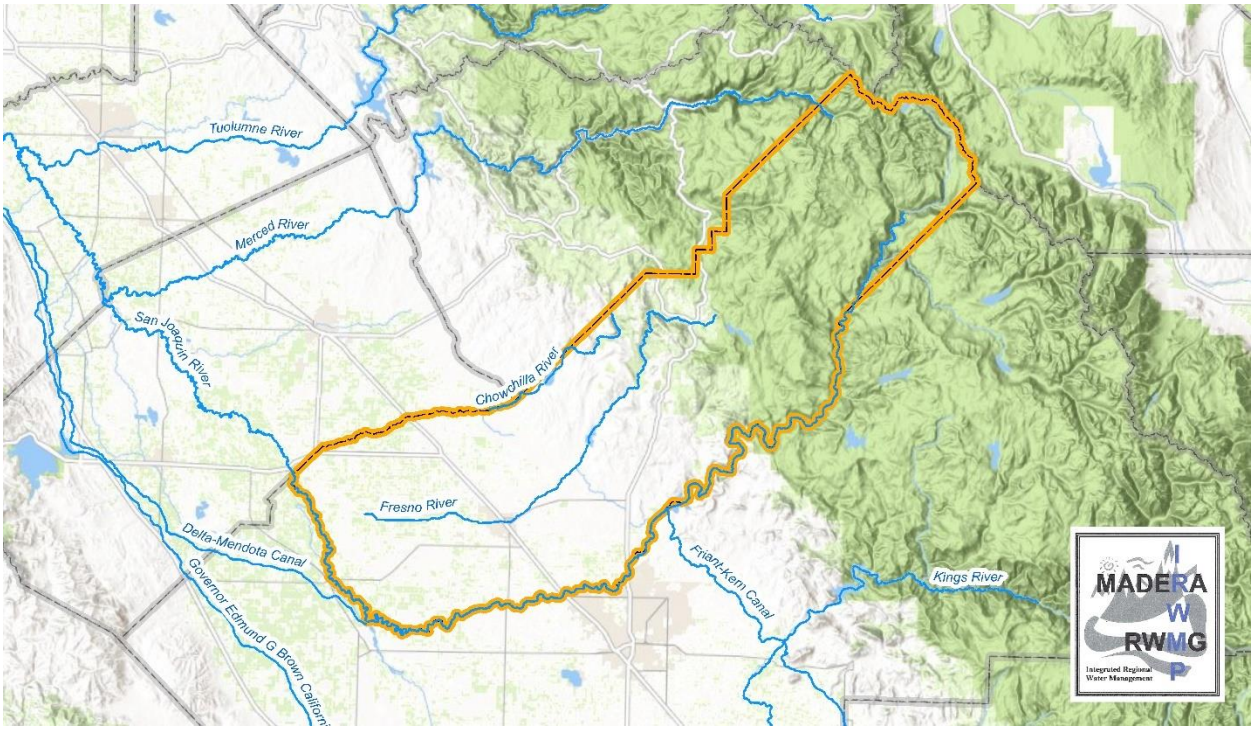
# MADERA INTEGRATED REGIONAL WATER MANAGEMENT PLAN PROPOSITION 1 UPDATE




MAY 2019

# MADERA IRWMP PROPOSITION 1 UPDATED MADERA IRWMP PROPOSITION 1 UPDATE

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May 2019


Project #180028

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## ABBREVIATIONS

| | |
|---|---|
| µg/L | Micrograms per liter |
| µmhos/cm | Micromhos per centimeter |
| µS/cm | Microsiemens per centimeter |
| AF | acre-feet |
| AWMP | Agricultural Water Management Plan |
| BMP | Best Management Practices |
| CALFED | CALFED Bay Delta Program |
| CARB | California Air Resources Board |
| CAS | California Aquifer Susceptibility |
| CASGEM | California State Groundwater Elevation Monitoring |
| CCID | Central California Irrigation District |
| CDEC | California Data Exchange Center |
| CDPH | California Department of Public Health |
| CEDEN | California Environmental Data Exchange Network |
| CEIC | California Environmental Information Clearinghouse |
| CEQA | California Environmental Quality Act |
| CERES | California Environmental Resources Evaluation System |
| CHSC | California Health and Safety Code |
| CIEA | California Indian Environmental Alliance |
| CII | commercial, industrial and institutional |
| CIMIS | California Irrigation Management Information System |
| CIWQS | California Integrated Water Quality System |
| CNRA | California National Resources Agency |
| CSA | County Service Area |
| CTS | California Tiger Salamander |
| CV-SALTS | Central Valley Salts Coalition |
| CVP | Central Valley Project |
| CWAP | California Water Action Plan |
| CWC | California Water Code |
| CWI | California Water Institute |
| CWP | California Water Plan |

| | |
|---|---|
| CZO | Critical Zone Observatory |
| DAC | Disadvantaged Community |
| DACI | Disadvantaged Community Involvement |
| DACTI | Disadvantaged Community Tribal Involvement |
| DDW | State Water Resources Control Board, Division of Drinking Water |
| DFW | Department of Fish and Wildlife |
| DMM | Demand Management Measures |
| DWR | Department of Water Resources |
| EA | Environmental Assessment |
| EDAC | Extreme Disadvantaged Community |
| EC | Electrical Conductance |
| ESA | Economically Stressed |
| ET | Evapotranspiration |
| EWMP | Efficient Water Management Practices |
| GAMA | Groundwater Ambient Monitoring and Assessment |
| GHG | Greenhouse Gas |
| GMP | Groundwater Management Plan |
| GSA | Groundwater Sustainability Act |
| GSP | Groundwater Sustainability Plan |
| HTK | Historical Tribe Known |
| I&M | Inventory and Monitoring |
| Index | Chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices |
| IRWM | Integrated Regional Water Management |
| IRWMP | Integrated Regional Water Management Plan |
| IWRIS | Integrated Water Resource Information System |
| JPA | Joint Powers Authority |
| KDSA | Kenneth D. Schmidt and Associates |
| KRCD | Kings River Conservation District |
| KREW | Kings River Experimental Watershed |
| KRFMP | Kings River Fisheries Management Program |
| KRWA | Kings River Water Association |
| LAFCO | Local Agency Formation Commissions |
| mAF | million-acre feet |
| MCL | Maximum Contaminant Level |
| MD | Maintenance District |
| MHI | Median Household Income |
| MOU | Memorandum of Understanding |
| MSL | mean sea level |
| MSR | Municipal Service Review |
| mya | Million Years Ago |
| NEPA | National Environmental Policy Act |
| NGO | Non-Governmental Organization |
| NPDES | National Pollution Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |

| | |
|---|---|
| O&M | Operation and Maintenance |
| POTW | Publicly Owned Treatment Works |
| RNHA | Regional Housing Needs Allocation |
| RWMG | Regional Water Management Group |
| RWQCB | Regional Water Quality Control Board |
| SFPUD | Sierra Foothills Public Utility District |
| SGMA | Sustainable Groundwater Management Act |
| SIEN | Sierra Nevada Network |
| SJER | San Joaquin Experimental Range |
| SLDMWA | San Luis & Delta Mendota Water Authority |
| SNAMP | Sierra Nevada Adaptive Management Project |
| SNMP | Salt and Nitrate Management Plan |
| SWAMP | Surface Water Ambient Monitoring Program |
| SWRCB | State Water Recourse Control Board |
| SWFM | Storm Water Flood Management |
| SWWG | Sierra Water Workgroup |
| TAC | Tribal Advisory Committee |
| TDS | Total Dissolved Solids |
| TMF | Technical, Managerial and Financial |
| URA | Under-Represented (or Under – Served) Area |
| USBR | United States Bureau of Reclamation |
| USEPA | United States Environmental Protection Agency |
| USGS | United States Geological Survey |
| UWMP | Urban Water Management Plan |
| VA | Vulnerability Assessment |
| WDL | Water Data Library |
| WSJV | Western San Joaquin Valley |
| WUC | Water Utility Climate |
| WUCA | Water Utility Climate Alliance |
| WWTF | Waste Water Treatment Facility |

# SECTION 1 - EXECUTIVE SUMMARY

The 2018 Madera Regional Water Management Group (RWMG) Integrated Regional Water Management Plan (IRWMP) Update was prepared with significant input from stakeholders in the Madera Region. The executive summary summarizes the content of the 2018 RWMG IRWMP and highlights the modifications to the 2014 IRWMP document. This document builds on the framework of the 2014 IRWMP, as well as local and regional planning efforts.

The 2018 Plan Update focuses on new requirements in the 2016 IRWMP Program Guidelines that will make the Plan and implementation project applications compliant with those Guidelines, and this places the Madera RWMG in a position to qualify projects for funding from the State.

The Madera RWMG formed in 2010 has brought together stakeholders from all areas of Madera County through public outreach. These stakeholders include the County, the cities of Chowchilla and Madera, Special Districts including water districts, irrigation districts, municipal service districts, and conservation districts, Disadvantaged communities (DAC), and Native American Tribal entities for the common goal of providing a defined road map for managing water supply and needs for the future.

There are two distinct areas within the region, the Foothill/Mountain and the Valley Floor. Each has their specific needs and goals. The collaboration between the stakeholders has produced a list of 108 projects which have been reviewed and meet the goals set out in this Proposition 1 Update to the Madera IRWMP.

This supplemental Proposition 1 Update incorporates additional goals to the goals set out in the 2014 Madera IRWMP prepared by Provost and Prichard. These additional goals include:

- Conservation – The reduction of energy consumption embedded in water use to reduce greenhouse gas emissions, consideration of California Air Resources Board strategies, and options for carbon sequestration.

- Improve Flood Control and Protection – Plan for changes in amount, intensity, timing, quality, and availability of water runoff and recharge.

- Improve Watershed Management – Plan for changes in amount, intensity, timing, quality, and availability of water runoff and recharge.

- Expand Stakeholder Education – Expand the outreach program through community involvement with DACs and Native American Tribes.

Changes from the 2014 IRWMP include the following:

- Regional Description

- Objectives

- Resource Management Strategies
- Project Review Process
- Plan Performance Monitoring
- Relation to Local Water Planning
- Relation to Local Land Use Planning
- Updated description of climate change vulnerabilities and adaptation strategies.
- Current discussion on the impacts of the drought to the Region.
- Added descriptions on the changes in the regional planning, progress on the groundwater sustainability planning efforts and regional water reliability goals.

Project monitoring is important to track the successes and benefits of a project, ensure it is being operated properly, comply with laws and regulations, and to monitor the Madera IRWMP process and benefits. The Madera IRWMP contains performance measures and monitoring methods to ensure the objectives of the Plan are met. These performance measures will be evaluated to promote adaptive management for climate change and changing conditions. Examples of project-specific monitoring can include monitoring water quality, groundwater depth, flood frequency, and effects a project may have on habitat or particular species. Project-specific monitoring is the responsibility of the agency(s) or group(s) that are implementing a project and expect to directly benefit from the project. These agency(s) are also responsible for developing project monitoring plans.

## *1.1 - Strategies*

Throughout this document there will be discussions on the major points to an IRWM Plan and the updates to be in compliance with the new 2016 Prop 1 guidelines. The specific nature of a strategy is to develop methods or approaches for achieving the goals and objectives of the IRWM Plan as it resolves specific issues in the Region. This will be recognized in various Tables in each specific section to address the revisions as provided in the 2016 update guidelines for Prop 1. The Team and Stakeholders have made every effort to establish targets with deadlines if possible, for each section. A monitoring program is also presented to provide the ability to measure the outcomes of each actionable strategy. This will allow the RWMG to see the progress toward the goals and objectives of the IRWM update.

# SECTION 2 - INTRODUCTION

An Integrated Regional Water Management Plan (IRWMP) provides an effective process to address complex water resources challenges within the region. IRWMP's require the support and input from stakeholders to identify major water and related resource management issues to provide potential solutions. These interests need to balance the economic and societal benefits, while maintaining the ecosystem that is important to water resource sustainability. The process of creating an IRWM Plan is locally-driven and includes input from many diverse stakeholders. An IRWM Plan investigates a broad spectrum of water issues including water supply, flood management, water quality, environmental restoration, recreation, land use, environmental justice, stakeholder involvement, and far reaching community and statewide interests. A key difference in IRWMP as compared to other planning documents is that IRWMP integrate multiple water management strategies to solve multiple priority challenges. IRWMP can help attract state and other funding to support regional projects. Millions of dollars have been allocated for IRWM Planning and Projects by the state through Propositions 50 and 84. Grants are ultimately awarded through the California Department of Water Resources after an evaluation where projects are measured against criteria outlined in individual Proposal Solicitation Packages (PSP) or Requests for Proposals (RFP).

The Madera RWMG has been actively involved throughout the IRWM Plan development process while also bringing together various water resource officials from special districts, Cities, and County government since the Region's initial IRWMP approved in 2008. The Madera RWMG has actively been coordinating with local community leaders and non-profit organizations to involve disadvantaged communities (DACs) as part of the IRWMP. The Program is designed to encourage integrated regional strategies for management of water resources by providing funding for projects and programs that support integrated water management. In 2014, the Madera RWMG updated the original Madera IRWMP to conform with Proposition 84 requirements for Safe Drinking Water, Water Quality and Supply, Flood Control, and the River and Coastal Protection Bond Act of 2006.

This update incorporates the requirements set forth in the Proposition 1, the Water Quality, Supply, and Infrastructure Improvement Act of 2014 and brings forth the previous content of the original IRWM plan and the 2014 update to be in compliance with 2016 IRWMP Standards identifies actions to adapt to and mitigate the impacts of climate change and highlights regional accomplishments in IRWM planning.

## *2.1 - Mission Statement*

*"The mission of the Regional Water Management Group (RWMG) will facilitate future coordination, collaboration, and communication for comprehensive management of water resources in the Madera Region. Through the mutual understanding among entities in the Madera Region regarding their joint efforts toward Integrated Regional Water management governance, development, planning, funding, and implementation to ensure that clean, adequate and affordable water supplies are available now and, in the future, to sustain this region and its responsible growth."*

## 2.2 - Governance

In 2010, the Madera RWMG was formed through the adoption of a Memorandum of Understanding (MOU) and a set of Bylaws to provide governance of the group. The Madera RWMG has been meeting monthly since its inception. The Madera RWMG rotates the location of the monthly meetings among three (3) locations to allow for easier access for stakeholders throughout the County. The voting members are as follows:

- Chowchilla Water District
- City of Chowchilla
- City of Madera
- Fairmead Community and Friends
- Gravelly Ford Water District
- Madera County
- Madera Irrigation District
- Madera Valley Water Company
- Madera Water District
- North Fork – Mono Rancheria
- Self Help Enterprises
- Southeast Madera County United - Madera Ranchos (SEMCU)

## 2.3 - Goals

To progress forward on the vision through this document the stakeholders developed a series of regional goals.

1. Protect and enhance the quality of surface and groundwater.
2. Promote community stewardship of our Region's water resources.
3. Provide reliable and sustainable water resources, both surface and groundwater, of sufficient quality and quantity to meet the existing and future needs of the Region.
4. Share those resources to protect and enhance the environmental resources of the Regions watersheds.
5. Develop the necessary projects and operations to manage the flood water in the Region to reduce the impact to people, property and environmental resources.

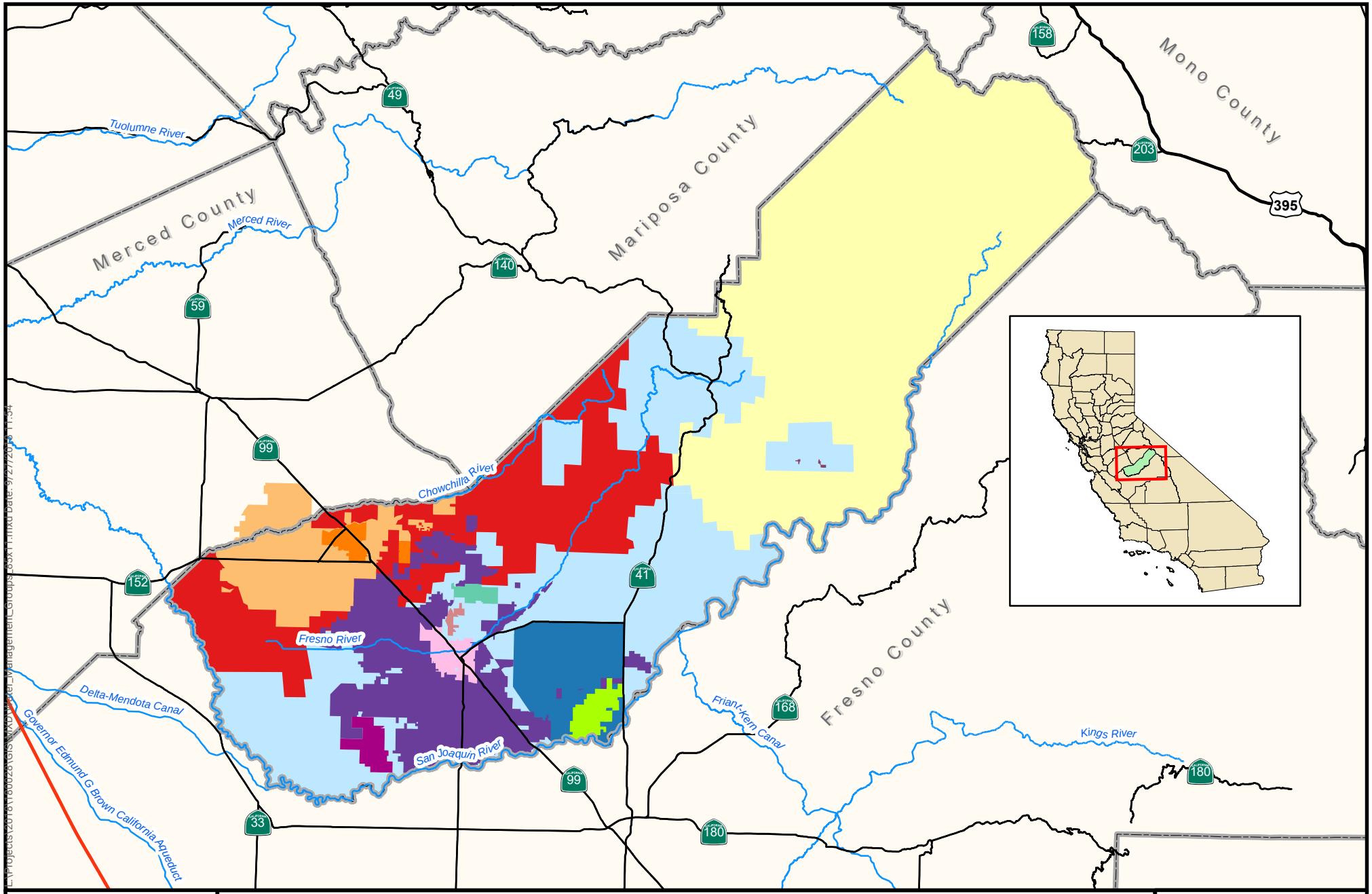


**Figure 2-1 Participating Agencies - Madera Regional Water Management Group**

- Chowchilla Red Top RCD
- Chowchilla WD
- City of Chowchilla
- Coarsegold RCD
- Gravelly Ford WD
- Madera County
- City of Madera
- Madera ID
- Madera WD
- Madera Valley WD
- North Fork Mono Rancheria
- Root Creek WD
- South East Madera United

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## 2.4 - Accomplishments

In 2006, the County of Madera began the process of developing an IRWMP for managing and protecting water resources.

