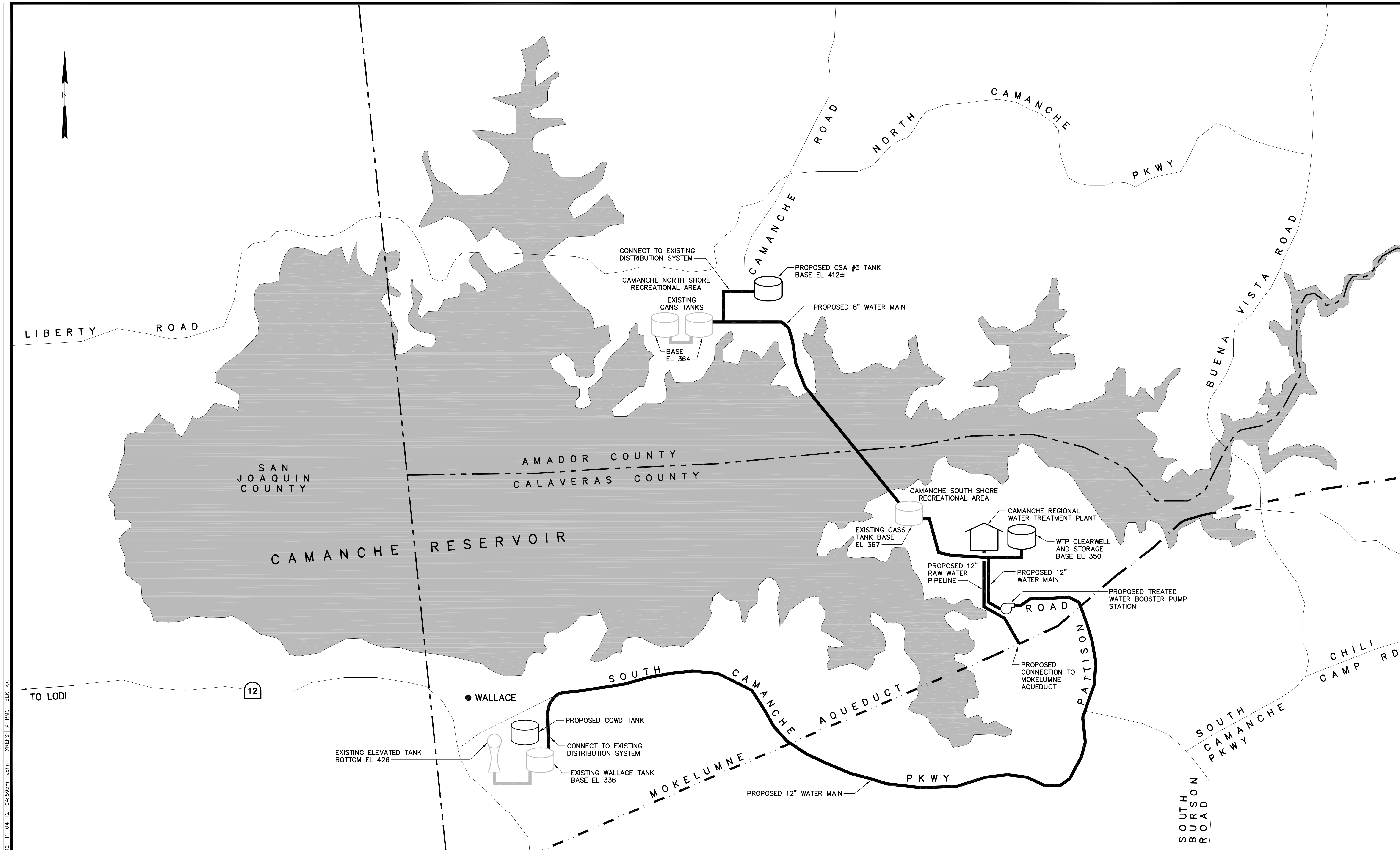

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RMC Water & Environment

REV	DATE	BY	APVD	DESCRIPTION

DESIGNED
DRAWN
CHECKED

SUBMITTED: RMC PROJ ENGR
APPROVED: RMC ENGR

CAMANCHE AREA REGIONAL WATER SUPPLY