The first Madera IRWMP was completed for the Madera Region under Prop 50 on April 14, 2008. This is a complete plan under the Prop 50 Standards that includes both the foothill and the valley areas, creating many new partnerships and involvement.

November 2008 - Advisory committees formed to assist in deliberation of issues addressed in IRWMP or regional water issues.

On November 24, 2009, the Madera County Water Advisory Commission created the Formation Committee to create the Regional Water Management Group.

On January 2, 2010 the RWMG for the Madera Region was officially formed.

On June 6, 2011 - Madera Region was recommended for full acceptance as a region during the Region Acceptance Process.

On February 2, 2012 – grant funding was received from DWR for Facilitation Support Services with a contracted Facilitator.

In January 2013 - Finalized creation and writing of New Members Packet and application for Disadvantaged Communities (DAC)

On May 8, 2013 – Second grant funding is received from DWR for Facilitation Support with a contracted facilitator.

In September 2014 - Completed the Update of the Madera IRWM Plan to Prop 84 Standards

The following projects have been achieved since the Madera RWMG was officially formed:

- 2011/2012 – Round 1 Implementation Grant was funded for the full amount of the award – $9,413,947. Round 1 included the following projects;
    - Project #1 – Ash Slough Arundo and Sediment Removal
    - Project #2 – Cottonwood Creek, Dry Creek, & Berenda Creek – Arundo and Sediment Removal
    - Project #3 – Root Creek Recharge Project
    - Project #4 – Fuel Reduction for Forest Health & Fire Safety in the Sierra National Forest (The first Forest Management Project funded as part of an IRWM which recognizes Watershed Health as a whole.)

- 2012/2013 – Received recommendation for full funding, $271,438.00, for the Round 2 Planning Grant to update the IRWM Plan to Proposition 84 standards

    - The update to Proposition 84 standards was prepared by Provost and Pritchard, December 2014.

- June 25, 2014 Received approval of Formal Amendment 2 to relocate the above referenced Project #2 from Cottonwood Creek, Dry Creek, & Berenda Creek to Berenda Slough and an extension of Ash Slough.

The Madera RWMG has changed the way area stakeholders interact by implementing monthly meetings and conducting outreach to Disadvantaged Communities (DACs). Through outreach, DAC Stakeholders have worked together with the Madera RWMG for the inclusion of DAC water quality and wastewater issues to the list of projects included in this Update as shown in Appendix A. Outreach has spurred collaboration of groups which have historically operated independently.

## *2.5 - IRWMP Updates and Changes*

The RWMG has established a goal of updating the IRWMP as needed to maintain information and regional goals as current, or to satisfy new IRWMP standards established by DWR. This update is driven by Proposition 1, the Water Quality Supply, and Infrastructure Improvement Act of 2014 and brings forth the previous content of the original IRWM plan and the 2014 update to be in compliance with 2016 IRWMP Standards identifies actions to adapt to and mitigate the impacts of climate change and highlights regional accomplishments in IRWM planning. To document on-going progress, the RWMG plans to periodically prepare a report which will include an updated project list, progress on current projects, changes to policies and procedures, and other relevant information that should be included in an IRWMP. These annual reports will be considered attachments to the adopted "Madera IRWMP Proposition 1 Update" and the information will be formally incorporated when the IRWMP is updated. This will help to formally archive important information each year and reduce the concentrated effort needed to accomplish the IRWMP updates

# SECTION 3 - REGION DESCRIPTION

Through the Regional Acceptance Process from 2010 to 2011 the Department of Water Resources recommended full acceptance that the Madera IRWMP Region is all the lands within the County borders of Madera County. Hereafter, this area will be called the Madera Region or Region. The Madera Region is located in the geographic center of California, in the San Joaquin Valley and extending into the Sierra Nevada mountains. The borders of the Region are generally defined by the crest of the Sierras to the east, the San Joaquin River on the south and west, and the Chowchilla River on the north. The Region includes the incorporated areas of the City of Madera and City of Chowchilla in addition to all County lands, water districts, irrigation districts, or similar, private municipal services districts or utilities that are not under the jurisdiction of any City, State, or Federal agency.

The Region receives all of its water supply from runoff from the Sierras and groundwater. The imported water is delivered through the US Bureau of Reclamation Central Valley Project to contractors in the Region and by the rivers and creeks. The Region has no infrastructure to deliver water from the Delta.

## *3.1 - Foothill/Mountain Region*

The communities in the Foothills and Mountains are unincorporated. The major communities include Ahwahnee, Bass Lake, Coarsegold, North Fork, Oakhurst, O'Neals, and Raymond. There are 122 special districts in the foothills Madera County. Almost all of the water use in the Foothills and Mountains is from groundwater with only three small water treatment plants relying on surface water from the San Joaquin River and its tributaries.

The recent drought has created the tree mortality issue with 129 million dead and dying trees in the Sierras. This has created serious watershed protection issues which has become an important goal of this plan. It is very common to see landslides, rock falls, and erosion associated with winter rains and flooding.

The predominant land uses in the Foothills and Mountains include agriculture (animal husbandry and cropping), residential and commercial (small towns and rural development), tourism, recreation, and natural resources such as the timber industry. However, the timber industry has been significantly reduced and impacted due to ever-increasing regulations. Most of the development in the Foothills and Mountains has occurred in the foothills with elevations ranging from 300 to 3,500 feet. The only true storage in the foothills is in the snow pack and the fractures.

The foothills are used for animal grazing, animal husbandry, irrigated and native pasture, small towns, and rural development. Cultivated agriculture, including vineyards and orchards, has recently increased in the area due to advances in agricultural technology and market demands. Relatively significant areas of commercial and residential development are located near the unincorporated communities of Oakhurst, Raymond, North Fork, Ahwahnee, Coarsegold, Indian Lakes, and Yosemite Lakes Park. Tourism and recreation are

also important land uses in the foothills. For example, the economy of the communities of Bass Lake and Oakhurst is dependent on the recreation industry.

Groundwater in the Foothills and Mountains is drawn from wells and springs in weathered materials and fractures in the hard rock. Recharge to the groundwater is derived from precipitation on the local watershed. Average precipitation is generally about 14 inches per year in the lowest foothill areas to more than 50 inches per year in the higher parts of the watersheds. In the areas evaluated, groundwater was moving from topographically high areas toward topographically low areas, indicating that there was little or no recharge from stream channels in low topographic areas.

Groundwater quality contaminants of concern in the Foothills and Mountains include manganese, iron, high salinity, hydrogen sulfide gas, uranium, nitrate, arsenic, and methylbutylethylene (MBTE) with the MCL being exceeded in some areas. Despite these problems, there are substantial amounts of good-quality groundwater in each of the areas evaluated in the Foothills and Mountains. Iron and manganese are commonly removed by treatment. Uranium treatment is being conducted on a well by the Bass Lake Water Company. If this treatment does not prove to be feasible, the need for a surface water system may be more pressing in the Bass Lake-Oakhurst area due to the presence of uranium.

Only the San Joaquin River system (including Willow Creek) is currently used for domestic water supply. The water quality in the river has historically been good. However, at lower elevations it has sufficient organic matter resulting in elevated disinfection byproducts (DBP), which have caused individual water systems to violate DBP MCLs. The greatest impact of failing septic systems is due to overland flow to surface water bodies. However, failing septic systems can also degrade local shallow groundwater. Untreated wastewater contains excessive nutrients that can harm native plant and fish populations. Strict adherence to existing regulations and development of policies to protect water quality is therefore necessary in the County.

Madera IRWMP region has areas of nitrate, arsenic, perchlorate, or hexavalent chromium contamination, which have been previously identified in both the foothill and valley water systems during reviews of well test results provided within prior versions of the IRWMP (Volume II of 2008 IRWMP, Appendix E). The Plan will include a description of the location, extent, and impacts of the contamination, any prior actions undertaken to address the contamination, and a description of any new actions needed to address the contamination. Additionally, any likely climate change impacts on the region will be determined from a vulnerability assessment and any potential actions will be presented accordingly.

## *3.2 - Valley Region*

Groundwater provides almost the entire urban and rural water use and about 75 percent of the agricultural water use in the Valley Floor. The remaining water demand is met with surface water.

Groundwater for the Valley Floor is pumped from the Madera, Chowchilla, and Delta-Mendota groundwater subbasins. Historically, the direction of groundwater flow in much of the Valley Floor was to the southwest, toward the valley trough (San Joaquin River downstream of Mendota). However, as groundwater pumping has increased, instead of flowing uniformly to the southwest, groundwater has been flowing away from the San Joaquin River to the northwest.

Groundwater quality contaminants of concern in the Valley Floor include high salinity (TDS), nitrate, uranium, arsenic, methane gas, iron, manganese, slime production, and dibromochloropropane (DBCP) with the maximum contaminant level (MCL) exceeded in some areas. Despite the water quality issues noted above, most of the groundwater in the Valley Floor is of suitable quality for irrigation. Groundwater of suitable quality for public consumption has been demonstrated to be present in most of the area at specific depths.

The Valley Floor has a long history of flooding, associated with the Fresno and Chowchilla Rivers and their tributaries. In the fall, residential flooding on the valley floor occurs due to hundreds of homes built below road grade capturing the road runoff (storm water). In the winter and spring, most of the flood control facilities experience some degree of failure due to the flows that are released from storage reservoirs. Floodway obstructions, limited channel capacity, and poor levee maintenance are the main factors causing flooding. Natural obstructions to flood flow include vegetation growing in floodway areas. Other obstructions include roadways, bridges, and culverts among others.

The Valley portion of the Madera Region is at an average elevation of about 300 feet above mean sea level and is approximately 100 miles from the ocean and separated from the coastal area by the Coastal Range Mountains, with most peaks ranging from 3,800 feet to 6,000 feet. Therefore, sea level rise is not a threat to the region.

DWR acknowledged in a white paper that California's Central Valley flood control system is deteriorating. Yet funding to maintain and upgrade flood protection infrastructure has sharply declined. Most project levees are maintained by local agencies such as reclamation and levee districts.

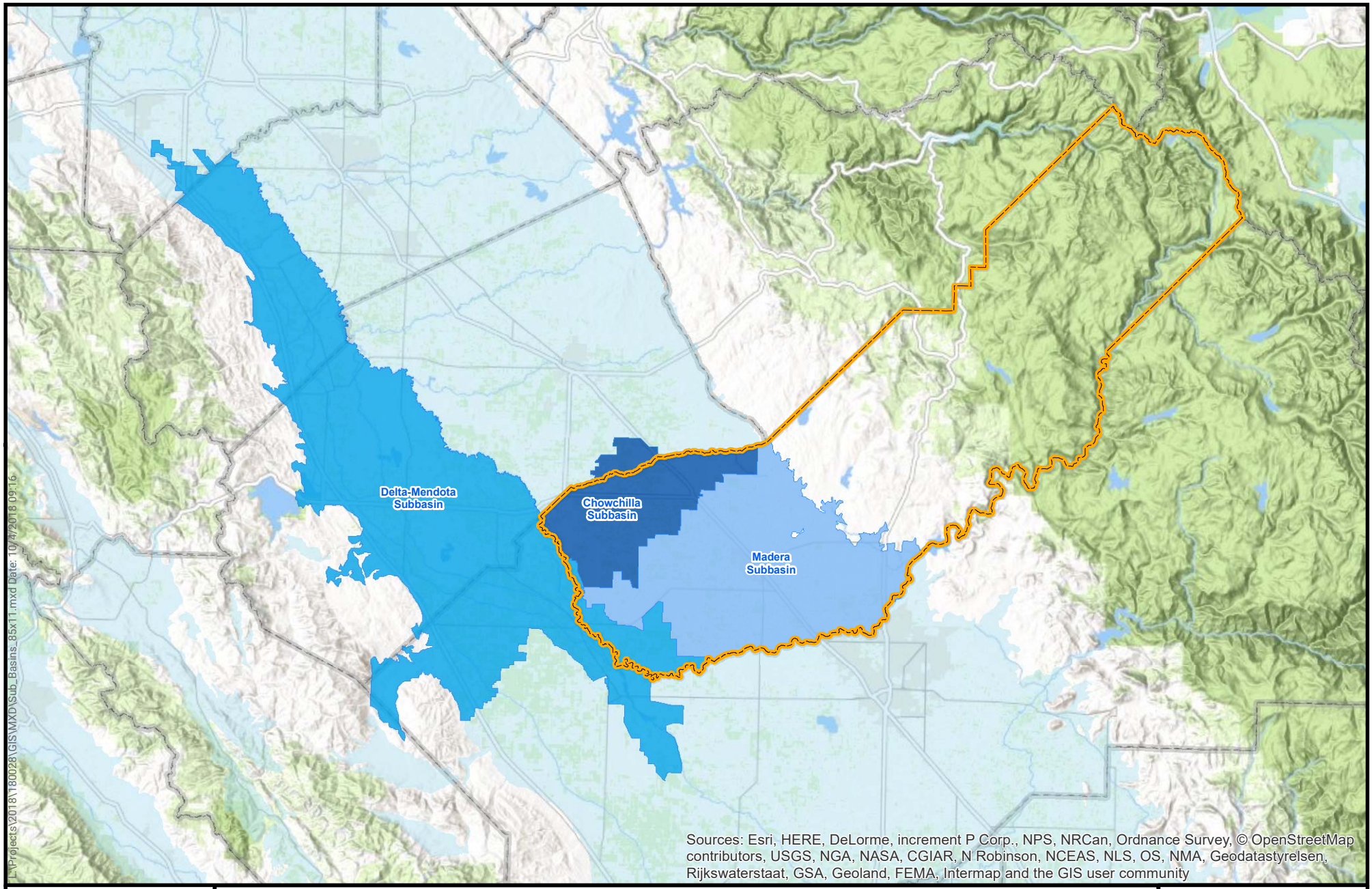


**Figure 3-1 Basins**

Chowchilla Subbasin
Delta-Mendota Subbasin
Madera Subbasin
San Joaquin Valley Basin
Madera County Boundary
County Boundary

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## *3.3 - San Joaquin River Hydrologic Region*

This region is approximately 15,200 square miles and is located between the Sacramento River Hydrologic Region to the north, and the Tulare Lake Hydrologic Region to the south (DWR 2013b). The watershed is bordered on the east by the Sierra Nevada and on the west by the Coast Range mountains. The San Joaquin River begins in the high Sierra Nevada's and has historically flowed approximately 100 miles to the west then turned north flowing for 260 miles, where it joined the Sacramento River to form the Delta. By 1951 and the completion of the Central Valley project, San Joaquin River flows were captured at Friant Dam and diverted into two (2) canals. The Madera-Chowchilla canal flows to the North with 100% of its delivery to Madera County and the Friant-Kern canal flows to the South. These canals service the Eastern side of the San Joaquin valley from Madera County to Kern County through 30 contracts with Cities and Irrigation districts. The portion of the river between Friant Dam and Sack Dam (approximately 85 miles) routinely dries out during much of the year. Continuous flows return for the final 60-miles of river, from Lander Avenue to the Delta and are comprised of ephemeral flows from the Coast Range, fresh water flows from the Sierra Nevada, and agricultural drainage. Main tributary rivers of the San Joaquin River include the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced to the east and during flood flows from the Friant Canal, the Chowchilla Bypass, and Fresno Rivers to the southeast.

### *3.3.1 - CHOWCHILLA SUBBASIN*

The Chowchilla Subbasin is identified as Basin 5-22.05 by DWR in Bulletin 118. The Subbasin covers an area of 248 square miles and is located in Madera County with a small portion in Merced County. The Subbasin is bounded by the Columbia Canal Company Service Area and San Joaquin River on the west. To the north, the Chowchilla Subbasin is bound by the southern portion of the Merced Subbasin. The southern boundary consists of an irregular pattern and borders the northern portion of the Madera Subbasin. Groundwater recharge is primarily from deep percolation of applied irrigation water. The Chowchilla Subbasin has been determined to be in critical overdraft.

### *3.3.2 - MADERA SUBBASIN*

The Madera Subbasin is identified as Basin 5-22.06 by DWR in Bulletin 118. The Subbasin covers an area of 614 square miles and is located entirely within Madera County. It is bounded on the south by the San Joaquin River, on the west by the eastern line of the Columbia Canal Service Area, on the north by the south line of the Chowchilla Subbasin, and on the east by the crystalline basement bedrock of the Sierra Nevada foothills. The Madera-Chowchilla canal delivers water to this area for irrigation. Groundwater recharge is primarily from deep percolation of applied irrigation water. The Madera Subbasin has been determined to be in critical overdraft.

### 3.3.3 - DELTA-MENDOTA SUBBASIN

The Delta-Mendota Subbasin is identified as Basin 5-22.07 by DWR. The Subbasin covers an area of 1,170 square miles. It lies largely in Fresno County along with portions of Madera, Merced, Stanislaus, and San Benito counties. It is bounded on the west by the Coast Range mountains, on the north by the Stanislaus/San Joaquin county line, and on the east generally by the San Joaquin River. The southern boundary is irregular and consists of portions of the western Kings Subbasin and the Westside Subbasin. DWR Bulletin 118 states that groundwater levels within the Delta-Mendota Subbasin have been relatively stable and this Subbasin is not considered to be in overdraft. Groundwater recharge is primarily from deep percolation of applied irrigation water.

## 3.4 - Watersheds

Major rivers in the Region include the San Joaquin, Fresno, and Chowchilla. No substantial flood control or irrigation facilities exist to serve the foothill or mountain areas. The Region is home to several reservoirs which provide both irrigation water and flood protection to the Valley area. The major watersheds are shown in Figure 3-2.

Eastman Lake, operated by the US Army Corps of Engineers, is in the foothills on the Chowchilla River. Bass Lake, operated by Pacific Gas & Electric, is impounded by Crane Valley Dam, located in the foothills on Willow Creek, which flows into the San Joaquin River above Millerton Lake. Millerton Lake, behind Friant Dam, operated by the United States Bureau of Reclamation, is on the San Joaquin River in the foothills at the eastern edge of the Valley. Mammoth Pool, Dam 6 Lake, and Redinger Lake are located along the San Joaquin River above Millerton Lake and are operated for power generation and recreation by Southern California Edison. On the Fresno River the US Army Corp of Engineers constructed Hidden Dam forming Hensley Lake for flood control, irrigation storage, and recreation. From Hensley Lake controlled flows continue down the Fresno River to the Chowchilla Canal.

The Eastside Bypass and the Chowchilla Bypass are the backbone of the flood control conveyance facilities in the Valley, providing additional flow capacity above and beyond that available in the San Joaquin River channel below Friant Dam. Madera Irrigation District and Chowchilla Water District have extensive irrigation canal systems supplied with water primarily from the San Joaquin, Chowchilla, and Fresno Rivers.

A portion of the Merced River watershed lies within the Region, although it drains into the Merced IRWM planning area to the north, and the Merced River comes together with the San Joaquin River in Merced County, north of the Region boundary.

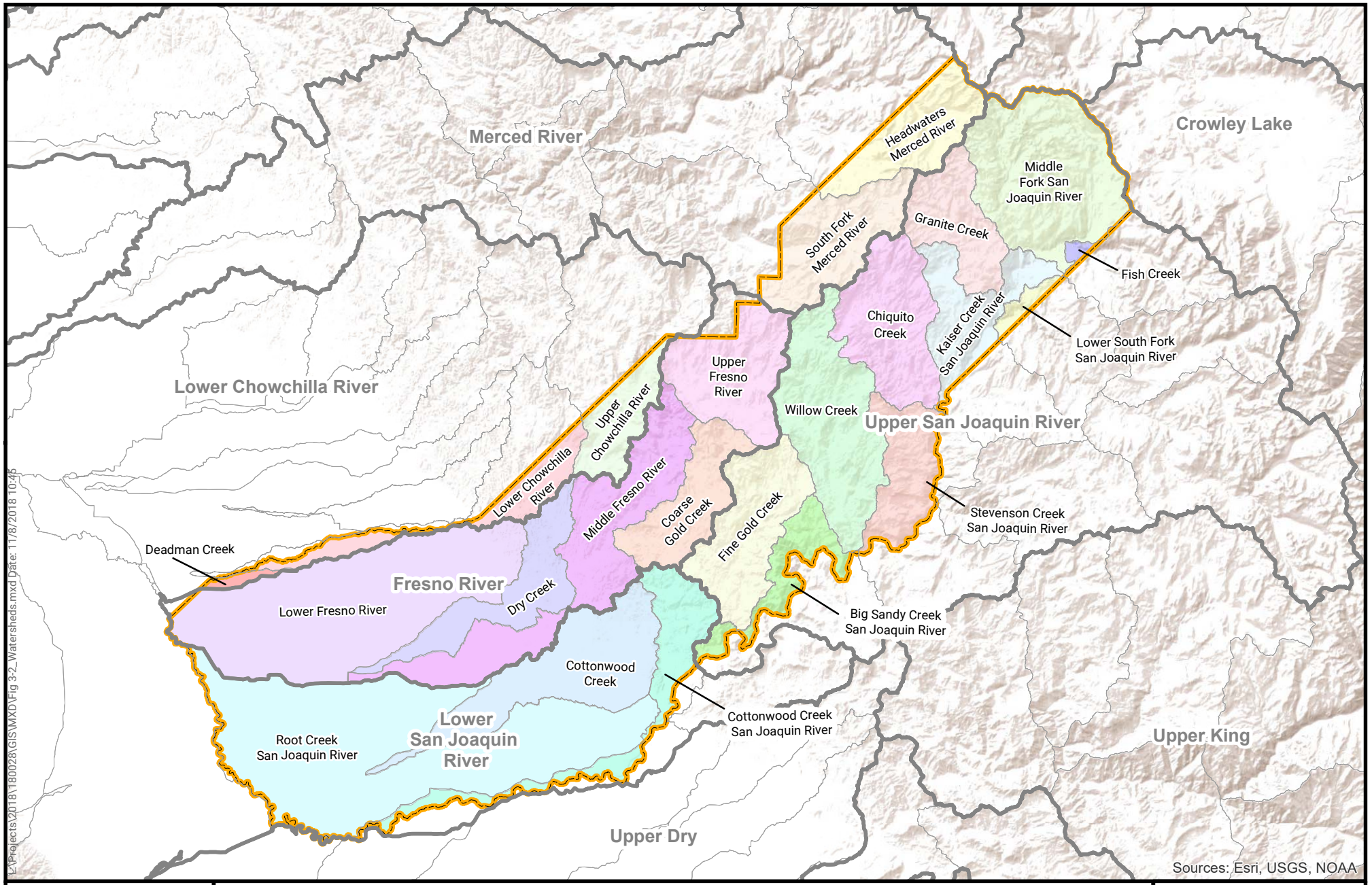



**Figure 3-2 Watersheds**

Major Watershed Boundary

Minor Watershed Boundary

Madera County Boundary

N

0 Miles 10

## 3.5 - Land Subsidence

Land subsidence occurs when groundwater levels in confined aquifers decline due to excessive withdrawals of water. This results in compaction of fine-grained sediments (clays) above and within the aquifer system as water is removed from pores between the grains of the sediments. Over time, as more water is removed from the area; the ground level sinks. Land subsidence can lead to reduced conveyance capacity in canals and damage to structures such as canals, levees, buildings, and wells. Subsidence can also cause flooding by creating low spots or reducing gradients in natural channels.

Within the valley of Madera County, land subsidence is a great concern. The area of the most significant subsidence is in the far western portion of the county. As shown in Figure 3-3 this area of the county in 2017 had subsidence ranging from 3 up to 15 inches. These areas with significant subsidence are in both the Chowchilla and Madera Subbasins.

As part of SGMA requirements, Groundwater Sustainability Agencies, the Chowchilla GSA and the Madera GSA, have been formed and they are preparing Groundwater Sustainability Plans (GSP) which will be completed in 2020. These plans will address land subsidence as an undesirable result.

### 3.5.1 - Cause of Local Land Subsidence

Land subsidence in the Valley portion of the Region is caused by pumping groundwater from the deeper confined aquifer that is separated from the shallower unconfined aquifer by the Corcoran Clay. The Corcoran Clay is the regional aquitard throughout the San Joaquin Valley and is prevalent throughout the western half of the valley area. The area of greatest land subsidence in the Region coincides with the area underlain by the Corcoran Clay, in western Madera County, particularly along the Eastside Bypass.

### 3.5.2 - History of Land Subsidence in Area

Land subsidence in the Region is of historic and ongoing significance. Between 1926 and 1972, subsidence resulted in between 1.0 and 4.0 feet of ground surface elevation drop within the western half of the Valley portion of the Madera Region. The area of greatest subsidence occurred roughly along the path of the East Side Bypass flood control structure of the San Joaquin River (Bull, 1975).

The majority of subsidence has occurred since 1940, when large turbine pumps came into widespread use for extracting water from the deeper confined aquifer. Availability of surface water from the Delta-Mendota Canal and the California Aqueduct resulted in decreased groundwater demand, stabilization of groundwater levels, and a reduced rate of subsidence. Drought conditions during 1976-1977 and 1987-1992 restricted surface water deliveries, resulting in increased demand for groundwater supply and increased subsidence rates. Drought and regulatory reductions in surface water deliveries (especially the San Joaquin River Restoration) from 2007 through 2014 have brought about unprecedented withdrawals of water from the deeper confined aquifer to meet local water demand.

### 3.5.3 - LOSS OF STORAGE DUE TO SUBSIDENCE

According to a 1995 USGS report, the primary cause of land subsidence in the Valley has been the compaction of fine-grained silt and clay sediments in the aquifer system following extensive long-term withdrawal of groundwater in excess of recharge. This subsidence, due to compaction of fine-grained sediments, began in the 1920s. As groundwater levels declined severely during the 1960s, fine-grained sediments lost water from pore spaces and became compacted from the weight of the overlying soil. When withdrawal rates decreased, and water levels were allowed to recover, compaction rates slowed significantly.

Increased groundwater pumping during the 1976-77 drought increased the rate of subsidence, some of which even resulted from compaction of coarse-grained sediments. When groundwater levels recovered in 1978 following the end of the drought years, the compacted coarse-grained sediments regained some of their original volume when the former or near former pore pressure was attained and the land surface rebounded. However, the fine-grained sediments remained compacted and will never recover.

The fine-grained portions of the aquifer are not typically considered water producing portions. The minimal amount of storage loss in the coarser grained sediments, the usable part of the aquifer, is for the most part recoverable and is not considered an appreciable loss of storage space in the usable parts of the aquifer.

### 3.5.4 - RECENT LAND SUBSIDENCE IMPACTS

Groundwater pumping that results in renewed compaction and land subsidence in the Valley could cause serious operational, maintenance, and construction-design problems for the California Aqueduct, the San Luis & Delta-Mendota canals, and other water-delivery and flood- control canals in the San Joaquin Valley. Subsidence has reduced the flow capacity of several canals that deliver irrigation water to farmers and transport floodwater out of the valley. Several canals managed by the San Luis & Delta-Mendota Water Authority (SLDMWA) and the Central California Irrigation District (CCID) have had reduced freeboard and structural damages that have already required millions of dollars of repairs, and more repairs are expected in the future (Sneed, et al. 2013). These instances of land subsidence are not in the Region but are adjacent to the westerly portions of the area near the San Joaquin River and indicate that subsidence is occurring in broad area of the central part of the San Joaquin Valley. Within the Region, subsidence near the San Joaquin River and its flood control structures may cause flooding of Highway 152 and a local Alview elementary school. It may also threaten valuable farmland and dairies while possibly jeopardizing the San Joaquin River Restoration Program.

Recent work by the USGS, USBR, DWR and Kenneth D. Schmidt and Associates (KDSA) indicates that the greatest amount of subsidence in the Region is in the area of the East Side Bypass. This is also referred to as the Red-Top Area, which is located in the west-northwest portion of the Region near the axis of the valley where the majority of the historic land subsidence has been documented. The maximum subsidence near the Eastside Bypass has amounted to approximately seven (7) feet.

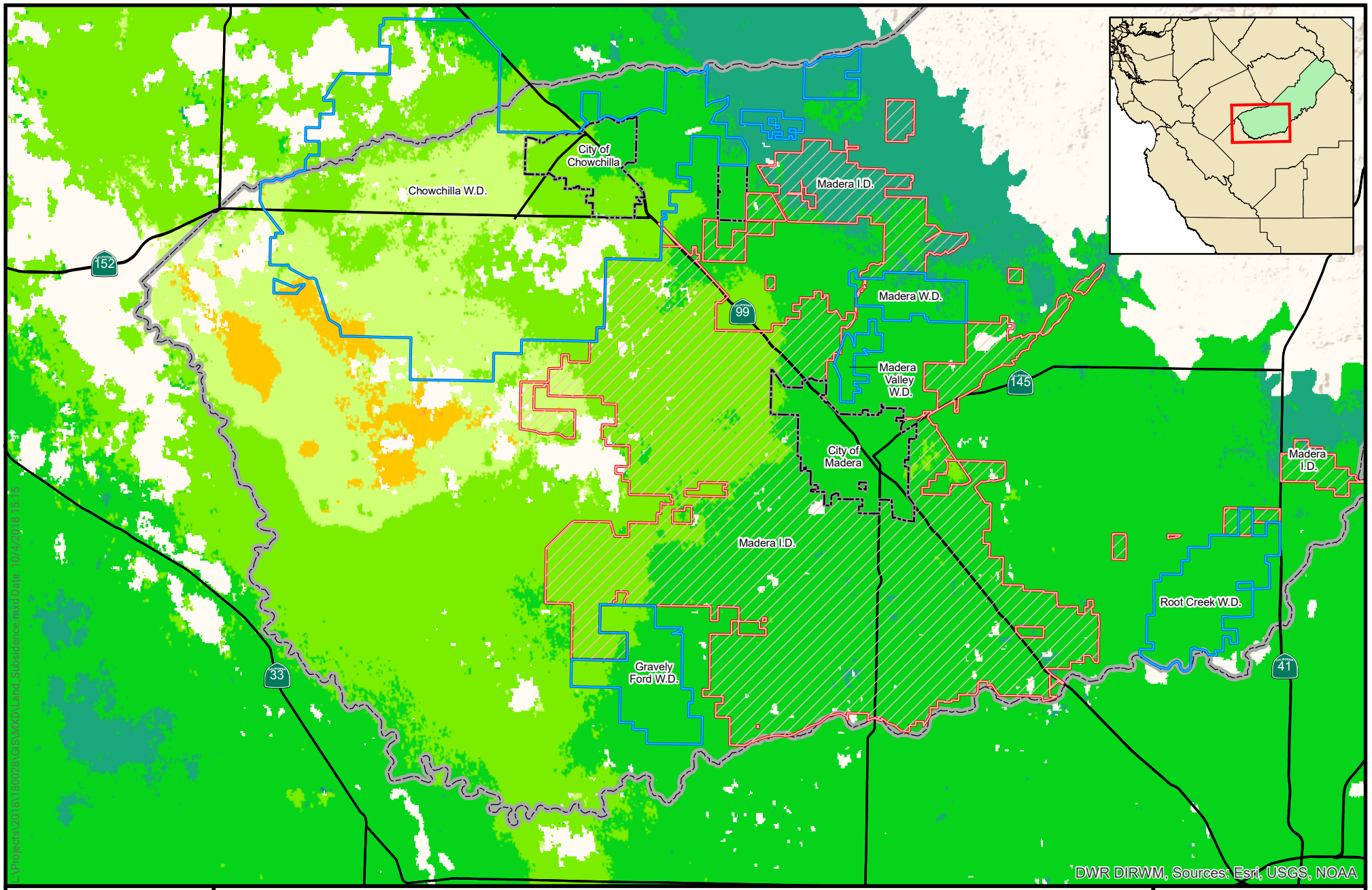



**Figure 3-3 Land Subsidence (Change in Elevation 2017)**

-15 to -12 (inches)
-12 to -9 (inches)
-9 to -6 (inches)
-6 to -3 (inches)
-3 to 0 (inches)
0 to 3 (inches)
City Boundary
Water District Boundary
Madera Irrigation District
Madera County
State Highway

N

0 Miles 5

## 3.6 - Water Quality Problem Areas

### 3.6.1 - Arsenic and Uranium

Water quality data in the Region is limited and Madera County Environmental Health records were searched for nitrate, arsenic, perchlorate, and hexavalent chromium contamination per AB1249. When searching violations of public water systems exceeding MCLs in both the Valley and Foothill /Mountain areas of the Region the most prevalent are for Arsenic and Uranium. In 2018 28 water systems were in violation for Arsenic and 19 for Uranium. There was also one violation for exceeding the MCL for Perchlorate in the Valley area.

Two groups have been formed to assist the Disadvantaged Communities. One is for the Foothill/Mountain area and the other for the Valley area. These groups are preparing reports that will address areas of contamination along with other projects to assist the communities. These reports will be added to this plan once they have released.

### 3.6.2 - Salt and Nitrate

Communities in the Central Valley rely on surface and groundwater for many beneficial uses including agriculture and drinking water supplies. However, elevated salt and nitrate concentrations in portions of the Central Valley impair or threaten to impair the region's water and soil quality which, in turn, adversely affects agricultural productivity and/or drinking water supplies.

The salinity and nitrate problems in the Central Valley are complex, multi-faceted and present a daunting challenge for the Central Valley Regional Water Quality Control Board (Central Valley Water Board or Board) to confront alone. To assist in the Board's long-term planning efforts, a broad group of agriculture, cities, industry, and regulatory agencies joined together in 2006 to form the Central Valley Salinity Alternatives for Long-Term Sustainability Initiative (CV-SALTS). The CV-SALTS Executive Committee is a decision-making body with 30 voting members that represent diverse stakeholder groups including agriculture, cities, industry, regulatory agencies, and community and environmental justice representatives. In addition, dischargers participating in CV-SALTS formed the non-profit Central Valley Salinity Coalition (CVSC) to manage and fund the effort and have entered into a Memorandum of Agreement with the State Water Board and the Central Valley Water Board to formalize their commitment. Goals adopted by CV-SALTS include:

- Sustain the Valley's lifestyle
- Support regional economic growth
- Retain a world-class agricultural economy
- Maintain a reliable, high-quality water supply
- Protect and enhance the environment

CV-SALTS was tasked with developing a Salt and Nitrate Management Plan (SNMP) for the entirety of the Central Valley Regional Water Quality Control Board's (Central Valley Water Board's) jurisdictional area. Although broader in overall scope, the SNMP was also developed to meet requirements set forth in the State Recycled Water Policy, adopted in 2009 by the State Water Resources Control Board (State Water Board). The Recycled Water Policy provides statewide direction regarding the appropriate criteria to be used when issuing permits for recycled water projects. In addition, the Recycled Water Policy articulates the State Water Board's policy that every groundwater basin/subbasin in California needs to have a consistent salt/nutrient management plan (i.e., SNMP). To ensure that such plans were developed in a timely manner, the Recycled Water Policy establishes criteria and timelines for their development.

CV-SALTS participants, including the Central Valley Water Board, have worked together to develop this SNMP to address salinity and nitrate concerns in the Central Valley Region in a comprehensive, consistent, and sustainable manner, both environmentally and economically. CV-SALTS participants are also committed to evaluating, promoting, and initiating options to provide safe drinking water to communities already impacted by salt and nitrates. To this end, this Central Valley SNMP builds on a range of water quality management policies and implementation programs already in existence, proposes additional policies and tools needed to provide the Central Valley Water Board with flexibility in addressing legacy and ongoing loading of salt and nitrate in the diverse region, and presents a comprehensive regulatory and programmatic approach for the sustainable management of salt and nitrate.

Combined, the development of the SNMP and the proposed, corresponding Basin Plan amendments will establish a revised regulatory framework and provide the flexibility necessary to make salt and nitrate management decisions at the appropriate temporal, geographic, and/or management scales. The SNMP will be reviewed and revised as needed to support state and regional policies, regulations, and/or new technical information developed during SNMP implementation.

### *3.6.3 - CENTRAL VALLEY SALT AND NITRATE MANAGEMENT PLAN*

Central Valley Water Board has flexibility in addressing legacy and ongoing loading of salts and nitrates in the diverse region and while presenting a comprehensive regulatory and programmatic approach for the sustainable management of salt and nitrate.

Combined, the development of the SNMP and the proposed, corresponding Basin Plan amendments will establish a revised regulatory framework and provide the flexibility necessary to make salt and nitrate management decisions at the appropriate temporal, geographic and/or management scales. The SNMP will be reviewed and revised as needed to support state and regional policies, regulations, and/or new technical information developed during SNMP implementation and establishes criteria and timelines for their development.

## *3.7 - Groundwater Levels*

Groundwater levels are one of the most critical parts for planning future water efforts. The Chowchilla, Delta Mendota, and Madera subbasins have been designated as in critical overdraft. To meet SGMA compliance, Groundwater Sustainability Agencies (GSA) have been formed and are working together to develop Groundwater Sustainability Plans (GSP) to improve the declining groundwater levels. The level of overdraft varies between the GSAs as some have imported water supplies and some areas rely entirely on groundwater.

Groundwater levels have been in decline and without changes to area wide policy, this trend will continue. The Department of Water Resources is requiring that all basins in critical overdraft meet sustainability goals by 2020. To achieve this goal, water supplies need to be increased or there needs to be a reduction in demand. One way to reduce demand is to take farmland out of production. Implementation conservation measures of water resources will also reduce demand but likely not to the magnitude that will fix the overdraft problem.