CAMANCHE AREA REGIONAL WATER SUPPLY PLAN

DWG NO	G-2
SHEET NO	
PROJ NO	0122-004
DATE	Oct 2012

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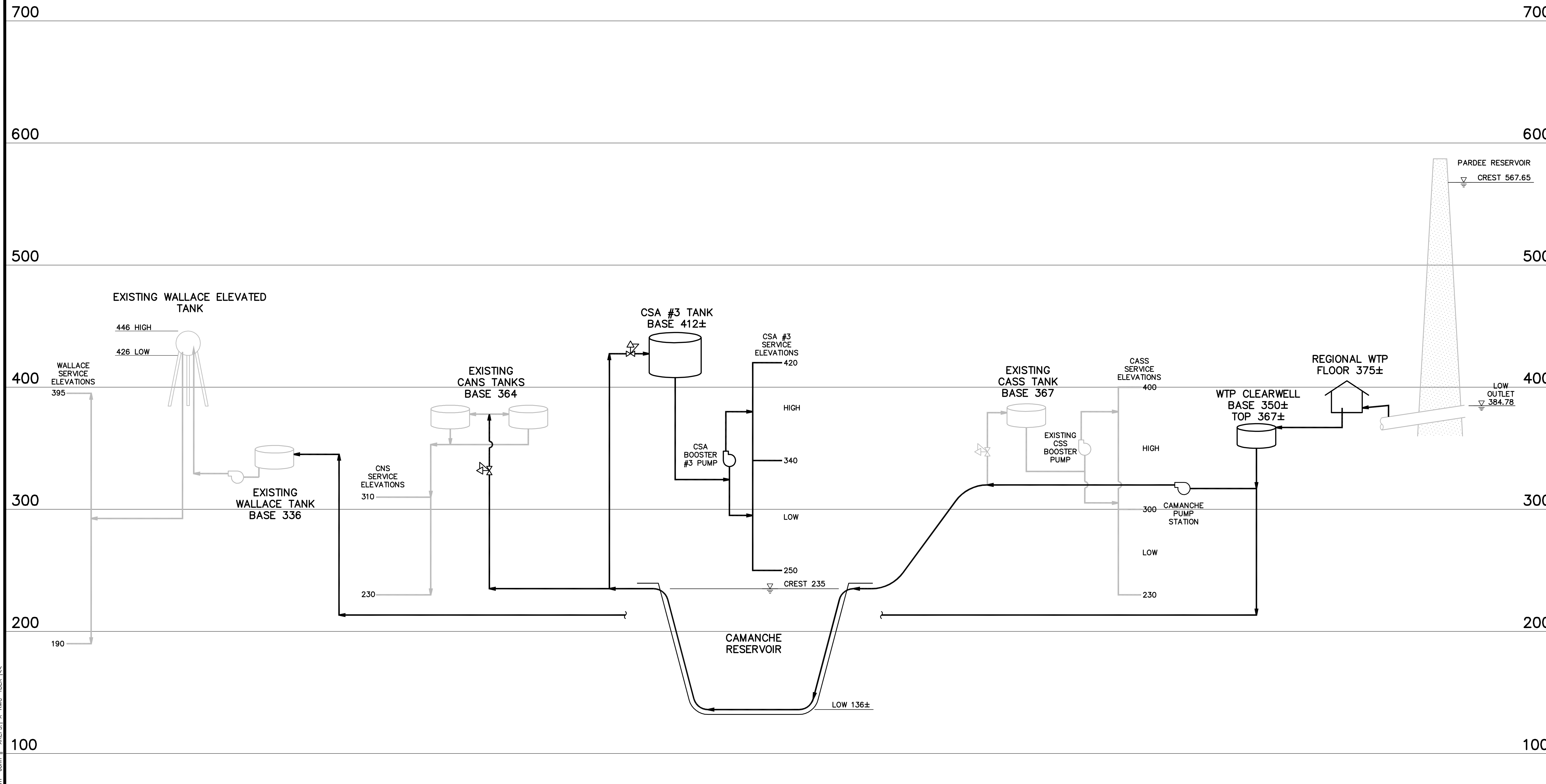

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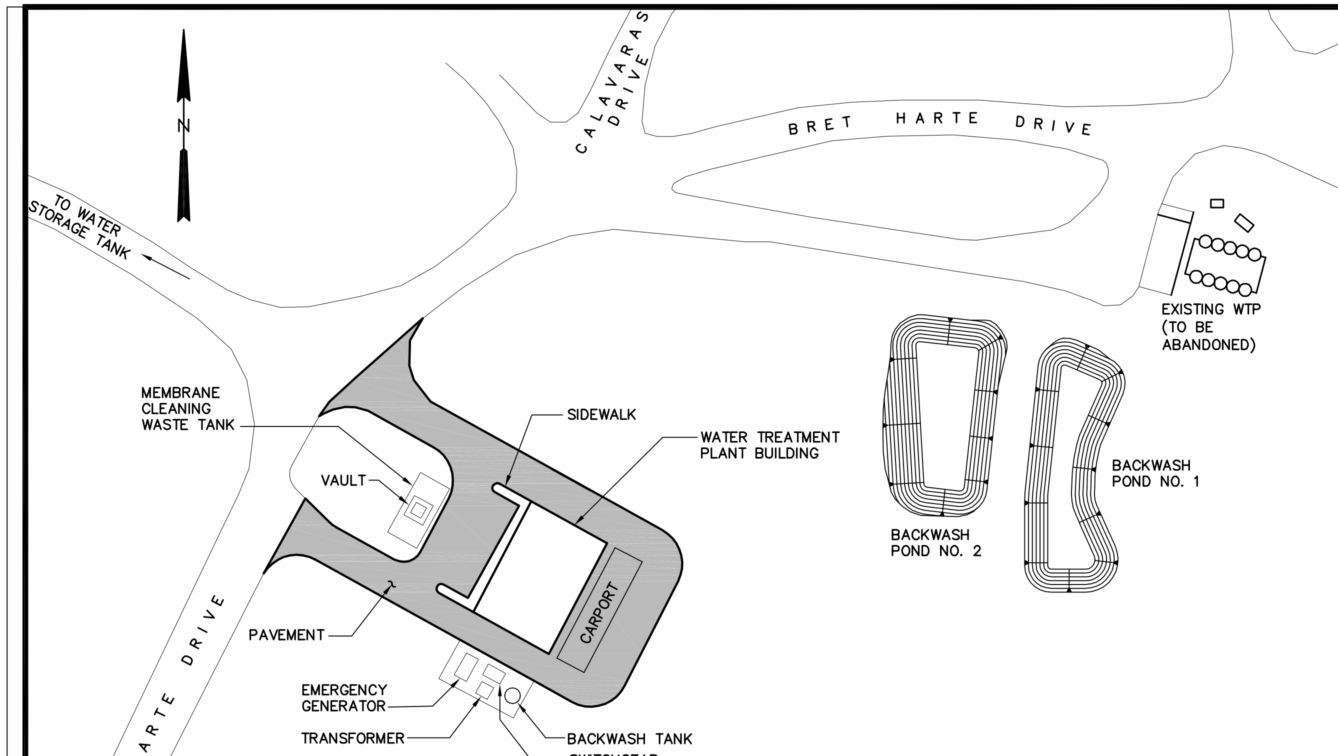