The following Figure 3-4 Depth to Groundwater show contours for Spring 2016 water level measurements.

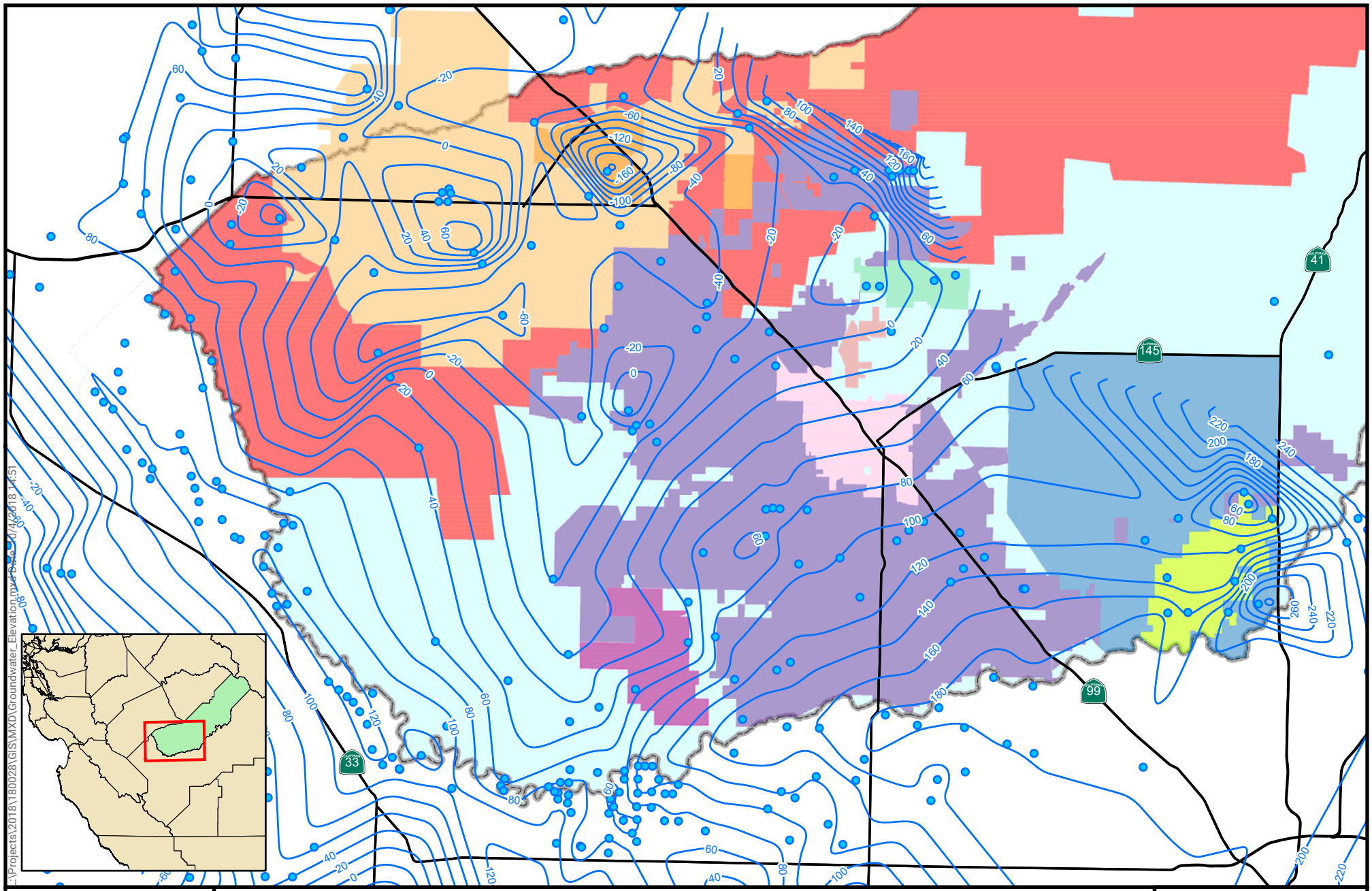
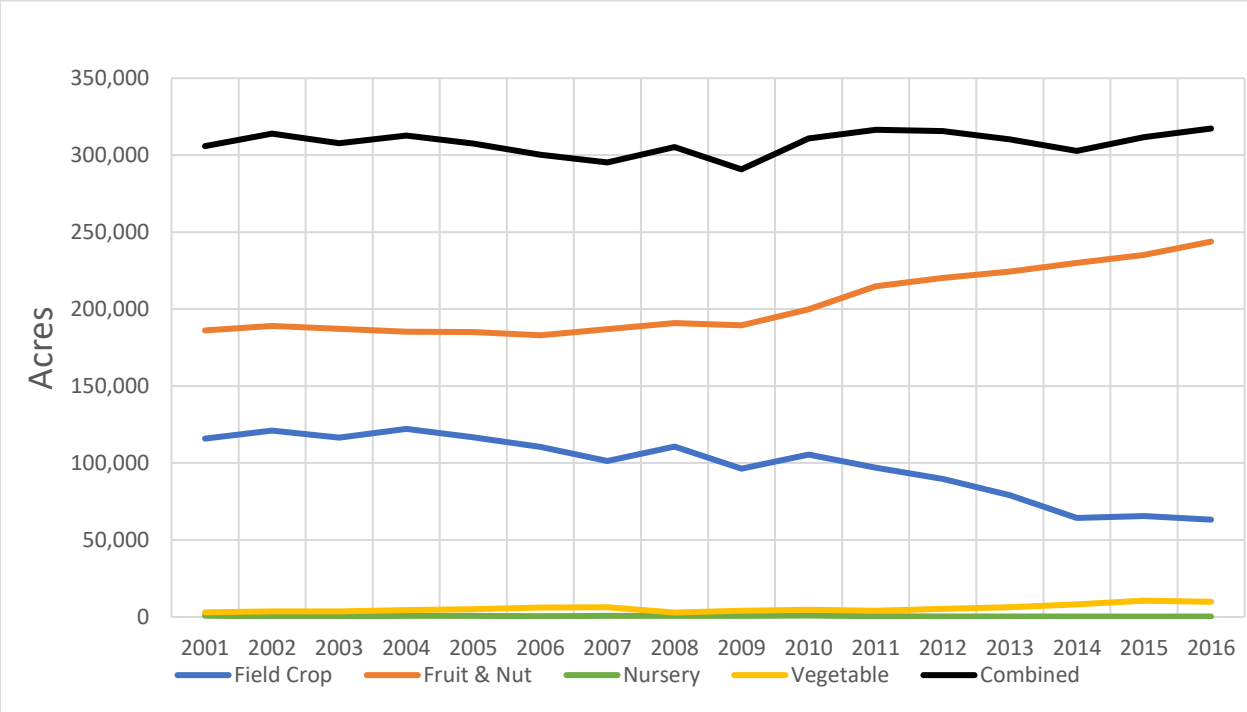



**Figure 3-4 Groundwater Elevations (Spring 2016)**

## *3.8 - Agricultural Water Demands*

The water demands for the area have remained relatively constant over the past 15 years. The amount of applied water to Ag land has been averaging 1,030,000 AF per year. During this same 15-year period the total of irrigated acreage remained constant. According to the Madera County Agricultural Commissioner's office, there has been shift from field crops to permanent crops consisting primarily of fruit and nuts, as noted in Table 3-1 below.

**Table 3-1 Madera County Crop Information (2016)**



# SECTION 4 - PLAN OBJECTIVES

## *4.1 - New Objectives Added for Proposition 1 Update*

Through the Proposition 1 Update process new objectives have been incorporated into the goals of the plan. New measurable criteria have been added to evaluate progress for meeting these goals. The following is a list of the additional new objectives:

- Adapting to changes in the amount, intensity, timing, quality, and variability of runoff and recharge;
- Consider the effect of sea level rise on water supply conditions and identify suitable adaptation measures;
- Reduction of energy embedded in water, and ultimately reducing GHG emissions
- Evaluate different ways to meet IRWM plan objectives, where practical, consider the strategies adopted by CARB in its AB 32 Scoping Plan;
- Consider carbon sequestration and renewable energy options are integrally tied to supporting IRWMP objectives.

Water is used by a diverse group of stakeholders in the Madera Region for a variety of needs including municipal and industrial, agriculture, hydropower, and environmental flows. Water management issues for the region are broad and include water supply, water quality, flood management, environmental stewardship, regional self-sufficiency, and infrastructure development. This wide spectrum of water users and issues challenges water managers in the region. The regional goals expressed in this Plan were created to address the entirety of the Region's water management needs, issues, and conflicts.

The regional goals and measurable objectives were established through a collaborative process that included meetings, stakeholder surveys, public workshops, and open discussions. This process included several iterations from 2006 through 2014. The groups involved included the Regional Water Management Group and the general public. The process produced several lists of issues, conflicts, potential goals and objectives in the region. These were combined into the final list of regional goals and measurable objectives found in this Plan. The final list was reviewed and approved by the RWMG in the form of a Draft Goals and Objectives Chapter and then subsequently with approval of the IRWMP.

In the 2015 Provost & Prichard report, goals for the Valley area and the Foothill/Mountain areas were developed per the requirements of Proposition 84 Integrated Regional Water Management Plan. The goals established in the 2015 report are as follows.

## *4.2 - Valley Goals*

- Achieve groundwater sustainability
- Expand Stakeholder Education
- Assure groundwater quality meets drinking and irrigation water quality standards
- Improve Flood Control and Protection

- Conservation

## 4.3 - Foothill/Mountain Goals

- Create practical, enforceable policies resulting in sustainable groundwater management
- Improve water quality
- Improve Watershed Management
- Expand Stakeholder Education
- Conservation

## 4.4 - Additional Goals for Proposition 1

The goal of conservation will apply to both the Valley and Foothill/Mountain areas. Specific to this goal is the reduction of energy. By reducing energy embedded in water use, this will in turn reduce GHG emissions. The design of proposed water projects will consider energy reduction as a high priority.

Also, as consideration in the designs, California Air Resources Board (CARB), strategies for reduced emissions will be evaluated and incorporated.

Another new goal is to consider options for carbon sequestration and using renewable energy where such options are integrally tied to supporting IRWM Plan objective.

The goals, including the additional new goals, are show in the following Table 4-1. The number of projects and ranking of the projects to achieve the objectives is attached as Appendix A.

## Table 4-1 - Summary of Objectives and Goals

| *Goals for Valley Region* | | | *Total Projects that Achieve Objective* | *Score of Project Achieving objective (avg. 0-5)* |
|---|---|---|---|---|
| **1 - Achieve groundwater sustainability** | | | | |
| | a. | Increase regional capacity for direct recharge by 50,000 AF/Year | 39 | 2.86 |
| | b. | Integrate flood/storm water conveyance infrastructure and regional irrigation system | 39 | 2.21 |
| | c. | Expand CASGEM groundwater monitoring network to semi-annually measure regional groundwater on a per-aquifer basis | 39 | 2.36 |
| | d. | Improve water reliability | 39 | 2.79 |
| | e. | Expand water conservation efforts | 39 | 2.64 |
| **2 - Expand Stakeholder Education** | | | | |
| | a. | Community education on water issues | 6 | 2.71 |
| | b. | Native American Tribes | 6 | 2.57 |
| **3 - Assure groundwater quality meets drinking and irrigation water quality standards** | | | | |
| | a. | Identify problem areas | 15 | 2.79 |
| | b. | Identify strategies to address chemical Constituents of Concern | 15 | 2.11 |
| | c. | Propose projects to address waters which do not meet State Public Health Goals or irrigation standards | 15 | 2.29 |
| **4 – Improve Flood Control and Protection** | | | | |
| | a. | Improve flood conveyance capacity | 32 | 2.21 |
| | b. | Improve water storage capacity | 32 | 2.71 |
| | c. | Adapt to changes in amount, intensity, timing, quality and availability of runoff and recharge | 32 | 3.22 |
| **5 – Conservation** | | | | |
| | a. | Reduce energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions | 23 | 2.78 |
| | b. | Consider, where practical, the strategies adopted by California Air Resources Board (CARB) in its AB 32 Scoping Plan, when evaluating different ways to meet IRWM plan objectives | 23 | 2 |
| | c. | Consider options for carbon sequestration and using renewable energy where such options are integrally tied to supporting IRWM Plan objective | 23 | 2.11 |

Table 4-1 (cont.) - Summary of Objectives and Goal

| Goals for Foothill/Mountain Region | | Total Projects that Achieve Objective | Score of Project Achieving objective (avg. 0-5) |
|---|---|---|---|
| **6 - Create practical, enforceable policies resulting in sustainable** | | | |
| a. | Determine strategies to enhance sustainability in foothill and mountain water supplies | 7 | 2.38 |
| b. | Develop policies to improve hard rock well sustainability and quantity | 7 | 2.17 |
| c. | Develop sources of surface water supply | 7 | 2.58 |
| d. | Implement water conservation policies to achieve the State's "20 x 2020" goal | 7 | 2.33 |
| e. | Fully utilize recycled wastewater from County maintained districts and urban areas | 7 | 2.17 |
| f. | Develop and implement a comprehensive groundwater monitoring program by 2020 | 7 | 2.58 |
| **7 - Improve Water Quality** | | | |
| a. | Promote community awareness of potential water quality issues | 7 | 2.5 |
| b. | Protect source water areas | 7 | 2.67 |
| **8 – Improve Watershed Management** | | | |
| a. | Manage forest density to increase surface runoff | 18 | 2.5 |
| b. | Manage vegetation to reduce fire risk and attempt to keep fires within their natural range of variability. | 18 | 2.42 |
| c. | Reduce erosion and sedimentation. | 18 | 2 |
| d. | Promote natural water storage through meadow, stream, wetlands and floodplain restoration. | 18 | 2.5 |
| e. | Adapt to changes in amount, intensity, timing, quality and availability of runoff and recharge | 18 | 3.22 |
| **9 - Expand Stakeholder Education** | | | |
| a. | Community education on water issues | 2 | 2.75 |
| b. | Develop programs to increase communications with Native American Tribes | 2 | 2.56 |
| **10 – Conservation** | | | |
| a. | Reduce energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions | 4 | 2.44 |
| b. | Consider, where practical, the strategies adopted by California Air Resources Board (CARB) in its AB 32 Scoping Plan, when evaluating different ways to meet IRWM plan objectives | 4 | 2.5 |
| c. | Consider options for carbon sequestration and using renewable energy where such options are integrally tied to supporting IRWM Plan objective | 4 | 2.11 |
| **11 – Climate Change (Valley/Foothill Regions)** | | | |
| a. | Plan addresses potential impacts of future climate change | | 2.44 |
| b. | Long term reduction of greenhouse gases | 4 | 2.5 |
| c. | Promote public education about impacts of climate change | 4 | 2.11 |

## *4.5 - Valley Goals*

### *4.5.1 - GOAL NO. 1: ACHIEVE GROUNDWATER SUSTAINABILITY*

This goal has been carried over from the 2014 IRWMP because it was highlighted as the "over-arching goal" of the IRWMP process. Additionally, it remains the top priority of the

SGMA process as well as it aims to preserve groundwater supply for residents of the valley floor.

Groundwater overdraft in Madera County currently calculated to be approximately 250,000 AF/year for both the Chowchilla and Madera Subbasins. This is calculated from the Madera Regional Groundwater Plan (Provost & Pritchard, 2014) and the Root Creek Water District Groundwater Management Plan (Provost & Pritchard, 2012). All stakeholders recognize that this is not sustainable and equally recognize that the problem is of such magnitude that effective and lasting changes cannot be instantly implemented.

Achieving groundwater sustainability, which this report defines as limiting net groundwater use to not more than the natural recharge of the underlying aquifers, will require a coordinated and ongoing effort. The objectives are presented in order of desired implementation.

### *Objective 1a: Increase regional capacity for direct recharge by a minimum of 50,000 AF/Year.*

Current direct recharge capacity within the RWMG boundaries is limited to losses within canals, river channels, and some basins operated by local water and irrigation districts. Several studies by MRWMG members and stakeholders over the past decade have identified areas where direct recharge could be effectively used to replenish the deep aquifer, but to date funding limitations have precluded construction of any of these major facilities.

Land and facilities are only a part of the recharge challenge. Without water supplies, there is no recharge, so also included in this objective is the expansion of the variety and volume of water supplies available to the Group members for recharge use. As a practical matter, firm water supplies are expensive and difficult to secure. Therefore, it is expected that this effort will focus on increasing capacity to convey and retain high-flow supplies in the years when they are available.

Funding for both facilities and water supplies may come from grants, local operational funds, property assessments, or other mechanisms selected by the Members. Local funding will be focused on a sub-regional basis on projects benefitting those supplying the funds.

Groundwater recharge will be an important part of achieving the goal of groundwater sustainability. Under this objective, the RWMG will identify potential sites for recharge facilities, water supplies that can be used for recharge, and funding opportunities.

### *Objective 1b: Integrate flood/storm water conveyance infrastructure and regional irrigation system.*

Storm water remains an under-utilized resource within the RWMG area. The RWMG plans to develop the means and facilities to capture, retain, and make beneficial use of storm water flowing through the region which is now lost to evaporation because it is impounded in areas with impermeable soils and does not effectively percolate to the groundwater. This objective

may include construction of new retention/percolation basins sited in areas where percolation can reach the aquifer.

This objective may also include strategies to convey flood water into public irrigation canals to supplement surface water delivered from the San Joaquin River. All strategies will require compliance with NPDES regulations for storm water management.

### *Objective 1c: Expand CASGEM groundwater monitoring network to semi-annually measure regional groundwater on a per-aquifer basis.*

Since 2011, several of the RWMG members have been collaborating on an area-wide groundwater monitoring program known as the California State Groundwater Elevation Monitoring program, or CASGEM. The program is a solid start toward developing a more regional knowledge of groundwater conditions and has already generated useful data for the participating agencies.

There is, however, a need for greater data precision and integration as the RWMG moves toward management of the groundwater aquifer throughout the region. Semi-annual well monitoring will enhance the understanding of aquifer variations resulting from rainfall and irrigation pumping throughout the year. Integrating data on a per-aquifer and sub-regional basis will aid in creating specific sustainability parameters in each area of the RWMG's boundaries in a manner that is most equitable for all stakeholders. The regional monitoring program could be expanded to include additional agencies and monitoring entities.

### *Objective 1d: Improve Water Reliability.*

Water is necessary for human consumption, personal hygiene, and many economic activities in Madera County. Improved water reliability can allow agencies to meet peak demands, provide water supplies during power outages, maintenance and facility malfunctions, and provide minimum water supplies during droughts. This objective can be achieved by developing new water supplies, establishing a diverse portfolio of water supply options, securing outside water agreements to import water to the RWMG area, making greater use of floodwater supplies through surface and subsurface storage projects, and increasing redundancy in water systems.

### *Objective 1e: Expand Water Conservation Efforts.*

There are limited water supplies in Madera County and stretching the existing water supplies is important. This objective can be achieved through water conservation by urban, industrial, commercial, municipal, and agricultural water users.

In response to the requirements of SB 7x-7, also known as the Water Conservation Act of 2009, goals of reducing per-capita water use by 20% by 2020. This is known as the State's 20x2020 goal. Urban water conservation can include many methods such as metering, public education, low-flow devices, ordinances, etc. As a result, implementation of effective indoor demand reduction measures will have a proportionally greater impact on demand

reduction. Concerted efforts to replace traditional indoor water fixtures and older appliances with water-conserving fixtures and appliances conforming to the latest standards will be an effective tool for achieving demand reduction goals.

Numerous methods are also available for agricultural water conservation such as tailwater recovery, spill prevention, metering, etc. The ultimate goal is to reduce consumption on a per capita or per acre water basis and achieve more with the same water supplies.

### *4.5.2 - GOAL NO. 2: EXPAND STAKEHOLDER EDUCATION*

The Madera RWMG is required to implement strategies to raise stakeholder and citizen awareness of State objectives for water management issues, including the magnitude of the challenge, potential mitigations, feasible projects, funding options, and consequences for failure to take effective action. This objective is critical and related to the success of other objectives, as many of the objectives require the support or at least the consent of the stakeholders and/or citizens throughout the Madera RWMG plan area to be implemented.

#### *Objective 2a: Community education on water issues.*

Develop programs and resources for use by members in a variety of public educational settings. Subjects to be addressed will include description of the regional water situation, the seriousness and urgency of the problem at hand, how and why the situation has developed over time, how other areas within California have addressed similar situations, options for mitigation that have been identified locally, options for financing those mitigations, and potential consequences of failing to take timely and effective action.

Numerous venues are available for public education. These may include:

- Presentations to agencies and organizations
- Service club and interest-group presentations
- Flyers and informational handouts
- Public Service Announcements to be released on radio, television, or in the press
- Development of educational websites to be linked to member and other agency sites
- Other public outreach methods described in Stakeholder Involvement outline in Section 9

#### *Objective 2b: Native American Tribes*

Develop programs which will further increase communications between the Madera RWMG and Native American tribes within the region to listen to concerns and to educate on proposed programs which will preserve and manage water supplies for the future. Work with Tribal Conservation Districts and Regional Tribal Advisory Committee shall follow the IRWM Tribal Guidelines.

### *4.5.3 - GOAL NO. 3: ASSURE GROUNDWATER QUALITY MEETS DRINKING AND IRRIGATION WATER QUALITY STANDARDS*

Certain areas within the RWMG boundaries, including both municipal and agricultural users, face water quality issues. These issues range from excessive TDS that makes irrigation less effective, to levels of contamination that exceed State Public Health Goals and Maximum Contaminant Levels for a variety of constituents of concern. Within the Madera RWMG area, certain wells have needed treatment for nitrates, iron, manganese, arsenic, and high heterotrophic plate count (which leads to a "blue slime" in the water).

#### *Objective 3a: Identify problem areas.*

Identify and map areas with water quality issues within the Madera RWMG boundaries. These maps will include extent of contaminant, the depth range where the contaminant has been found, and typical concentrations that have been found in groundwater.

#### *Objective 3b: Identify strategies to address chemical constituents of concern.*

Once the extent of each contaminant is identified, the Madera RWMG members will work together to identify common solutions for each constituent of concern, looking for ways to apply a common solution to a problem that may affect more than one-member agency. Such solutions may include wellhead treatment, blending to improve quality, centralized treatment, and zone selection for new wells to avoid contaminated water altogether.

#### *Objective 3c: Propose projects to address waters which do not meet State Public Health Goals or irrigation standards.*

Improvement projects will be conceived to address problematic waters. These projects will likely include treatment projects but could also include alternatives for supplies that would eliminate the need to use a contaminated supply. These projects will be formalized and considered by the Madera RWMG for including in future funding applications.

### *4.5.4 - GOAL NO. 4: IMPROVE FLOOD CONTROL AND PROTECTION*

Much of the valley is relatively flat and susceptible to flooding from various creek, sloughs, and rivers. Recent history has shown that flooding can cause major damage in Madera County. Flood control and protection can be enhanced with building ordinances, water storage, and flood conveyance. Climate change could also alter the timing, frequency and magnitude of flooding. A range of future conditions needs to be identified and new policies, programs, and projects developed to accommodate the anticipated changes in flooding.

#### *Objective 4a: Improve flood conveyance capacity.*

Many sloughs, streams, flood bypass channels, irrigation canals, and rivers convey flood flows in Madera County. Maintaining or increasing the capacity of these channels will allow some flood waters to pass through the County without causing flooding or damage. Greater

capacity could also increase the ability to convey and deliver water to flood control and recharge basins. Land subsidence is believed to have reduced the capacity of some facilities. In addition, vegetation such as Arundo donax has clogged some sloughs and reduced their conveyance capacity. Vegetation removal and eradication is a viable alternative to restore these facilities.

### *Objective 4b: Improve water storage capacity.*

Increasing storage capacity can provide better re-regulation of water supplies and also conserve water for later use. Storage can be increased by building new dams, raising existing dams, off-channel reservoirs, silt removal, and groundwater recharge basins. Raising existing dams provides the greatest potential benefits in the Madera IRWMP area. Recharge basins have lower ability to quickly capture flood flows but are still considered effective and an important part of the overall strategy.

### *Objective 4c: Adapt to changes in amount, intensity, timing, quality, and availability of runoff and recharge.*

With highly variable weather patterns, climate change may alter the amount, intensity, timing, quality, and availability of run off will need to have an adaptive management plan. Climate change could create instances where there may be longer time between wet events and, conversely, the runoff may be greater than normal. Projects that can accommodate larger variability will provide greater benefit.

## *4.5.5 - GOAL NO. 5: IMPROVE CONSERVATION*

Conservation of natural resources is a goal that can span across many areas of water operation and management. The following objectives that will be evaluated in project review:

### *Objective 5a: Reduce energy consumption.*

Reduction of energy consumption embedded in water use to ultimately reduce GHG emissions. Energy is the largest variable cost with regards to water conveyance and delivery. Increasing efficiency in pump stations will reduce energy consumption resulting in a reduction of GHG.

### *Objective 5b: Reduce emissions.*

The objective of reducing emissions will be considered in the review of potential projects. Strategies adopted by California Air Resources Board (CARB) in its AB 32 Scoping Plan will be utilized as guidelines when evaluating different ways to meet Madera IRWM plan objectives. Projects will be evaluated on whether they implement the strategies adopted by CARB and the overall total number of projects will be used to measure effectiveness of the IRWMP adopted projects.

### *Objective 5c: Reduce carbon footprint.*

The reduction of carbon footprint associated with water related operations is an objective of the Madera IRWMP. Options for carbon sequestration and using renewable energy will be evaluated in the review of potential Valley Projects.

## *4.6 - Foothill and Mountain Goals*

### *4.6.1 - GOAL NO. 6: CREATE PRACTICAL, ENFORCEABLE POLICIES RESULTING IN SUSTAINABLE GROUNDWATER MANAGEMENT*

This is a task that will fall primarily to the County of Madera along with the help from the local Maintenance Districts, Special Districts, and water companies. The County will take a lead role in organizing tasks such as organizing stakeholder meetings and outreach into the communities. The County will facilitate the process to develop a water management strategy between all the Foothill conveyance systems to achieve the best possible management of the area.

### *Objective 6a: Determine strategies to enhance sustainability in foothill and mountain water supplies.*

Under this objective, the members will work to identify viable and beneficial strategies to stabilize and enhance supplies from hard rock wells. Projects will be developed that increase infiltration of storm water and other sources.

### *Objective 6b: Develop policies to improve hard rock well sustainability and quantity.*

These potential policies may include enhancing supply to the hard rock areas, managing the number and size of extractions and other measures.

### *Objective 6c: Develop sources of surface water supply.*

As discussed above, virtually all surface water in the area is controlled by long-time riparian and appropriative rights-holders. Actions under this objective must include a dual-pronged approach to identify the possibilities for increasing surface runoff while at the same time negotiating with existing rights-holders to allow increases in surface water runoff. As a result of new any practices, supplies may then be diverted by foothill and mountain users, so that those increases do not automatically accrue to the existing rights-holders.

### *Objective 6d: Implement water conservation policies to achieve the State's 20x2020 goal.*

SB7x-7, also known as the Water Conservation Act of 2009, set a goal of reducing per-capita water use by 20% by 2020. This is known as the State's 20x2020 goal. As with the Valley, achieving sustainability in the foothill region is a balance between increasing supply while reducing demand. This objective addresses the latter. Because of the nature of foothill and

mountain development, characterized by native landscapes with little need for irrigation, the indoor/outdoor water demand balance in the foothill/mountain area is skewed farther to the indoor side. As a result, implementation of effective indoor demand reduction measures will have a proportionally greater impact on demand reduction here. Concerted efforts to replace traditional indoor water fixtures and older appliances with water-conserving fixtures and appliances conforming to the latest standards will be an effective tool for achieving demand reduction goals.

### *Objective 6e: Fully utilize recycled wastewater from County-maintained districts and urban areas.*

In areas such as Oakhurst, where municipal wastewater treatment is available, the potential exists to make and utilize recycled water for outdoor irrigation of public spaces and landscaping. Doing so will require construction of additional Wastewater Treatment Facilities to treat at least a portion of effluent to Title 22 standards and construction of sufficient "purple pipe" recycled water distribution systems to serve eligible public spaces and landscape areas in these communities.

### *Objective 6f: Develop and implement a comprehensive groundwater monitoring program by 2020.*

Groundwater monitoring is an effective tool to understand the change in underground storage of water, as well as gaining information about sources and flow directions of the underground. Groundwater monitoring is difficult in hard-rock areas but understanding the current conditions as well as possible is important.

## *4.6.2 - GOAL NO. 7: IMPROVE WATER QUALITY*

Existing issues include certain wells with levels of arsenic, iron, manganese, nitrate, gross alpha radiation, and uranium over DDW Maximum Contaminant Levels. Each of these is a naturally-occurring substance, characteristic of water stored in decomposing granite aquifers. As a result, prevention of these contaminants is not possible. Objectives under this goal must focus on treatment and mitigation of these natural effects.

### *Objective 7a: Promote community awareness of potential water quality issues.*

Since many wells in the foothill and mountain areas are private and serve only the property owner, quality testing requirements are less rigorous than those imposed on public water systems. Strategies under this objective should focus on education about the need for regular water testing and on the symptoms of contamination where those are observable by the user.

### *Objective 7b: Protect Source Water areas.*

Identify source water areas for the local aquifers and determine feasible means to protect water supplies from contamination before the water enters the underground fractures.

### *4.6.3 - GOAL NO. 8: IMPROVE WATERSHED MANAGEMENT*

A large portion of the Madera IRWMP area includes wild watershed lands that hold the source waters used in large quantities for agricultural, urban, and environmental uses. This goal includes promoting best management practices for range, forest, and alpine lands to protect ecosystems thereby improving water supplies and water quality. It also includes preserving open space and natural habitats that protect and enhance water resources and native species.

#### *Objective 8a: Manage forest density to increase surface runoff.*

Many forests in the IRWMP area have been modified from natural conditions. Lack of old growth trees allows greater sunlight and precipitation to reach the forest floor resulting in denser forests. Thinning forests to reduce tree density and underbrush can increase runoff while having the ancillary benefit of reducing fire risks. Removal of invasive non-native vegetation, that has higher water use than native vegetation, can also improve water supplies.

#### *Objective 8b: Manage vegetation to reduce fire risk and attempt to keep fires within their natural range of variability.*

Forest and brush fires can lead to erosive conditions that contribute soil, nutrients, debris and ash into the water supplies. Local landowners can be educated and encouraged to reduce fire risk by using fire resistant and retardant landscaping. Land managers can reduce fire risk by creating strategic fuel breaks, conducting fuel treatments and forest restoration, thinning underbrush, and allowing low-intensity fires to consume accumulated fuel.

#### *Objective 8c: Reduce erosion and sedimentation.*

Excessive erosion and sedimentation can negatively impact wetlands, water courses, and storage capacity of reservoirs. Several measures can be taken to reduce erosion and sedimentation including slope stabilization, road maintenance and decommissioning, grading and drainage improvements, and best management practices during construction.

#### *Objective 8d: Promote natural water storage through meadow, stream, wetlands, and floodplain restoration.*

Natural features such as streams, meadows, wetlands and floodplains have been impacted and their ability to store water has been reduced. Restoration projects can help restore the natural habitat conditions, while simultaneously restoring natural hydrologic functions. Restoring these features can help to regulate water and reduce peak flows.

### *Objective 8e: Adapt to changes in amount, intensity, timing, quality and availability of runoff and recharge.*

With highly variable climate changes the amount, intensity, timing, quality, and availability of run off will need to have an adaptive management plan. There may be longer time between wet events and the runoff may be greater than normal. Projects that can accommodate larger variability will provide greater benefit.

## *4.6.4 - GOAL NO. 9: EXPAND STAKEHOLDER EDUCATION*

Implement strategies to raise stakeholder and citizen awareness of water management issues including the magnitude of the challenge, potential mitigations, and consequences for failure to take effective action.

### *Objective 9a: Community education on water issues.*

See Objective 3a under Valley Goals. Similar objectives and strategies will apply in the Foothill/Mountain area.

### *Objective 9b: Native American Tribes*

See Objective 3b under Valley Goals. Similar objectives and strategies will apply in the Foothill/Mountain area.

## *4.6.5 - GOAL NO. 10: CONSERVATION*

Conservation of natural resources is a goal with objectives that span across many areas of water operation and management. The following objectives that will be evaluated in project review.

### *Objective 10a: Reduce energy consumption*

Reduce energy consumption embedded in water use to ultimately reducing GHG emissions.

### *Objective 10b: Reduce emissions*

Consider, where practical, the strategies adopted by California Air Resources Board (CARB) in its AB 32 Scoping Plan, when evaluating different ways to meet IRWM plan objectives.

### *Objective 10c: Reduce carbon footprint*

The reduction of carbon footprint associated with water related operations is an objective of the Madera IRWMP. Options for carbon sequestration and using renewable energy will be evaluated in the review of potential Foothill and Mountain projects.

# SECTION 5 - RESOURCE MANAGEMENT STRATEGIES

This Section supplements Chapter 6 of the 2014 IRWMP previously prepared by the Madera RWMG to incorporate additions for Prop 1 and the California Water Plan. Specifically, Table 6.1 of the 2014 IRWMP provides resource management strategies and their applicability to the Valley and/or Foothill/Mountain Areas.

The California Water Plan (CWP) has served as the long-term strategic plan for informing and guiding the sound management and development of water resources in the state. With updates every five years, this plan reaffirms the State's commitment to integrated water management.

The CWP Update 2013 lays out a comprehensive suite of actions intended to move California toward more sustainable management of water resources and more resilient water management systems. Ultimately, sustaining resiliency needs to be measured in terms of improved public safety, environmental stewardship, and economic stability.

## *5.1 - New CWP Criteria for Prop 1 Update*

For this Prop 1 Update new criteria from the CWP 2013 have been considered and incorporated. The new criteria evaluated is as follows:

- Sediment Management
- Outreach and Engagement
- Water and Culture

## *5.2 - Update to CWP Criteria*

### *5.2.1 - CLIMATE CHANGE*

New tools for vulnerability assessments are available for developing strategies for the effects of climate change for the region. The review process for climate change strategies is shown in detail in Section 9.

### *5.2.2 - REDUCING ENERGY CONSUMPTION*

The CWP criteria for reducing energy consumption has also been expanded to reducing energy embedded in water use. The goal is to reduce energy which in turn would reduce Green House Gas emissions. These criteria have been built into the objectives and goals of this Prop 1 Update.

### *5.2.3 - ADAPTATION STRATEGIES*

Throughout the planning process, strategies have been reviewed at Madera RWMG meetings with stakeholders, water officials, City representatives, County representatives, elected officials, and community leaders. This process has brought together concerns and ideas for developing a plan which is adapting to changing conditions. A broader look at issues of climate change, energy reduction, water quality, and water supply adaptation is a must for a successful future. Adaptation strategies for Climate Change are included in Table 9-3, where they are grouped by climate change impacts and subsequently ranked by effectiveness of adaptation. Essentially, the more adaptation criteria the measure accommodates, the higher the measure is ranked within the list.

# SECTION 6 - PROJECT REVIEW PROCESS

The adopted project review process accomplishes four key objectives identified in the IRWMP Guidelines and meets Proposition 1 requirements:

- Project Identification and Solicitation: The adopted process allows the Madera RWMG to solicit, and the Partners to identify, proposed projects which have the potential to meet the IRWMP goals and objectives.

- Project Selection: The adopted process allows the Madera RWMG to review and select projects from the proposals made by the Members and to list those selected projects in the Madera IRWMP.

- Publishing the Project List: The adopted process allows the Madera RWMG to communicate the list of projects in the Madera IRWMP to stakeholders and the public.

- Matching Projects to Funding Opportunities: The adopted process further allows the Madera RWMG to rank and select the most promising projects to include in specific grant applications, based upon the funding program's published scoring and ranking criteria, thereby increasing the chances that the Madera RWMG's grant application will be favorably reviewed, scored, and funded.

## *6.1 - Review of New Objectives*

The Madera RWMG reviewed the new goals and objectives for the Prop 1 Update at their monthly meetings of the Madera group. These goals and objectives incorporate potential effects of climate change and its vulnerabilities of climate change such as amount, intensity, timing, quality, and variability of runoff and recharge. These objectives also consider the reduction of energy to ultimately reduce GHGs. The group ranked these objectives to understand the group's priorities. The following table, New Objectives for Prop 1 Update (2018), show a summary of the poll.

**Table 6-1 - New Objectives for Prop 1 Update (2018)**

| No. | Objective | Low | Medium | High | Ave |
|---|---|---|---|---|---|
| 2b | Native American Tribes | 4 | 3 | 3 | 2.11 |
| 5a | Reduce energy consumption | 1 | 3 | 6 | 2.78 |
| 5b | Air resources strategies | 0 | 7 | 3 | 2.56 |
| 5c | Carbon sequestration | 2 | 7 | 1 | 2.11 |
| 8e | Adapt to changes in amount, intensity, timing, quality, and availability of runoff and recharge | 0 | 1 | 9 | 3.22 |
| 9b | Native American Tribes | 1 | 5 | 4 | 2.56 |
| 10a | Reduce energy consumption | 1 | 6 | 3 | 2.44 |
| 10b | Air resources strategies | 0 | 8 | 2 | 2.44 |
| 10c | Carbon sequestration | 3 | 6 | 1 | 2.00 |
| | | 12 | 46 | 32 | |
| Notes: | Valley Objectives | | | | |
| | Foothill and Mountain Objectives | | | | |

## 6.2 - Integration of Objectives

The ranking of the new objectives was then incorporated into the overall ranking from the 2014 IRWMP update. The following Table Combines Objectives (2014, 2018) shows the combined rankings.