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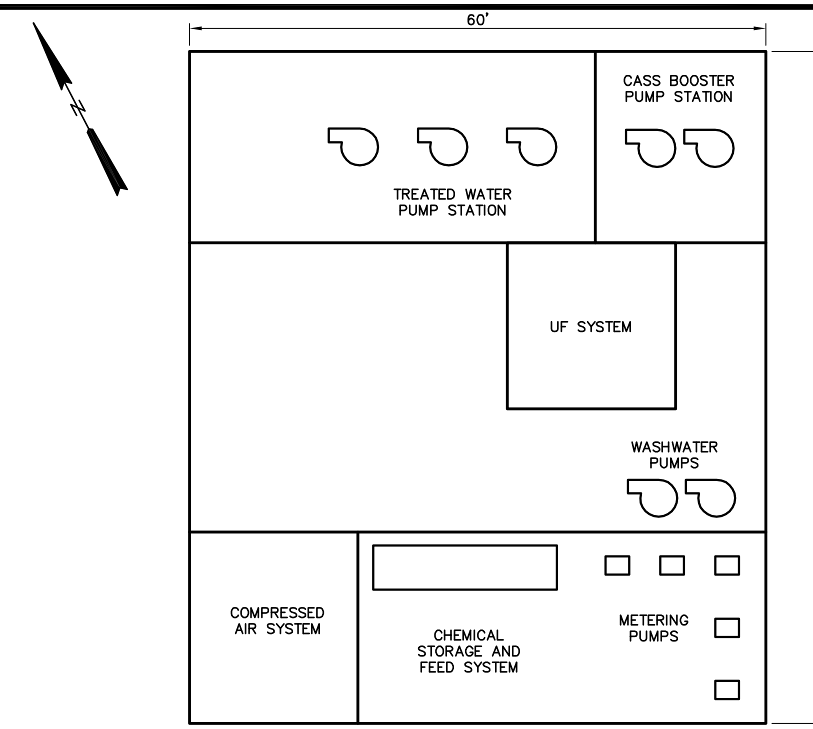

WATER TREATMENT PLANT
1.5 MGD SCENARIO
SERVING EBMUD AND AWA (2)
1"=10'

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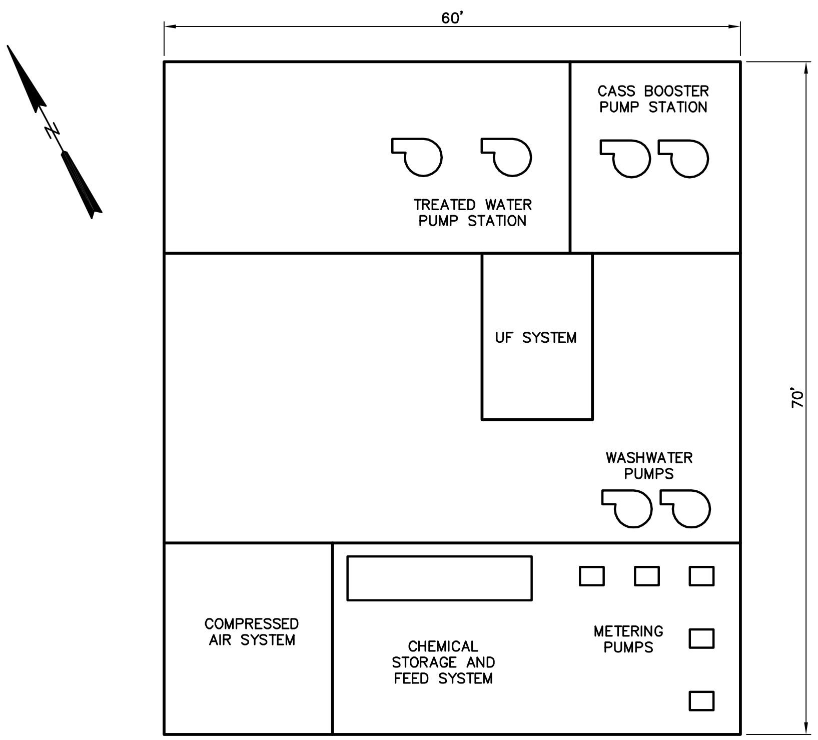