Table 6-2 - Combined Objectives (2014, 2018)

| No. | Objective | Low | Medium | High | Ave |
|---|---|---|---|---|---|
| 8e | Adapt to changes in amount, intensity, timing, quality, and availability of runoff and recharge | 0 | 1 | 9 | 3.22 |
| 1a | Increase regional capacity for direct recharge by 50,000 AF/Year | 0 | 2 | 12 | 2.86 |
| 2a | Community education on water issues (Valley) | 0 | 3 | 11 | 2.79 |
| 1d | Improve water reliability | 0 | 3 | 11 | 2.79 |
| 5a | Reduce energy consumption | 1 | 3 | 6 | 2.78 |
| 9a | Community education on water issues | 0 | 3 | 9 | 2.75 |
| 4b | Improve water storage capacity | 1 | 2 | 11 | 2.71 |
| 7b | Protect source water areas | 0 | 4 | 8 | 2.67 |
| 1e | Expand water conservation efforts | 0 | 5 | 9 | 2.64 |
| 6c | Develop sources of surface water supply | 0 | 5 | 7 | 2.58 |
| 6f | Develop and implement a comprehensive groundwater monitoring program by 2020 | 0 | 5 | 7 | 2.58 |
| 3a | Identify (water quality) problem areas | 2 | 2 | 10 | 2.57 |
| 5b | Air resources strategies | 0 | 7 | 3 | 2.56 |
| 9b | Native American Tribes | 1 | 5 | 4 | 2.56 |
| 8a | Manage forest density to increase surface runoff | 1 | 4 | 7 | 2.50 |
| 7a | Promote community awareness of potential water quality issues | 0 | 6 | 6 | 2.50 |
| 8d | Promote natural water storage through meadow, stream, wetlands and floodplain restoration. | 1 | 4 | 7 | 2.50 |
| 10a | Reduce energy consumption | 1 | 6 | 3 | 2.44 |
| 10b | Air resources strategies | 0 | 8 | 2 | 2.44 |
| 3b | Identify strategies to address chemical Constituents of Concern | 1 | 6 | 7 | 2.43 |
| 8b | Manage vegetation to reduce fire risk and keep fires within natural range of variability | 2 | 3 | 7 | 2.42 |
| 6a | Determine strategies to enhance sustainability in foothill and mountain water supplies | 1 | 6 | 6 | 2.38 |
| 1c | Expand CASGEM groundwater monitoring network | 1 | 7 | 6 | 2.36 |
| 6d | Implement water conservation policies to achieve the State's 20x2020 goal | 1 | 6 | 5 | 2.33 |
| 3c | Propose projects to address waters which do not meet State Public Health Goals | 2 | 6 | 6 | 2.29 |
| 4a | Improve flood conveyance capacity | 2 | 7 | 5 | 2.21 |
| 1b | Integrate flood/storm water conveyance infrastructure and regional irrigation system | 2 | 7 | 5 | 2.21 |
| 6b | Develop policies to improve hard rock well sustainability and quantity | 2 | 6 | 4 | 2.17 |
| 6e | Fully utilize recycled wastewater from County-maintained districts and urban areas | 3 | 4 | 5 | 2.17 |
| 5c | Carbon sequestration | 2 | 7 | 1 | 2.11 |
| 8c | Reduce erosion and sedimentation. | 3 | 6 | 3 | 2.00 |
| 2b | Native American Tribes | 4 | 3 | 3 | 2.11 |
| 10c | Carbon sequestration | 3 | 6 | 1 | 2.00 |
| | Total | 37 | 158 | 206 | |

The Madera RWMG after reviewing proposed projects by the stakeholders have compiled 108 projects which rank highly for meeting the Madera IRWMP goals as set out in this plan. These projects are identified in Appendix A.

# SECTION 7 - PLAN PERFORMANCE AND MONITORING

Project monitoring is important to track the successes and benefits of a project, ensure it is being operated properly, complies with laws and regulations, and to monitor the IRWM process and benefits. The Madera IRWMP contains performance measures and monitoring methods to ensure the objectives of the Plan are met. These performance measures will be evaluated to promote adaptive management for climate change and changing conditions. Examples of project-specific monitoring can include monitoring water quality, groundwater depth, flood frequency, and effects a project may have on habitat or particular species. Project-specific monitoring is the responsibility of the agency(s) or group(s) that are implementing a project and expect to directly benefit from the project. These agency(s) are also responsible for developing project monitoring plans.

The Madera RWMG will require draft monitoring plans for projects that are considered for funding. Final monitoring plans are prepared after final designs are completed and are typically approved by regulatory or funding agencies. The Madera RWMG will request copies in order to provide complete reporting within the Madera RWMG.

Draft monitoring plans typically include the following information when applicable:

## *7.1 - General Information*

- Project description
- Describe what is being monitored (water quality, water flows, etc.).
- Need for monitoring

## *7.2 - Monitoring Program Parameters*

- Frequency and schedule
- Overall time period (e.g. 5 years, life of project, etc.)
- Locations
- Protocols
- Tools and equipment
- Pertinent laws and regulations
- Quality control procedures

## *7.3 - Project Specific Impacts/Benefit Analysis*

As stated in the 2014 Plan (Chapter 8.5), in accordance with state law, the potential environmental impacts of all projects pursuant to the Madera IRWMP will be evaluated under the California Environmental Quality Act (CEQA). When funding requirements so dictate, additional environmental review will be done pursuant to the National Environmental Policy Act (NEPA).

As required under CEQA and NEPA, mitigation measures will be developed whenever feasible, for impacts which are determined to be significant. Project impacts and benefits

must be described when projects are submitted to the Madera RWMG in the Project Information (Project Review Process) Form and prior to funding consideration. Grant Pre-applications must include thorough discussions of potential benefits and impacts, but will not require completion of CEQA. However, if an agency chose to complete CEQA review of a potential project, it could improve the chances of that project being recommended for inclusion in a funding application since there would be: 1) an increased certainty of the project's scope, benefits and impacts; and 2) a reduction in the time required to move the project to construction after approval of funding.

As a minimum, the benefit/impact analysis should address the topics found in a CEQA Environment Assessment (EA), including: aesthetics, air quality, biological resources, climate change, cultural resources, geology and soils, hydrology and water quality, land use and planning, noise, population and housing, public services and utilities, recreation, and transportation and circulation.

## *7.4 - Data Management Procedures*

- Data storage and tracking
- Incorporation into Statewide databases
- Targets to be reached (if any)
- Measures to remedy or react to problems encountered during monitoring
- Reporting procedures

## *7.5 - Other Topics*

- Funding source for on-going monitoring
- Responsibility for on-going monitoring

An important component of monitoring and data management is qualitative or quantitative trend analysis. When relevant, appropriate trend analysis will be a part of project monitoring plans. See Table 7-1 for a summary of the measurement criteria of the objectives in the Madera RWMG.

## Table 7-1 Measurement Criteria for the Objectives of the Madera IRWMP

| *Measurement Criteria* |
|---|
| **1 - Achieve Groundwater Sustainability** |
| 1a - Increase Regional Capacity for Direct Recharge |
| Number of groundwater recharge facilities in operation |
| Number of acres developed for intentional recharge |
| Number of acre-feet of water available for recharge use |
| Number of acre-fee of water actually diverted for recharge use |
| Quantity of groundwater irrigation replaced by imported surface water irrigation (in-lieu recharge) |
| 1b - Integrate flood/storm water conveyance infrastructure and regional irrigation system |
| Number of projects integrating flood/storm and irrigation system conveyance completed |
| On-going evaluation of remaining opportunities to integrate flood/storm and irrigation system conveyance |
| 1C - Expand CASGEM groundwater monitoring network to semi- annually measure regional groundwater on a per-aquifer basis |
| Number of monitoring well sites in operation |
| Number of monitoring wells for which a well log is available |
| Number of member and affiliate agencies participating in the monitoring program |
| Number of wells being monitored and reported twice annually |
| 1d - Improve water reliability |
| Number of water reliability projects implemented |
| Increase in dry year water supply in acre-feet |
| Number of acres/people with improved water reliability |
| 1e - Expand water conservation efforts |
| Number of acre-feet of water conserved |
| Number of water conservation projects implemented |
| **2 - Expand Stakeholder Education** |
| 2a - Determine most desirable form of organization and achieve buy-in from RWMG member agencies |
| Completion of internal report on available organizational options |
| Completion of member vote on most desirable form of organization |
| 2b - Identify sources for ongoing operational funding for the independent local organization |
| Report to IRWMG summarizing funding options for the independent local organization |
| 2c - Seek special legislation as required to create the chosen special district |
| Identify local Assemblyman |
| Complete Special Legislation bill |
| Assemblyman introduces special legislation in the Assembly |
| **3 - Assure groundwater quality meets drinking and irrigation water quality standards** |
| 3a, 9a - Community education on water issues |
| Number of new programs |
| Number of days of educational activity provided |
| New materials and dissemination |
| 3b - Native American Tribes |
| Number of meetings with Tribes |
| Number of meetings Tribe representatives attend |

| *Measurement Criteria continued* |
|---|
| **4 – Improve Flood Control and Protection** |
| 4a - Identify water quality problem areas |
| Number of water quality studies |
| Number of problem areas identified and characterized |
| 4b - Identify strategies to address chemical constituents of concern |
| Number of water quality studies |
| Number of projects implemented to improve water quality |
| 4c - Propose projects to address waters which do not meet State Public Health Goals or irrigation |
| Number of projects implemented |
| Number of projects completed that mitigate water quality violations |
| **5 – Conservation** |
| 5a, 10a - Improve flood conveyance capacity |
| Number of projects completed |
| Miles of channels improved |
| Total increase in conveyance capacity in cfs |
| 5b, 10b - Improve water storage capacity |
| Number of storage projects completed |
| Additional acre-feet of storage capacity developed |
| 5c, 10c -Adapt to changes in runoff and recharge |
| Number of years all storm water captured in county |
| Additional acre-feet of storage capacity developed |
| **6 - Create practical, enforceable policies resulting in sustainable groundwater management** |
| 6a -Reduce energy consumption |
| Number of projects approved that have energy reductions |
| Number of years that have energy reductions |
| 6b - Air resources strategies |
| Number of projects approved with air improvement components |
| Number of CARB strategies met |
| 6c - Reduce energy consumption |
| Number of projects with renewable energy components |
| Number of projects with clean energy components |
| **7 - Improve Water Quality** |
| 7a -Determine strategies to enhance sustainability in foothill and mountain water supplies |
| Number of local stakeholder meetings to discuss strategies and recommend to IRWMG |
| IRWMG adopts foothill/mountain water supply sustainability strategies |
| 7b - Develop policies to improve hard rock well sustainability and quantity |
| Number of local stakeholder meetings to discuss strategies and recommend to IRWMG |
| IRWMG adopts foothill/mountain hard rock well sustainability strategies |
| 7c - Develop sources of surface water supply |
| Number of meetings with Valley-based water rights-holders |
| Number of local stakeholder meetings to discuss strategies and recommend to IRWMG |
| IRWMG adopts foothill/mountain surface water enhancement strategies |
| 7d - Implement water conservation policies to achieve the State's 20x2020 goal |
| Number of local stakeholder meetings to discuss strategies and recommend to RWMG |
| Number of outreach meetings with foothill/ mountain water purveyors |
| IRWMG adopts foothill/mountain water conservation policies |

## *Measurement Criteria continued*

7e - Fully utilize recycled wastewater from County-maintained districts and urban areas

- Identify and contact foothill/mountain Publicly Owned Treatment Works operators
- Number of outreach meetings with identified POTW operators
- Number of potential recycled water projects identified
- Quantity of potential recycled water to be produced in identified projects

7f - Develop and implement a comprehensive groundwater monitoring program by 2020

- Number of local stakeholder meetings to discuss strategies and recommend to RWMG
- Number of potential groundwater monitor wells identified
- Percentage of identified wells committed to a monitoring program
- Number of semi-annual monitoring reports prepared

### 8 – Improve Watershed Management

8a - Promote community awareness of potential water quality issues

- Number of new programs
- Number of days of educational activity provided
- New materials and dissemination

8b - Protect Source Water areas

- Number of local stakeholder meetings to discuss strategies
- Percentage of source water identified
- Number of source water protection projects and programs identified

### 9 - Expand Stakeholder Education

9a - Manage forest density to increase surface runoff

- Area of forest thinned
- Estimated volume of increased runoff

9b - Manage vegetation to reduce fire risk and attempt to keep fires within their natural range of variability

- Number of projects completed
- Area of land managed to reduce unnaturally large fires
- Number of acres of fuel breaks

9c -Reduce erosion and sedimentation

- Amount of development that is relocated away from sensitive areas
- Acreage of protected lands
- Number of properly employed sediment/erosion BMPs
- Number of studies evaluating land use and erosion/sedimentation

9d - Promote natural water storage through meadow, stream, wetlands and floodplain restoration

- Number of meadows, wetlands, streams or floodplains restored
- Number of acres/miles of areas restored.
- Water temperatures pre-and post restoration
- Groundwater level change
- Number of special status species' habitat improved in restored areas
- Number of acre-feet stored or delayed in runoff

9e - Adapt to change in amount, intensity, timing, quality, and availability of runoff and recharge

- Number of acre-feet stored or delayed in runoff
- Groundwater level change

### 10 - Climate Change

10a - Plan addresses potential impacts of future climate change

- Increased flood flows
- Increase in storage facilities to off-set longer dry cycles

10b - Long term reduction of greenhouse gases

- Reduction in gas producing energy use
- Supports efforts to develop alternative energy sources

10c -Promote public education about impacts of climate change

- Relationship of climate change to water resources
- Provides protection to the pristine natural resources from climate change impacts

# SECTION 8 - LOCAL LAND USE AND WATER PLANNING

This Section supplements Chapter 13 of the 2014 IRWMP previously prepared by the Madera RWMG to incorporate any required additions for Prop 1.

## *8.1 - Madera Regional Water Management Group*

The Madera RWMG has been actively involved in bringing together area-wide water resource officials from water districts, Cities, and County government since 2008 when the Region's initial Integrated Regional Water Management Plan (IRWMP) was approved. The Madera RWMG has actively been coordinating with local community leaders and non-profit organizations to involve disadvantaged communities as part of the IRWMP. The Program is designed to encourage integrated regional strategies for management of water resources by providing funding for projects and programs that support integrated water management.

The group has been bringing stakeholders and water administrators together through monthly meetings. The meeting locations rotate through three locations in the county to accommodate easier community access. The group also sponsors workshops and other events to educate and inform the public.

## *8.2 - Local Land Use Planning Documents*

Local land use planning documents from the City of Madera, Madera County Local Agency Formation Commission, and Federal Agencies provided insight into the goals and specific needs. During the Prop 1 update, the following plans were reviewed, Madera County General Plan, Ahwahnee Area Plan, Coarsegold Area Plan, Gateway Village (Riverstone) Area Plan, Madera State Center Community College Specific Plan, and Rio Mesa Area Plan were reviewed. These documents are summarized in the following Table 8-1.

## *8.3 - Local Water Plans*

In 2014, the Madera IRWM Plan that was prepared by Provost and Prichard identified local water plans. These plans are summarized in Table 8-2 with addition of Madera County's 2017 Stormwater Resource Plan.

## *8.4 - Stormwater Resource Plan*

The Madera County Storm Water Resource Plan (SWRP) is a first of its kind watershed-based storm water plan that establishes an integrated and coordinated storm water runoff management strategy for the County. Development of the Madera County SWRP was funded through a Proposition 1 planning grant and is being led by the County of Madera in coordination with a Technical Advisory Committee, Stakeholder Group, and community members. The MSWRP is attached in Appendix B.

## 8.5 - Chowchilla Subbasin

The Chowchilla Subbasin exists within the larger San Joaquin Valley Groundwater basin. The County of Madera is the exclusive GSA for the portion of the Chowchilla Subbasin in the unincorporated area of the County, and not otherwise covered by another public agency. Other GSAs in the Chowchilla Basin include Chowchilla Water District, Triangle T Water District and Merced County. This Chowchilla Subbasin GSA group will have one Groundwater Sustainability Plan (GSP) to address the severe overdraft conditions that exist in the basin. The plan will go into effect in 2020 with the goal of sustainability by 2040.

## 8.6 - Madera Subbasin

The Madera Subbasin exists within the larger San Joaquin Valley Groundwater basin. The County of Madera is the exclusive GSA for the portion of the Madera Subbasin in the unincorporated area of the County, and not otherwise covered by another public agency. An Advisory Committee advises the Madera County GSA for the Madera Subbasin. There are multiple GSAs within the Madera Subbasin, including the Madera County GSA, City of Madera GSA, Madera Irrigation District, Root Creek Water District, Madera Water District, Gravelly Ford Water District, and New Stone Water District. There are four GSPs being prepared in the Madera Subbasin by Gravelly Ford Water District GSA, New Stone Water District GSA, Root Creek Water District GSA and the Madera GSA, these four are negotiating a coordination-agreement to cover the Madera Subbasin.

## 8.7 - Delta-Mendota Subbasin

The Delta Mendota Subbasin Coordination Committee oversees the governance of six (6) individual regions totaling approximately 747,000 acres, consisting of 24 individual GSAs, that are developing GSPs:

- North and Central Delta-Mendota Region GSP (315,927 acres)
- San Joaquin River Exchange Contractors Water Authority (SJRECWA) GSP (289, 912 acres)
- Grassland GSP (104,417 acres)
- Farmers Water District (WD) GSP (2,214 acres)
- Fresno County GSP (24,354 acres)
- Aliso WD GSP (26,636 acres)

The overall governance structure of the Coordination Committee is shown in Figure 8-1.

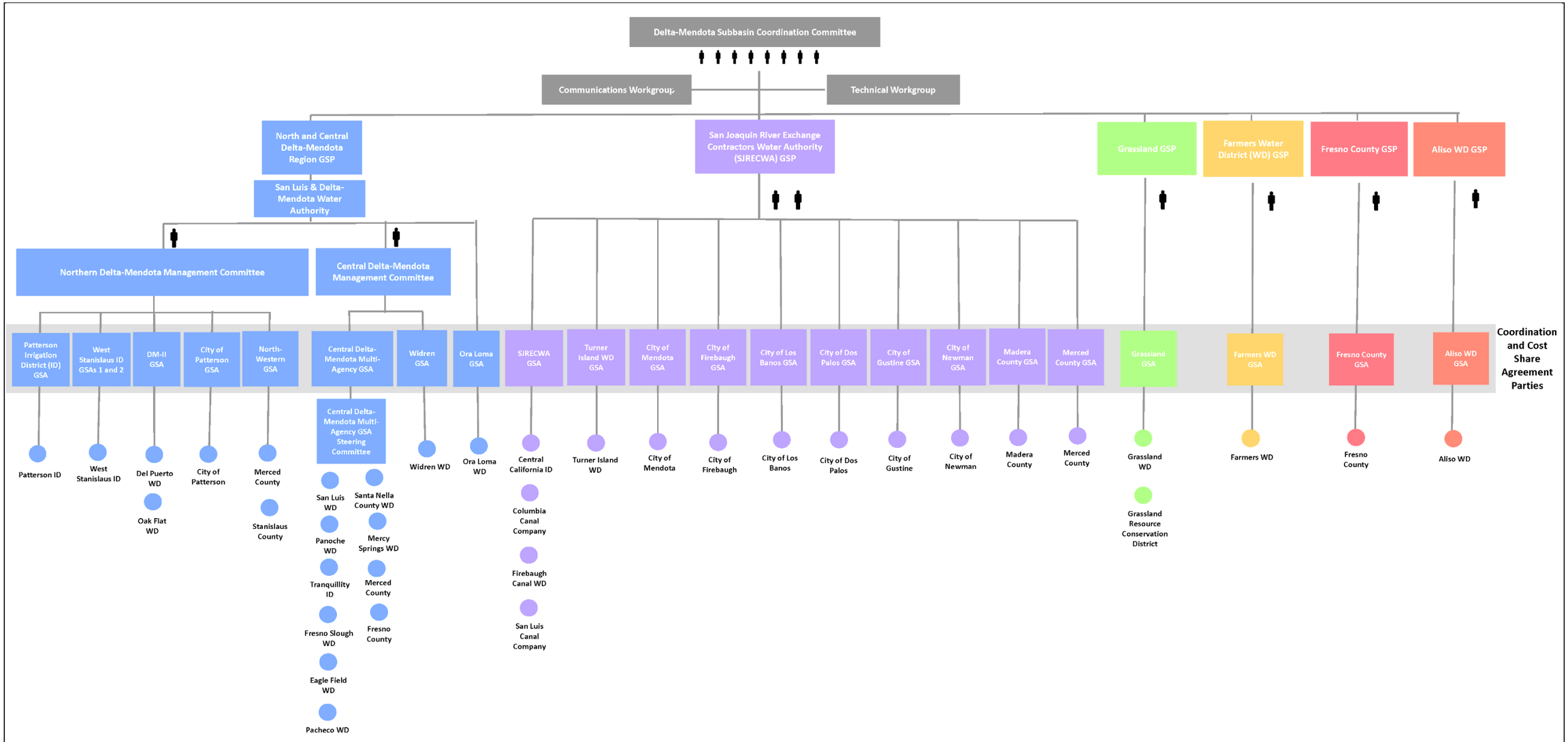



Figure 8-1
Delta-Mendota Subbasin SGMA Governance Structure

## Table 8-1 –Land Use Planning Documents

| Agencies/Organizations and Type of Plan | Reduce Water Use / Demand | | Improve Operation Efficiency and Transfers | | | | Increase Water Supply | | | | | | Improve Water Quality | | | | | | Practice Resources Stewardship | | | | | | | | Improve Flood Management | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ag Water Use Efficiency | Urban Water use Efficiency | Conveyance - Delta | Conveyance - Regional & Local | System Reoperation | Water Transfers | Conjunctive Management & Groundwater | Desalination | Precipitation Enhancement | Recycled Municipal Water | Surface Storage - CALFED | Surface Storage - Regional & Local | Drinking Water Treatment & Distribution | Ground Water & Aquifer & Remediation | Matching Water Quality to Use | Pollution Prevention | Salt & Salinity Management | Urban Runoff Management | Ag Lands Stewardship | Economic Incentives (Loans, Grants, & Water Pricing) | Ecosystem Restoration | Forest Management | Land Use Planning & Management | Recharge Areas Protection | Water-dependent Recreation | Watershed Management | Flood Risk Management | Other Strategies |
| **LAND USE PLANNING DOCUMENTS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Madera County** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ahwahnee Area Plan | | × | | | | | | | | × | | | | | | | | × | | | | | | | | | | |
| Coarsegold Area Plan | | × | | | | | | | | × | | | | | | | | × | | | | | × | | | | | |
| Gateway Village Area Plan | × | × | | × | | × | | | | | | | | × | | × | | × | | | | | × | | | | | |
| Gunner Ranch Area Plan | | × | | | | | | | | × | | | | | | | | × | | | | | | | | | | |
| Madera County General Plan | | × | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Madera State Center Community College Specific Plan | | × | | | | | | | | | | | | | | | | × | | | | | | | | | | |
| North Fork/South Fork Community Center Area Plan | | | | | | | | | | | | | | | | | | | | | | | × | | | | | |
| Oakhurst Area Plan | | × | | | | | | | | | | | | | | | | × | × | | | | × | | | | | |
| Raymond Area Plan | | × | | | | | | | | | | | | | | | | | × | | | | × | | | | | |
| Rio Mesa Area Plan | | × | | | | | | | | × | | | | | | | | × | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Madera County Local Agency Formation Commission** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Draft MSR for CSA #1 and CSA #21 | No specific policies in the doc that apply. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Greater Rio Mesa Area MSR | No specific policies in the doc that apply. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Madera Ranchos MSR | No specific policies in the doc that apply. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Oakhurst MSR | No specific policies in the doc that apply. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MSR for EIGHT PUBLIC WATER DISTRICTS in MADERA COUNTY | | | × | | | | | | | | | × | | | | | | | | | | | | | | | | |
| **State of California** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Federal** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sierra National Forest - Forrest Land and Resource Management Plan, 1991 | No specific policies in the doc that apply. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Badger Pass Ski Lodge Rehabilitation - FONSI | | × | | | | | | | | | | | | | | | | × | | | | | | | | | | |
| Ansel Adams, John Muir, and Dinkey Lakes Wilderness | | | | | | | | | | | | | | | | | | | | | | × | | | | | | |

## Table 8-2 – Local Water Plans

| | Reduce Water Use / Demand | | Improve Operation Efficiency and Transfers | | | | Increase Water Supply | | | | | | | | Improve Water Quality | | | | | | Practice Resources Stewardship | | | | | | | | Improve Flood Management | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agencies/Organizations and Type of Plan** | Ag Water Use Efficiency | Urban Water use Efficiency | Conveyance - Delta | Conveyance - Regional & Local | System Reoperation | Water Transfers | Groundwater Storage & Conjunctive Water Management | Desalination | Precipitation Enhancement | Water-use Efficiency | Stormwater Management | Water Recycling | Surface Storage - CALFED | Surface Storage - Regional & Local | Drinking Water Treatment & Distribution | Ground Water & Aquifer & Remediation | Matching Water Quality to Use | Pollution Prevention | Salt & Salinity Management | Urban Runoff Management | Ag Lands Stewardship | Economic Incentives (Loans, Grants, & Water Pricing) | Ecosystem Restoration | Forest Management | Land Use Planning & Management | Recharge Areas Protection | Water-dependent Recreation | Watershed Management | Flood Risk Management | Other Strategies |
| **WATER PLANNING DOCUMENTS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **County of Madera / Region** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| County of Madera: General Plan | × | × | | | | × | × | | | | | | | | | × | × | × | | × | | | × | × | × | × | × | × | | × |
| County of Madera: AB 3030 Ground Water Management Plan | | × | | | | × | × | | | | | × | | × | × | × | × | × | × | × | × | | | | × | × | | × | | |
| County of Madera: Storm Water Quality Management Program | | | | | | | × | | | | | | | | | | × | × | | × | | | | | | × | | × | | |
| Madera Regional Groundwater Management Plan, A partnership between: City of Chowchilla, Chowchilla Water District, City of Madera, Madera Irrigation District, South-East Madera County United | × | × | | × | | | × | | | | | | | × | × | × | | | × | × | × | × | | | × | × | | × | × | |
| **City of Chowchilla (GP/EIR)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| City of Chowchilla: Draft 2008 Urban Water Management Plan | | × | | | | × | × | × | | × | | | | | × | | | × | × | | | | | | × | × | | × | | |
| **City of Madera** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| City of Madera 2010 Urban Water Management Plan | | × | | | × | × | | × | | | | | | × | | | | | | | | | | | | | | × | | |
| City of Madera Storm Water Management Plan | | × | | × | | | × | | | | | | | | | | | × | | × | | | | | | | | | | × |
| **Special Districts** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aliso Water District: Ground Water Management Plan (information not available) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chowchilla-Red-Top-City Joint Powers Authority, AB 3030 Groundwater Management Plan (1997) | × | | | | | × | × | × | | | | | | × | × | × | | × | × | | × | | | | × | × | | × | | |
| Chowchilla Water District, Water Management Plan Five Year Update (2008 Criteria) | × | | | | | × | × | | | | | | | | | | | | | | × | × | | | × | × | | × | | |
| Gravelly Ford Water District: 2009 Water Management Plan | × | | | | | × | × | | | | | | × | | | | | | | | | | | | | × | | | × | × |
| Madera Irrigation District: (Agriculture) Water Management Plan, 5-year Update 2012 | × | | | | | × | | | | | | | | | | | | | | | | | | | | | | | | |
| Root Creek Water District: AB 3030 Groundwater Management Plan, January 2012 | × | | | | × | × | × | | | | | | | | | × | | | | | | | | | | × | | | | |
| **Madera County** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Storm Water Resource Plan 2017 | | | | | | | × | | | | | | | | | | × | × | | | | | | | | × | | × | | |
| **State of California** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| California Water Action Plan | × | × | × | | × | | × | × | | × | × | | × | × | | × | | × | × | × | | × | × | × | × | × | × | × | × | |
| **Federal** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yosemite National Park - Wawona Water Conservation Plan | | × | | | | | × | | | | | | | | | | | | | | | × | × | | | | | | | |
| Madera Irrigation District: (Agriculture) Water Management Plan, 5-year Update 2012 | × | | | | | × | | | | | | | | | | | | | | | | | | | | | | | | |
| Root Creek Water District: AB 3030 Groundwater Management Plan, January 2012 | × | | | | × | × | × | | | | | | | | | | × | | | | | | | | | | × | | | |
| **State of California** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| California Water Action Plan | × | × | × | | × | | × | × | | | | | × | | | | | | | | | × | × | × | × | | | × | × | |
| **Federal** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yosemite National Park - Wawona Water Conservation Plan | | × | | | | | × | | | | | | | | | | | | | | | × | × | | | | | | | |

# SECTION 9 - CLIMATE CHANGE

This Section supplements Chapter 16 of the 2014 IRWMP previously prepared by the Madera RWMG to incorporate any required additions for Prop 1.

California faces the prospect of significant water management challenges related to climate change and is already experiencing a wide array of effects. Impacts that are currently occurring and that are projected to continue include increased temperatures, sea level rise, a reduced winter snowpack, and altered precipitation patterns, including more frequent and intense storm events (CNRA, 2012). The previous measures and conclusions in Chapter 16 of the 2014 IRWMP for this region should also be reviewed on this topic for additional background information (Appendix D).

While it is clear that actions must be taken to reduce greenhouse gas (GHG) emissions to mitigate impacts on global climate, adaptation to already-occurring impacts is also crucial to continue to effectively manage the State's water resources. Water resource managers and customers can play key roles in improving water and energy efficiency, reducing GHG emissions, and improving stewardship of the State's natural resources (DWR, 2008)

The State Water Project Delivery Final Delivery Reliability Report 2011 (DWR 2012b) (the most recent version available at the time of this IRWM Plan) projects a temperature increase of 1.3° to 4.0 °F by mid-century and 2.7° to 8.1° F by the end of the 21st century, and that increased temperatures will lead to less snowfall at lower elevations and decreased snowpack. By midcentury it is predicted that Sierra Nevada snowpack will reduce by 25 percent to 40 percent of historical average. Decreased snowpack is projected to be greater in the northern Sierra Nevada, closer to the origin of SWP water, than in the southern Sierra Nevada. Furthermore, an increase in "rain on snow" events may lead to earlier runoff. Given these changes, water shortages worse than the 1977 drought could occur one out of every six to eight years by the middle of the 21st century and one out of every two to four years by the end of 21st century. Increased demand combined with declining flows will likely lead to decreased carryover storage from year to year.

These changes have the potential to impact water demand, water supply, flood management, water quality, aquatic ecosystems, sea level rise, and hydroelectric resources. In some areas of the U.S., including California, the impacts of climate change on water resources are already being detected and encountered with other climate change events having little to no impact on the region despite being evident in other parts of the State, such as sea level rise. It is expected that more prominent impacts will be seen within the next 20 to 50 years.

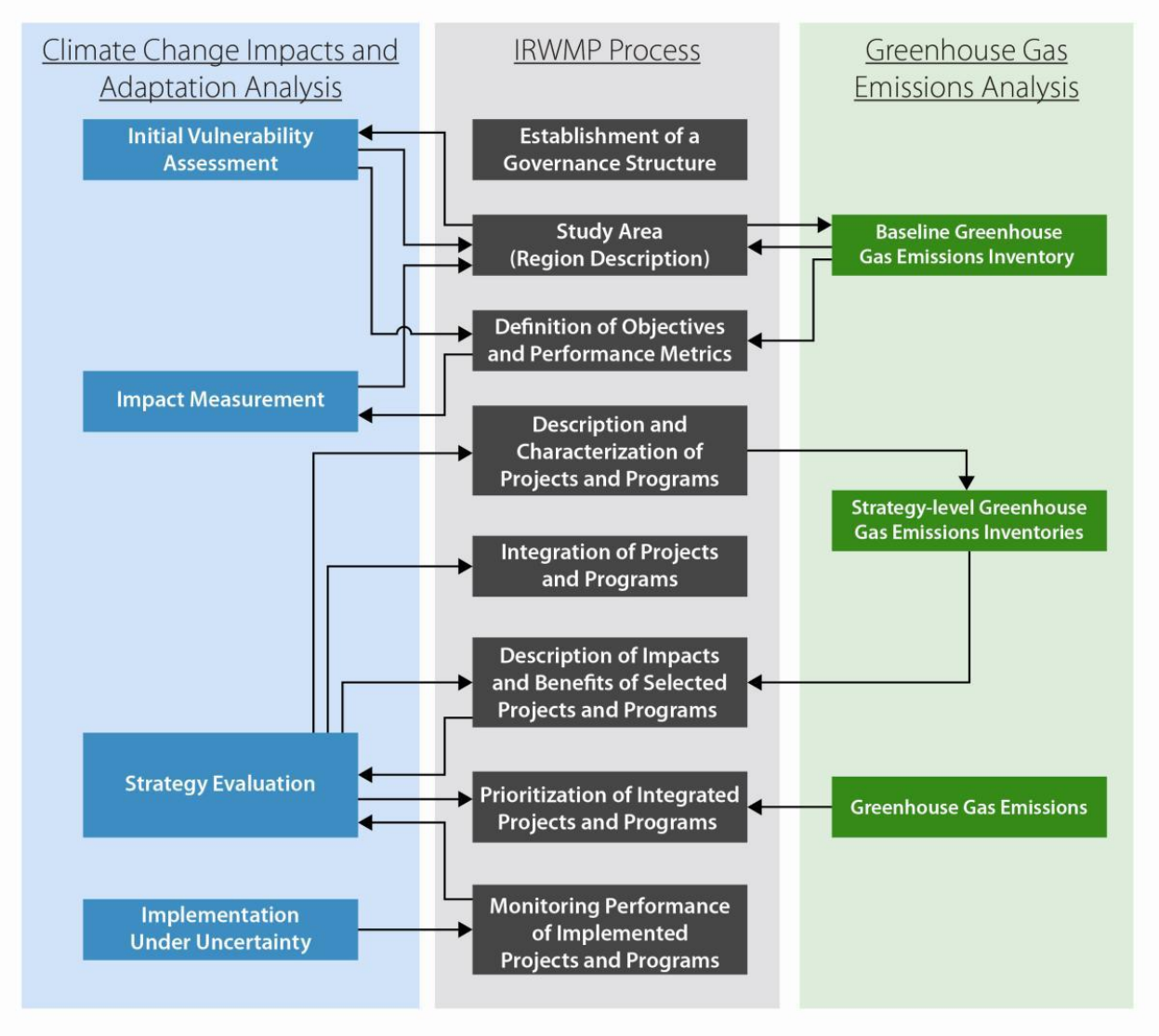
## *9.1 - Assess Vulnerability*

Identifying the region-specific water resources that are potentially vulnerable to climate change in a way that is both significant for the stakeholders involved and quantifiable is essential in being proactive regarding the effects of climate change. The interrelationship of the Madera IRWMP process and climate change is shown in Table 9-1. This flow chart

expresses how projects and programs under Madera IRWMP can benefit the region and reduce emissions of greenhouse gases and the effects of climate change.

- **Characterizing a Region:** This step is part of any regional planning framework and involves identifying key water-related resources in the region and related infrastructure.
- **Identifying Qualitative Water-Related Climate Change Impacts:** Conduct a literature review of anticipated climate change impacts specific to the region and resources identified.
- **Identifying Key Indicators of Potential Vulnerability:** Identify simple, "back of the envelope" metrics for qualitatively assessing vulnerability to climate change for key water resources; and
- **Prioritizing Vulnerable Water Resources**: Based on qualitative metrics, prioritize the resources that are more likely to be vulnerable to climate change effects and have a significant impact on water management in the region.
- **Water infrastructure may be inadequate under greater climate variability.** Water storage infrastructure was designed for historic flow regime and development levels, and may not accommodate increased winter peak flows, or have adequate carryover storage for drought periods. The conveyance system was designed for a certain demand, and inadequate peaking capacity may exist during times of extraordinary heat (for irrigation demand). Conflicts over storage may increase among agricultural, domestic, hydropower, flood control, and environmental needs.
- **Decreased overall supply would likely result in a higher concentration of pollutants.** Increased concentrations of pollutants may occur from increased groundwater pumping for agriculture and/or municipalities. Local pollution from landfills may impact neighboring surface and/or groundwater quality, especially when combined with other agricultural pollutants such as nitrate and various pesticides. Pollutants may be concentrated in surface water from a combination of lower flows and return flows from irrigation. Salinity concentrations may also begin to pose increasing threats to arable land in the face of a changing climate, irrigation practices, or water supply regime.
- **Fire risk** is projected to rise significantly at higher elevations. The Cal-Adapt website facilitates projections for fire risk based on climate modeling under high and low GHG emission scenarios for specific areas in California.
- **Flooding may have the greatest effects on disadvantaged/under-represented communities.** The elderly and the young, and populations that lack resources or knowledge due to language or economic status are potentially the most vulnerable to the effects of flooding; adaptation strategies may require coordination with public health officials.

Table 9-1 - Relationship between IRWMP Process and Climate Change Analyses




### *9.1.1 - VULNERABILITY CONCLUSIONS*

Based on the analysis from the 2014 IRWMP (Chapter 16.4), the following vulnerabilities were identified for the Madera Region. The listed vulnerabilities were reviewed during the preparation of this document and determined to still be valid. These vulnerabilities are listed in their order of importance:

**1. Backup Water Supplies.** The region has a reliable water supply, largely because groundwater has been a dependable backup supply during droughts and the dry season. However, groundwater levels are declining and groundwater demands may increase if climate change reduces precipitation and water yield, or causes earlier spring runoff that cannot be stored. If groundwater levels decline too much then the groundwater will become a less reliable supply, cause subsidence, increase energy demand and groundwater quality

may decline. This vulnerability can be measured by several metrics, including groundwater overdraft, groundwater level decline, groundwater remaining in storage, and changes in well yields.