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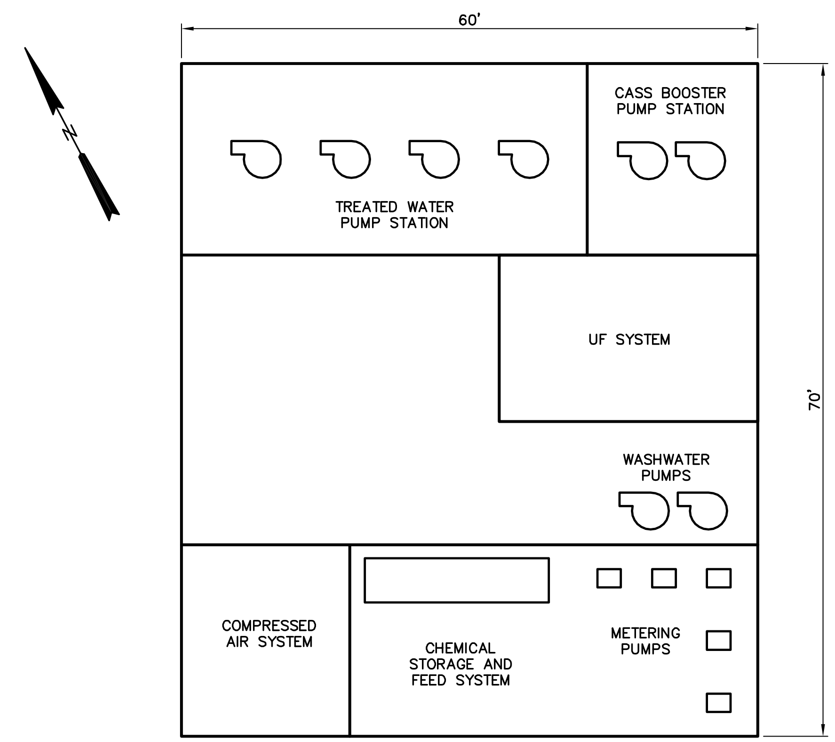

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SERVING _______ (3)
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RMC
Water & Environment

REV	DATE	BY	APVD	DESCRIPTION

DESIGNED
DRAWN
CHECKED

SUBMITTED: RMC PROJ ENGR
APPROVED: RMC ENGR

CAMANCHE AREA REGIONAL WATER SUPPLY

SITE PLAN

DWG NO	G-4
SHEET NO	
PROJ NO	0122-004
DATE	Oct 2012

FILENAME: 0122-4-G04 10-25-12 07:52am John XREFS: X-RMC-TBLK

Last Saved By: John 10-25-12 07:52am

Camanche Area Regional Water Supply Project, Preferred Alternative - Cost Estimate

		Quantity	Unit	Unit price	Source	Notes	Cost Breakdown			O&M Cost
							EBMUD	AWA	CCWD	
Vintage Home Fixture Retrofit										
Rebate Program in CANS and CASS	$50,138	191	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin	$50,138			
Rebate Program in Lake Camanche Village	$96,338	367	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin		$96,338		
Rebate Program in Wallace	$7,875	30	homes	$250	RMC	$25 showerhead rebate; $225 toilet subsidy; 5% additional cost for program admin			$7,875	
Water Treatment Plant and Appurtenances										
0.5 MGD WTP to serve CANS and CASS	$1,799,489				EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$1,799,489			$270,000
Additional 1 MGD of capacity at WTP to serve Lake Camanche Village	$2,000,000	1,000,000	gal	$2	RMC	Additional treatment capacity assumed to cost approximately $2/gal based on costs associated		$2,000,000		$540,000
Additional 0.75 MGD of capacity at WTP to serve Wallace	$1,500,000	750,000	gal	$2	RMC	with similar membrane water treatment plants recently constructed in California.			$1,500,000	$405,000
Conveyance										
12" raw water pipeline from Mokelumne Aqueduct to WTP	$558,843	5,800	LF	$96	EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$136,425	$256,680	$165,738	$3,480
8" treated water pipeline from WTP to CANS	$641,669	7,614 4,160	LF	$48 $66 (underwater)	EBMUD	Based on estimate provided by EBMUD during September 2012 meeting.	$222,688	$418,980		$7,064
500,000 gallon storage tank for Lake Camanche Village	$454,235	500,000	LS	$0.91	1999 KASL report, scaled to 2012 dollars	Need 1,000,000 total gallons of storage to cover one full maximum day demand. This is above recommendation of KASL report.		$454,235		$75,000
8" treated water pipeline to AWA tank / existing system	$187,200	$3,400	LF	$55	1999 KASL report, scaled to 2012 dollars			$187,200		
Booster Pump station for Lake Camanche Village	$206,470	1	LS	$206,470	1999 KASL report, scaled to 2012 dollars	assume 25hp		$206,470		$39,921
8" treated water pipeline from WTP to park entrance	$264,282	4,800	LF	$55	1999 KASL report, scaled to 2012 dollars				$264,282	$2,880
Pump station w/ standby power at park entrance	$206,470	1	LS	$206,470	1999 KASL report, scaled to 2012 dollars	assume 25hp			$206,470	$39,921
10" and 12" treated water pipeline from park entrance to wallace	$2,601,527	31,500	LF	$83	1999 KASL report, scaled to 2012 dollars				$2,601,527	$18,900
600,000 gallon storage tank (fire/emergency flows at Wallace)	$545,082	600,000	gal	$0.91	1999 KASL report, scaled to 2012 dollars				$545,082	$75,000
Conjunctive Use										
Altitude valve on CASS and CANS tanks	$55,059	2	EA	$27,529	1999 KASL report, scaled to 2012 dollars			$55,059		$2,753
Pressure reducing valves and pressure sustaining valves	$27,529	1	LS	$27,529	1999 KASL report, scaled to 2012 dollars			$27,529		$1,376
BASE CONSTRUCTION COST	**$11,202,204**						**$2,208,740**	**$3,702,491**	**$5,290,974**	
Construction Contingency Factor (10% for EBMUD facilities, 30% for AWA & CCWD facilities)	$2,694,474						$220,874	$919,455	$1,554,145	
CONSTRUCTION COST SUBTOTAL	**$13,896,678**						**$2,429,614**	**$4,621,946**	**$6,845,118**	
Implementation Cost Factor (5% for EBMUD facilities, 30% for AWA & CCWD facilities)	$3,274,056				EBMUD	Per EBMUD during Sept 24, 2012 meeting	$121,481	$1,144,617	$2,007,958	
TOTAL CAPITAL COST	**$17,200,000**						**$2,600,000**	**$5,800,000**	**$8,900,000**	
TOTAL O&M COST							**$300,000**	**$700,000**	**$500,000**	**$1,500,000**

Appendix F – CARWSP Preliminary Project Plan

DRAFT Technical Memorandum

Camanche Area Regional Water Supply Plan

Subject:	**Preliminary CARWSP Project Plan**
Prepared For:	Project Partners Committee (PPC)
Prepared by:	Rob Alcott
Reviewed by:	Alyson Watson
Date:	January 2, 2012
Reference:	Task 3.5

1 Introduction

The purpose of this Preliminary Camanche Area Water Supply Project (CARWSP) Project Plan is twofold. One purpose is to describe the mutually agreed-upon elements of CARWSP as formulated by partner agencies Amador Water Agency (AWA), Calaveras County Water District (CCWD) and East Bay Municipal Utility District (EBMUD). The project elements addressed in this plan include a project phasing timetable, anticipated project development milestones, allocation of project related costs, financing framework, and project operations and maintenance parameters. The other purpose of this plan is to document the intentions of each Project Partner with respect to the development of the project, the process to be followed to bring the project to fruition, and the roles and responsibilities of each of the three Project Partners in that process.

2 Background

The communities located adjacent to Lake Camanche, including several economically disadvantaged communities (DACs), have struggled for many years to overcome water supply quality and reliability problems. These communities lie within the service areas of three water agencies, AWA, CCWD and EBMUD. In past years each of these agencies has worked individually to address problems troubling their respective community water systems with limited success. A regional solution to these long standing water supply problems is represented by CARWSP, a collaborative effort of the three water agencies.

The Camanche area is the region generally surrounding Lake Camanche in western Amador and Calaveras Counties and includes two DAC communities (Lake Camanche Village and North Lake Camanche Recreation Area), and the communities of Wallace and South Shore Camanche Recreation Area. The primary source of water supply in the Camanche area is presently groundwater.

Groundwater quantity and quality in the Camanche area vary considerably from well site to well site due to the region's geology and the small and unpredictable yields of the groundwater system that typifies this area of the Sierra foothills. Wells serving the Amador County areas north of Lake Camanche are located within the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin. Wells serving the areas south of Lake Camanche are located in the Eastern San Joaquin Subbasin. Located on the eastern fringe of the San Joaquin Valley Groundwater Basin, the groundwater resources in the Camanche area are associated with both the fractured rock systems typically found in the foothills and alluvial systems characteristic of the San Joaquin Valley geology to the west.

Over the years groundwater has proven to be an unreliable, and oftentimes unsuitable, water supply source for the Camanche area communities. In addition to highly variable quantities of available groundwater, groundwater quality (elevated iron and manganese, and occasionally total coliform concentrations) has also been a chronic issue.