**2. Inadequate Water Storage.** Storage facilities in the Madera Region include several surface reservoirs and subsurface groundwater storage. These facilities have been successful in helping the region regulate seasonal and year-to-year surface water flows; however, there is still demand for more storage. The current facilities may be inadequate if warming reduces annual seasonal water storage in the form of snow. Obtaining permits to construct new large dams is extremely difficult and time intensive, and, therefore, storage would have to be developed by raising existing dams, and constructing groundwater banks and off-channel reservoirs, each of which still require environmental analysis and impact mitigation. This vulnerability can be measured by the volume of new storage developed in acre-feet, and the need can be assessed by measuring the quantity of carryover water remaining in storage year to year, or quantity of carry-over water and floodwater lost to the Region.

**3. Climate Sensitive Crops.** Warmer average temperatures could reduce losses from winter freezes to some crops such as citrus, but other crops such as stone fruit , pistachios and almonds depend on a required number of hours below a certain temperature each winter (known as "chilling hours") to kill pests or ensure an effective dormancy. Higher temperatures could result in lower yields for these crops. No adaptation measures are available for this impact, other than changing crop types, which is expensive and very slow if permanent plantings are impacted. This vulnerability can be measured with the number of chilling hours below freezing, and impacts to crop productivity each year.

**4. Flooding.** Flooding can be a problem in areas of the Valley portion of Madera County lying along the San Joaquin River. Increases in high flows could create future problems since it is unlikely that large new flood control dams can be constructed. Therefore, proper floodplain zoning and limiting high-value development on floodplains is crucial to preventing future problems. Increasing flood channel capacity and constructing additional storage facilities is also important. This vulnerability can be measured by the number of essential structures constructed in the 200-year floodplain.

These vulnerabilities will be re-evaluated at least every five years to reflect changes in local cropping, water demands, water supplies, new facilities, and climate change projections.

## *9.2 - Measure Regional Impacts*

To the extent appropriate, it is important to quantify climate change impacts to a region's most vulnerable water resources. This step can be highly analytical or qualitative, depending on the system, estimated level of vulnerability, operational complexity, and resources available for the analysis. Climate model variables and relative reliability are shown in Table 9-2.

Table 9-2 Climate Model Variables and Relative Reliability for Water Resources Analysis

| Water Management Issue | Climate Model Variables | Relative Reliability of Climate Model Output |
|---|---|---|
| **Water Supply** | | |
| Long-term supplies - mean annual basin yield | Annual average temperature and precipitation | - High on temperature<br>- Precipitation depends on geographic scale, higher at sub- continental scale<br>- Regional climate model precipitation projections are more reliable than GCM projections |
| Long-term demand | Warm-season temperature and precipitation | Same as above |
| Shift in seasonality of runoff in snowmelt-dominated areas | Monthly temperature | Medium-High |
| Shift in seasonality of runoff in non- snowmelt-dominated areas | Seasonal precipitation | Medium-Low |
| Long-term supplies - variability in yield | Monthly temperature and precipitation | Medium-Low |
| **Flooding** | | |
| Seasonal floods | Winter and spring precipitation | Medium-Low |
| Major storms/cyclones | Frontal systems; cyclone information and track | Low |
| Flash floods | Hourly precipitation in small geographic areas | Very Low |
| **Water Quality** | | |
| Biological oxygen demand | Annual, seasonal, monthly air temperature (to estimate water temperature) | Medium-High |
| Dissolved oxygen | Annual, seasonal, monthly air temperature (to estimate water temperature) | Medium-High |
| Flow reduction | Annual, seasonal, monthly temperature, precipitation | Medium-High |
| Saline intrusion of groundwater | Sea level rise; annual temperature and precipitation | Low |
| Algal bloom | Annual, seasonal, monthly temperature | Medium-Low |
| Turbidity | Daily, hourly precipitation intensity | Low |
| Cryptosporidium | Daily, hourly precipitation intensity | Low |

## *9.3 - Evaluate Strategies*

The comparison and ranking of existing and potential resource management strategies based on their effectiveness in mitigating and adapting to climate change impacts is another important step in addressing the impacts of climate change. New potential projects or programs may also be identified during this step of the process. Evaluating strategies for climate change adaptive capacity provides a comprehensive evaluation of

individual strategies or projects, as well as integrated project portfolios. This process will allow decision-makers to make well-informed management decisions and prevents the repetition of previously failed projects. These strategies are shown in Table 9-3.

**Table-9-3 – Resource Management Strategies to Climate Change Adaptation**

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

## 9.4 - Agricultural Practices and Reduction of Greenhouse Gases

The agricultural lands stewardship strategy includes measures that promote the continued use of agricultural lands and protect natural resources through the maintenance of agricultural lands. Erosion control measures are an example of agricultural land stewardship practices that support the viability of croplands while offering water resource benefits. This strategy contributes to the protection of open space and the traditional characteristics of rural communities. Further, it helps landowners maintain their farms and ranches rather than being forced to sell their land because of pressure from urban development.

Agriculture is a large component of the Madera County economy, contributing $2,017,446,000 in 2015 (Madera County Farm Bureau , 2016). The majority of these farms are owned by families, so there is a high potential for collaboration between stakeholders. There are many strategies that can be implemented to reduce greenhouse gas emissions that have been implemented across the state. The following Table 9-4 provides examples that sequester carbon and reduce emissions and the reduction of greenhouse gases.

**Table-9-4 – Agricultural Practices that Sequester Carbon and or Reduce Emissions of Other Greenhouse Gases**

| Key Agricultural Practices | Typical Definition and Some Examples | Effect on Greenhouse Gases |
|---|---|---|
| Conservation or riparian buffers | Grasses or trees planted along streams and croplands to prevent soil erosion and nutrient runoff into waterways. | Increases carbon storage through sequestration. |
| Conservation tillage on croplands | Typically defined as any tillage and planting system in which 30% or more of the crop residue remains on the soil after planting. This disturbs the soil less, and therefore allows soil carbon to accumulate. There are different kinds of conservation tillage systems, including no till, ridge till, minimum till, and mulch till. | Increases carbon storage through enhanced soil sequestration may reduce energy-related $CO_2$ emissions from farm equipment and could affect $N_2O$ positively or negatively. |
| Grazing land management | Modification to grazing practices that produce beef and dairy products that lead to net greenhouse gas reductions (e.g., rotational grazing). | Increases carbon storage through enhanced soil sequestration, may affect emissions of $CH_4$ and $N_2O$. |
| Biofuel substitution | Displacement of fossil fuels with biomass (e.g., agricultural and forestry wastes, or crops and trees grown for biomass purposes) in energy production, or in the production of energy-intensive products like steel. | Substitutes carbon for fossil fuel and energy-intensive products. Burning and growing of biomass can also affect soil $N_2O$ emissions. |

## 9.5 - Forestry Practices

California's major water development projects rely on water produced in forested watersheds. Almost all forest management activities can affect water quantity and quality. This strategy focuses on those forest management activities that are designed to improve the

availability and quality of water for downstream users, on both publicly and privately-owned forest lands. Examples of forest management activities include vegetation and fuels management to enhance soil moisture, groundwater recharge and streamflow.

The following Table 9-5 provides examples of forestry practices that can sequester carbon and the effects on greenhouse gases.

**Table 9-5 - Forestry Practices that Sequester Preserve Carbon**

| Key Forestry Practices | Typical Definition and Some Examples | Effect on Greenhouse Gases |
|---|---|---|
| Afforestation | Tree planting on lands previously not in forestry (e.g., conversion of marginal cropland to trees). | Increases carbon storage through sequestration. |
| Reforestation | Tree planting on lands that in the more recent past were in forestry, excluding the planting of trees immediately after harvest (e.g., restoring trees on severely burned lands that will demonstrably not regenerate without intervention). | Increases carbon storage through sequestration. |
| Forest preservation or avoided deforestation | Protection of forests that are threatened by logging or clearing. | Avoids $CO_2$ emissions via conservation of existing carbon stocks. |
| Forest management | Modification to forestry practices that produce wood products to enhance sequestration over time (e.g., lengthening the harvest-regeneration cycle, adopting low-impact logging). | Increases carbon storage by sequestration and may also avoid $CO_2$ emissions by altering management. May generate some $N_2O$ emissions due to fertilization practices. |

## *9.6 - Implement Under Uncertainty*

Incorporate regional management strategies into a broader planning context that considers the uncertainties associated with climate change. This can be done in many ways, for example using approaches based on adaptive management, robust decision making, and other decision-support methods. Uncertainty influences every step of a planning process involving climate change, including methods for climate change impact measurement, project selection, implementation, and performance monitoring.

Uncertainty should be a key consideration of most IRWMP activities, from defining and prioritizing objectives to evaluating projects and project portfolios. There are several strategies for planning under uncertainty, and many are not mutually exclusive.

- **Robust Decision Making:** This method involves using performance metric evaluations to identify tradeoffs associated with the various project options and objectives. With the tradeoff information, hedges can be developed from which realistic portfolios can be identified. Iterations are often involved in which portfolios are reevaluated collectively, fine-tuned, and evaluated again (Water Utility Climate Alliance (WUCA), 2010).

- **Adaptive Management:** This method consists of identifying and monitoring the most important uncertainties and translating them into risk triggers or early warning indicators. The values of the variables that constitute early warning indicators can be established deterministically (e.g., a threshold) or probabilistically (e.g., frequency by which a level is exceeded). Adaptive management constructs a flexible path with actions to take when specific triggers occur. This approach is gaining more popularity because the future cannot be accurately predicted (MWD 2010, CDM 2007, DWR 2010a).
- **Other Approaches:** There are many methods for incorporating large uncertainty into the planning process, some of which are variants of RDM and adaptive management. Traditional scenario planning and decision-scaling are among the other methods discussed.

# SECTION 10 - STAKEHOLDER INVOLVEMENT

## *10.1 - Purpose and Overview*

This plan serves as a future guide for the public communication and outreach activities of the Madera RWMG.

The goals of stakeholder involvement are to: 1) ensure that interested parties (e.g., members of the public, non-government organizations, and public agencies), and community residents are well-informed of the deliberations and activities of the Madera RWMG and the development of the IRWMP, and 2) encourage participation in the Madera RWMG and IRWMP process from interested parties and residents.

Elements of this overview include objectives and principles, audiences and partners, and key messages and outreach strategies to follow. A brief final element is an evaluation of plan implementation.

The "Community Capacity Assessment Report," which will provide an in-depth overview of DAC and tribal outreach efforts, is being prepared by Sierra Institute in conjunction with Sierra Water Workgroup. This section will be updated after receipt of this document and attached in Appendix C.

## *10.2 - Objectives and Principles*

### *10.2.1 - OBJECTIVES OF THE MADERA RWMG COMMUNICATION/OUTREACH PLAN:*

- Ensure that interested parties and residents are aware of the work, schedule, progress, and deliberations of the Madera RWMG;
- Ensure that interested parties and residents have opportunities to provide input to the Madera RWMG's deliberations;
- Support and engage disadvantaged communities and tribes; two of the highest priority stakeholders in the Region
- Build the Madera RWMG's network, solicit greater feedback and participation in project development and implementation process
- Communicate successes and goals to stakeholders, the general public, and funders
- Showcase the beauty and diversity of the region

### *10.2.2 - PRINCIPLES*

- The Madera RWMG will proactively develop and nurture relationships with new and existing partners by conducting outreach and education activities (see Strategies in Section V).
- The Madera RWMG will partner with interested parties to leverage existing networks and outreach efforts, in an effort to stretch resources.

- The Madera RWMG will make information and materials (e.g. meeting agendas, materials, requests for proposals, other action items) available to stakeholders and the general public on a timely basis to provide ample time to consider information and, as appropriate, provide input and participate.
- The Madera RWMG strives to include participation from the region's many diverse geographic and interest-based audiences and may apply different communication strategies to target different groups.
- The Madera RWMG plans to keep pace with the rapid evolution of information distribution, particularly through online outlets.

### *10.2.3 - AUDIENCES AND PARTNERS*

Water resource issues affect the entire population in a region. Some of the many diverse geographic and interest-based audiences in the region include:

- Disadvantaged communities;
- Landowners;
- Farmers and growers;
- Environmental groups;
- Recreational users;
- California Native American Tribes;
- Developers;
- Community organizations;
- Public agencies;
- Elected officials.

The Madera RWMG has developed lists of specific groups, organizations, and agencies to participate in our integrative regional management process and continues to seek ways to expand the collaborative network and detailed in Appendix D.

To date, the Madera RWMG's outreach and communication strategies have been successful in building a core of partners and participants. These partnerships are critical to maximizing the efficiency and effectiveness of ongoing communication and outreach efforts aimed at expanding the group's network of participants. Additional partners may be solicited as activities are developed.

### *10.2.4 - KEY MESSAGES*

The Madera RWMG will widely distribute the following, but not limited to, key messages across many communication outlets and to broad audiences:

- The Madera Region hydrological subbasins are an important source of clean water for San Joaquin Valley's communities, agriculture, and environment. The region supplies water for abundant recreational opportunities, scenic beauty, irrigation for hundreds of thousands of the nation's riches farmlands, habitat

for plants and animals, drinking water, and groundwater replenishment.

- The Madera IRWMP and the Madera RWMG represent a unique opportunity to protect and conserve this unique region's resources with science-based, integrated regional water management;
- The Madera RWMG utilizes a consensus-based process to address regionally significant issues;
- By collaborating as a group, we can develop solutions to issues and challenges that protect and improve the region as a whole. Working together, the group can achieve more than the sum of contributions from its individual participants;
- The group seeks solutions through project planning and development, attracting grant funds, and implementing projects that contribute to the region's sustainability. The group aims to increase the region's capacity to respond positively to social, economic, and environmental challenges, and ultimately, reduce and prevent the need for reactive problem-solving.

### *10.2.5 - COMMUNICATION AND OUTREACH STRATEGIES*

This section identifies communication and outreach strategies that are utilized by the Madera RWMG to enhance communication and collaboration and broaden involvement of all community stakeholders:

- **Madera RWMG website** (www.maderacountywater.com/regional-water-management-group/): A clearinghouse for all information and materials associated with Madera RWMG meetings, information, education, and any other communication and outreach efforts/needs.
- **Email correspondence:** Develop and maintain an email distribution list for all interested parties; this comprehensive list would also have a segmented list of only those parties who have expressed interest in partnering.
- **Press relations:** Proactively develop and regularly utilize relationships with key press and media outlets for the purpose of sharing news and information.
- **Outreach materials:** Develop a standardized series of general promotional and outreach materials, as well as activity-specific and topic-specific materials as needed.
- **Networking:** Madera RWMG members will periodically (e.g., twice a year) brief the geographic or interest-based groups that they serve on, participate in, or recommend, as applicable.
- **Communication to elected officials:** Madera RWMG Coordinator and members conduct an annual round of briefings for elected officials and agency executive officers.
- **Events:** The Madera RWMG hosts public workshops or other public events to support the kickoff of the planning process and the rollout of key deliverables.
- **Social media:** Distribute news and information via Facebook, Twitter, and/or LinkedIn

### 10.2.6 - EVALUATION

As part of its normal business, the Madera RWMG will evaluate the effectiveness of its communication and outreach efforts on an annual basis and revise this plan accordingly.

Evaluation Keys:

- Check the progress being made toward objectives; and identify and address obstacles to achievement of the objectives;
- Evaluation must be based on measurable progress towards objectives or tasks that have been identified.

Potential Metrics:

- Number of stakeholders on the email list;
- Website traffic
- Feedback from the process;
- Meeting participation;
- Media interactions: number of stories and articles published in various media outlets;
- Number of collaborative inter-regional projects.

## 10.3 - Native American Tribes Coordination

### 10.3.1 - CALIFORNIA WATER PLAN TRIBAL ADVISORY COMMITTEE

In November 2011, the DWR extended invitations to Native American Tribes and non-profit organizations serving Native American Tribes to participate in the first ever California Water Plan Tribal Advisory Committee (Tribal AC). The goal of establishing a Tribal AC is to create a forum where Native American Tribes and non-profit organizations serving Native American Tribes can review, comment on, and help to develop the material in the California Water Plan Update 2013 and ensure that these materials include Tribal perspectives on land, water, and culture. This includes implementing and developing strategies to address issues identified at the 2009 Tribal Water Summit; the Water Plan's Strategic Plan, Resource Management Strategies, and Regional Reports; and Tribal water planning concerns in general. The Tribal AC will advise DWR on these matters directly. The Water Plan will also create opportunities for direct discussion between the Tribal AC and the Water Plan State Agency Steering Committee, chaired by DWR.

The Tribal AC consists of members identified by Native American Tribes and CA Native American non-profit organizations to serve as liaisons between the California Water Plan Update 2013 (CWP 2013) and their respective Tribes and/organizations. Additionally, the Tribal AC has 1-3 seats on the Public Advisory Committee for the California Water Plan (Public AC). The primary role of these Tribal AC representatives on the Public AC is for information exchange. These representatives participate in Public AC meetings and are responsible for sharing Tribal AC perspectives (when developed by the Tribal AC in

advance), and identifying items of interest to bring back to the Tribal AC. They are responsible for ensuring that the Tribal AC reps on the Public AC are not responsible for documenting the entire minutes of the Public AC, but on ensuring that items that may be of particular interest to Tribal AC or Tribal peoples are flagged to the Public AC and brought to the attention of Tribal AC.

For the purposes of this Tribal Communication Plan, the term "Native American Tribe" signifies all Indigenous Communities of California, including those that are federally non-recognized and federally recognized, and those with allotment lands, regardless of whether they own those lands. Additionally, because some water bodies and Tribal boundaries cross State borders, this Communication Plan includes Indigenous Communities in Oregon, Nevada, and Arizona that are impacted by water in California.

### *10.3.2 - COMMUNICATION GOALS*

- State agencies, local governments, and water purveyors that deal with water resources acknowledge the indigenous and aboriginal rights of Native American Tribes and their water rights, so that Tribes can safely continue their cultural, religious, subsistence, economic, and sustainability practices in perpetuity. (Safely in this context refers to the public health aspects of cultural and religious practices, for example, the ability to eat fish that are not contaminated with mercury and other toxins.)
- State agencies, local governments, and water purveyors acknowledge that Native American Tribes are a viable people comprising government or representative entities with viable concerns and solutions and listened to as individuals and negotiated with on a government-to-government basis.
- Native American Tribes identify likely impacts and effects on interests and resources from water planning and management decisions or projects in advance of decision-making and have adequate time to review associated proposals.
- Native American Tribes bring their authentic and diverse voices, including traditional knowledge, into the CWP Update processes, and into other State planning processes that involve water resources.
- Regular California Tribal Water Summits that include the highest level of decision-makers from State, local, and federal governments are held.
- Native American Tribes from northern, central, and southern California begin to work together to protect their watersheds for habitat, water quality, water supply, and traditional cultural places.
- Identify and outreach to Tribes and Tribal Communities whose water bodies and Tribal boundaries cross into California State borders – ensure that their Tribal perspectives and concerns are being considered for the CWP.
- In planning future California Tribal Water Summits, identify, strategize and prioritize all issues and ideas for program and policy change and/or recommendation.

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