Following limited success in finding independent and sustainable solutions, the three responsible agencies have, with critical support of a Proposition 84 Planning Grant from the Department of Water Resources (DWR), developed CARWSP, a regional solution to the area's ongoing water supply problems. With CARWSP, raw water will be conveyed from the Mokelumne Aqueducts to a new regional surface water treatment plant located at Camanche South Shore. Treated water from this new treatment plant will be served to the adjacent Camanche South Shore community, and conveyed south to CCWD (to serve Wallace) and north to AWA (to serve Lake Camanche Village) and EBMUD (to serve the Camanche North Shore Recreation Area).

3 The CARWSP Project

A number of project-related considerations, including component facilities, project engineering and design, project capacity and cost allocations, financing, operations and maintenance, and water rights have been addressed by the Project Partners in the planning and preliminary engineering process funded by the Proposition 84 Planning Grant. These are presented and discussed in further detail in the following sections.

3.1.1 Project Components

Displayed in the table below are the key components of the CARWSP Project. Also shown are the designated capacities of each component and the intended agency owner and operator the component.

Table 1: Key Components of the CARWSP Project

Component	Designated Capacity	Owner	Operator
Aqueduct connection & raw water pipeline to WTP	2,177,200 g/d	EBMUD	EBMUD
Camanche Regional WTP	2,177,200g/d	EBMUD	EBMUD
Vintage Home Fixture Retrofit	588 homes	EBMUD – 191 AWA – 367 CCWD - 30	EBMUD – 191 AWA – 367 CCWD – 30
North Shore Pipeline	1,531,500 g/d	EBMUD	EBMUD
Lake Cam. Village Pipeline, Pump Station & Tank (w/conjunctive use conversion)	1,000,000 g/d	AWA	AWA
Wallace Pipeline, Pump Station & Tank (w/conjunctive use conversion)	645,700 g/d	CCWD	CCWD

3.1.2 Allocation of CARWSP Project Capital Costs

The capital cost for each *shared* component of CARWSP is to be based on the designated capacity (expressed as a percent) assigned to each sharing agency. The designated capacity of each project component is displayed in the table below.

Table 2: Designated Capacity of Shared CARWSP Components

	Max Day Treated Water Capacity	Percent Share
Camanche Regional WTP	2,177,200	100%
EBMUD	531,500	24.4%
AWA	1,000,000	45.9%
CCWD	645,700	29.7%
North Shore Pipeline	1,531,500	100%
EBMUD	531,500	34.7%
AWA	1,000,000	65.3%
Vintage Home Fixture Retrofit	588	100%
EBMUD	191	32.5%
AWA	367	62.4%
CCWD	30	5.1%

The table below displays how the capital costs for each primary project component are allocated to the three project partners based on the designated capacity assigned to each partner agency. The capital cost for components which benefit just one agency is to be borne solely by that agency.

Table 3: Allocation of Capital Costs of CARWSP Components

Component	Cost Share - %		
	EBMUD	AWA	CCWD
Aqueduct connection & raw water pipeline to WTP	24.4	45.9	29.7
Camanche Regional WTP	24.4	45.9	29.7
Vintage Home Fixture Retrofit	32.5	62.4	5.1
North Shore Pipeline	34.7	65.3	0
Lake Cam. Village Pipeline, Pump Station & Tank, and Conjunctive Use conversion	0	100	0
Wallace Pipeline, Pump Station& Tank, and Conjunctive Use conversion	0	0	100

3.1.3 Project Phasing

The CARWSP project is expected to be developed in three primary phases as funding becomes available. The development role (in terms of design, environmental, permitting and construction/implementation) of each partner agency is shown in Table 4 below for each of the planned project phases. Where two agencies are shown, the first agency is expected to serve as lead agency with the other agency serving in a support role.

Table 4: CARWSP Implementation Phases

Phase	Component	Design	CEQA	Permits	Construct/ Implement
1	• Aqueduct connection and 12" raw water pipeline to WTP • WTP at 0.5 mgd capacity • Treated water 8" pipeline (WTP to Camanche North Shore) • Turnout and valve (WTP to Camanche South Shore) • Lake Cam Village Intertie • Vintage Home Fixture Retrofit (CANS, CASS and Lk Cam Village)	EBMUD	EBMUD	EBMUD	EBMUD/ AWA
2	• Expand WTP by 1 mgd • Lake Camanche Village pipeline • Booster pump station • Storage tank (500,000 gal) • Pressure reducing and sustaining valves (for conjunctive use operations)	AWA/ EBMUD	AWA/ EBMUD	AWA/ EBMUD	AWA/ EBMUD
3	• Expand WTP by 0.7 mgd • Treated water (8") pipeline (WTP to park entrance) • Treated water (12" and 10") pipeline (park entrance to Wallace) • Pump station and standby power • Storage tank (600,000 gal) • Pressure reducing and sustaining valves (for conjunctive use operations) • Vintage Home Fixture Retrofit (Wallace)	CCWD/ EBMUD	CCWD/ EBMUD	CCWD/ EBMUD	CCWD/ EBMUD

3.1.4 Financing

The capital costs for the phased construction of CARWSP are expected to be financed over time using a combination of funding sources, including Project Partner (agency) funds, Proposition 84 grant funding, USDA Rural Development funds, Drinking Water State Revolving Fund loans, and perhaps bonds issued by individual partner agencies and retired by rate revenues.

Phase 1 - Development of the first phase of CARWSP is planned to be financed in part by EBMUD and in part by grant funding. With Phase 1 facilities directly benefitting two DAC communities, the Project Partners anticipate securing grant funding to finance a significant portion of Phase 1 costs.

Phase 2 – The facilities to be constructed in Phase 2 will solely serve AWA's Lake Camanche Village, a disadvantaged community. Customers within the Lake Camanche Village service area are unable to absorb the rate increases necessary to pay for the Phase 2 improvements, and therefore AWA has determined grant funding will be necessary to fund these improvements. Potential grant funding sources include Proposition 84 grant funding and USDA Rural Development funds.

Phase 3 – The Phase 3 facilities will solely serve CCWD's Wallace service area. Wallace now contains about 100 homes, with an additional 300 approved lots on which homes will likely be built over the coming years. CCWD's ability to fund the costs of Phase 3 is severely limited by the small Wallace rate base. CCWD expects it will be necessary to secure some grant funding to help fund the costs for these Phase 3 facilities. Potential grant funding sources include Proposition 84 grant funding and USDA Rural Development funds.

3.1.5 Project Operations and Maintenance

All CARWSP Project components, including raw water conveyance, treatment and transmission facilities, will require planned and unplanned maintenance. The costs for maintenance, repair, and replacement will be shared by the Project Partners under an agreement to be developed by the partner agencies. The Operations and Maintenance (O&M) agreement will include terms dealing with master metering, regional project operations, maintenance and repairs, coordination protocols, annual partner meetings, dispute resolution procedures, and other topics including, if needed, storage and wheeling. The O&M Agreement is expected to distinguish between shared project components and exclusive components as follows.

- Shared components – CARWSP project components that serve/benefit two or more of the three project partners will be operated and maintained pursuant to the terms of a mutually acceptable O&M Agreement to be developed by the Project Partners.
- Exclusive components – Project components which exclusively serve/benefit one individual project partner will be operated and maintained solely by the owner of those exclusive components.

3.1.6 Water Rights

The parties have sufficient water rights to address the needs of the areas served by CARWSP. The surface water source that will supply CARWSP is the Mokelumne River. Project water will be diverted from EBMUD's Mokelumne Aqueduct at a location proximate to Camanche South Shore and conveyed via a 12" pipeline to the Regional Water Treatment Plant for treatment. Once all phases of the project have been constructed, the parties will revisit particular arrangements regarding water rights and agency responsibilities as associated with CARSWP.

Treated water will be conveyed to the adjacent Camanche South Shore community, and from there south to Wallace. In addition, an 8" cross-Camanche Reservoir pipeline will convey treated water to serve EBMUD's Camanche North Shore and AWA's Lake Camanche Village.

Table 5: Summary of CARWSP Water Rights

Partner Agency	Area to be Served (Place of Use)	Water Right/Entitlement
EBMUD	Camanche South Shore Camanche North Shore	EBMUD holds water rights to Mokelumne River water supply (Permit #10478 – Pardee / Camanche).
AWA	Lake Camanche Village	AWA has a pre-1914 contractual right from PG&E to 15,000 acre-feet per year (AFY) of Mokelumne River water.

Partner Agency	Area to be Served (Place of Use)	Water Right/Entitlement
CCWD	Wallace	The State of California has reserved 27,000 AFA of Mokelumne River water for use by water agencies serving Calaveras County.

3.1.7 Water Accounting

The O&M agreement will include terms addressing raw and treated water metering and accounting. The agreement is expected to define a mutually-accepted method for measuring the amount of raw water delivered to the CARWSP regional treatment plant and the amounts of treated water taken by each Project Partner to serve their respective service areas.

Potential master metering locations include the Mokelumne Aqueduct connection (raw water), and treated water metering at the Regional WTP discharge, Lake Camanche Village and Camanche North Shore service area connections, and the Wallace service area transmission line connection.

3.1.8 Costs and Payments

The Project Partners will develop a mutually-acceptable agreement (tentatively called the Project Cost Basis and Payment Agreement) which will establish the basis for assessing CARWSP related costs and the method for Project Partner payments. These costs are expected to be based on cost-of-service principles. Additionally, the following fixed and variable cost definitions will serve as general guidelines in developing the cost basis.

- Fixed costs – Includes monthly operating and maintenance costs and replacement costs of shared CARWSP Project facilities that are incurred independent from the amount of water conveyed through the CARWSP project.
- Variable costs – Includes daily operating and maintenance costs such as electrical power, chemicals, and other costs that are dependent on the volume of water conveyed through the shared CARWSP facilities.

Each Project Partner will be responsible for paying its respective share of all annual costs, both fixed and variable (and financing, if applicable), in accordance with the terms of the agreed upon Project Cost Basis and Payment Agreement.

3.1.9 Agreements

Listed below are potential Project Partner agreements that will or may be required to achieve a fully operational CARWSP project.

- Operations & Maintenance Agreement
- Project Cost Basis and Payment Agreement
- Emergency response and mutual aid
- Project Financing
- Water Storage and Conveyance
- Others agreements mutually deemed necessary or appropriate

4 Project Partner Intentions and Planned Actions

The CARWSP Project represents an opportunity for each Project Partner to address water supply problems within its service area. Each partner agency, however, must overcome a unique set of circumstances and limitations to effectively execute the tasks necessary to complete all elements of CARWSP. Described below are the circumstances and limitations each Project Partner faces, and the intentions of each agency with respect to overcoming those challenges.

4.1.1 Amador Water Agency

Water customers within Lake Camanche Village, the area to be served by CARWSP in AWA's service area, are severely limited in terms of their ability to pay AWA's proportionate costs for developing CARWSP. Because the Village is a disadvantaged community, AWA will aggressively seek funding for its share of CARWSP costs from state and federal grant programs. Without significant financial assistance, AWA will be severely challenged to implement its portions of CARWSP.

Going forward, AWA intends to:

- Work collaboratively with EBMUD to complete Phase 1 design, environmental documentation, permitting and construction documents.
- Pursue grant opportunities to secure funding for Phase 1 facilities.
- Negotiate with EBMUD to develop mutually-acceptable CARWSP Phase 1 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 1 by the two project Partners.
- Following completion of Phase 1 (or in conjunction with it), complete Phase 2 design, environmental documentation, permitting and construction documents in consultation with EBMUD.
- Pursue grant opportunities to secure funding for Phase 2 facilities.
- Negotiate with EBMUD to develop mutually-acceptable Phase 2 amendments to the O&M Agreement, Cost Basis and Payment Agreement, and any other agreement developed for Phase 1 by AWA and EBMUD.
- Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by both EBMUD and AWA, negotiate a mutually-acceptable agreement to take over service to EBMUD's Camanche North Shore (which is within AWA's service territory).

4.1.2 Calaveras County Water District

The groundwater system that has historically served Wallace (and which was developed and operated by the Wallace Community Services District) has been unable to satisfactorily meet customer demands. Through a series of negotiations, CCWD is annexing the Wallace CSD community into the CCWD service area. Knowing the existing groundwater system is inadequate to meet the community's needs, CCWD is actively exploring alternative water supply options to either replace or supplement the existing groundwater system. CCWD has determined the best approach to addressing the water-related problems repeatedly experienced by Wallace is the one which most cost-effectively resolves, to CCWD's satisfaction, the chronic water quantity and quality problems with which it has repeatedly struggled.

Going forward, CCWD intends to:

- Pursue grant and other potential no or low costs funding opportunities to secure financing for Phase 3 facilities.
- Continue to evaluate other water supply options for the Wallace community in an effort to identify the most suitable and cost effective alternative.

- Should CCWD elect to proceed with the CARWSP Phase 3:
    - Complete Phase 3 design, environmental documentation, permitting, and construction documents in consultation with EBMUD.
    - Negotiate with EBMUD to develop mutually-acceptable CARWSP Phase 3 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 3 by CCWD and EBMUD in consultation with AWA.
    - Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by both EBMUD and CCWD, negotiate a mutually-acceptable agreement to take over service to EBMUD's Camanche South Shore (which is within CCWD's service territory).

4.1.3 East Bay Municipal Utility District

EBMUD has served water to the communities of Camanche South Shore and Camanche North Shore since they were initially developed in the 1950s. South Shore is supplied water pumped from Camanche Reservoir, treated at a small water treatment facility originally built in the early 1970's, and distributed to the mobile home community and recreation areas locate along the reservoir's south shore. North Shore is supplied water extracted from groundwater wells which is minimally treated and distributed to the mobile home community and recreation areas located along the reservoir's north shore. Camanche North Shore is a disadvantaged community.

Going forward, EBMUD intends to:

- Work collaboratively with AWA to complete Phase 1 design, environmental documentation, permitting and construction documents.
- Pursue grant funding to secure funding for Phase 1 facilities.
- Negotiate with AWA to develop mutually-acceptable CARWSP Phase 1 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 1 by the two project Partners.
- Following completion of Phase 1 (or in conjunction with it), consult with and support AWA as it completes Phase 2 design, environmental documentation, permitting and construction.
- Negotiate with AWA to develop mutually-acceptable Phase 2 amendments to the O&M Agreement, Cost Basis and Payment Agreement, and any other agreement developed for Phase 1.
- Upon a determination by CCWD to proceed with Phase 3, support CCWD as it completes Phase 3 design, environmental documentation, permitting and construction.
- Negotiate with CCWD to develop mutually-acceptable CARWSP Phase 3 agreements, including an O&M Agreement, Cost Basis and Payment Agreement, and other agreements deemed appropriate for Phase 3 by CCWD and EBMUD in consultation with AWA.
- Once all phases of CARWSP are constructed and operational, or before then if deemed desirable and appropriate by the other Project Partners, negotiate agreements with: CCWD to take over service to EBMUD's Camanche South Shore (which is within CCWD's service territory), and AWA to serve Camanche North Shore (which is within AWA's service territory).