UPPER FEATHER RIVER
INTEGRATED REGIONAL WATER MANAGEMENT PROGRAM
Regional Water Management Group

Sharon Thrall, Plumas County Flood Control and Water Conservation District
Paul Roen, Sierra County
Terry Swofford, Plumas County
Russell Reid, Feather River Resource Conservation District
Bill Nunes, Sierra Valley Resource Conservation District
Jim Roberti, Sierra Groundwater Management District
Roger Diefendorf, Plumas County Community Development Commission
Trina Cunningham, Maidu Summit Consortium
Jeffrey Greening, Public Member
Joe Hoffman, Plumas National Forest (Advisory)
Carol Thornton, Lassen National Forest (Advisory)
Quentin Youngblood, Tahoe National Forest (Advisory)

AGENDA FOR REGIONAL WATER MANAGEMENT GROUP MEETING OF JUNE 24, 2016 TO BE HELD AT 1:00 P.M. IN THE PLUMAS COUNTY PLANNING CONFERENCE ROOM, 555 MAIN STREET, QUINCY, CALIFORNIA

www.featherriver.org

AGENDA

The Regional Water Management Group of the Upper Feather River Integrated Regional Water Management Program welcomes you to its meetings, which are regularly held on the fourth Wednesday of every other month, and your interest is encouraged and appreciated.

Any item without a specified time on the agenda may be taken up at any time and in any order.

Any person desiring to address the Board shall first secure permission of the Regional Water Management Group Chair. Any public comments made during a regular Regional Water Management Group meeting will be recorded. Members of the public may submit their comments in writing to be included in the public record.

CONSENT AGENDA: These matters include routine administrative actions. All items on the consent calendar will be voted on at some time during the meeting under "Consent Agenda." If you wish to have an item removed from the Consent Agenda, you may do so by addressing the Chairperson.

REASONABLE ACCOMMODATIONS: In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting please contact Randy Wilson at 530-283-6214. Notification 72 hours prior to the meeting will enable the County to make reasonable arrangements to ensure accessibility. Auxiliary aids and services are available for people with disabilities.

STANDING ORDERS

1:00 P.M. **CALL TO ORDER/ROLL CALL**

ADDITIONS TO OR DELETIONS FROM THE AGENDA

PUBLIC COMMENT OPPORTUNITY
Matters under the jurisdiction of the RWMG, and not on the posted agenda, may be addressed by the general public at the beginning of the regular agenda and any off-agenda matters before the RWMG for consideration. However, California law prohibits the RWMG from taking action on any matter which is not on the posted agenda unless it is determined to be an urgency item by the RWMG. Any member of the public wishing to address the RWMG during the "Public Comment" period will be limited to a maximum of 3 minutes.

ANNOUNCEMENTS/REPORTS
Brief announcements.

CONSENT AGENDA
These items are expected to be routine and non-controversial. The RWMG will act upon them at one time without discussion. Any RWMG members, staff member or interested party may request that an item be removed from the consent agenda for discussion.

A) RWMG

Approve RWMG Meeting Summary for the regular meeting held on May 20, 2016.

ACTION AGENDA

1. PROJECT STATUS UPDATE

Update on project schedule, task, stakeholder and tribal outreach, and budget. Informational.

2. SIERRA WATER WORKGROUP PRESENTATION

Presentation by Liz Mansfield and Kate Gladstein, Sierra Water Workgroup (SWWG). Liz will be presenting on the goals and objectives of the SWWG, including the memorandum of understanding (MOU). Kate will present on the interregional data management system, and demonstrate the GIS mapping tool used by Tahoe-Sierra, Yosemite-Mariposa and CABY RWMGs. Information and request for consideration of the MOU.

3. PROPOSITION 1 DISADVANTAGED COMMUNITY INVOLVEMENT COORDINATION

Update and discussion of current coordination efforts in response to the Proposition 1 Draft Disadvantaged Community Involvement Request for Proposal. Discussion and/or direction to staff.

4. INTEGRATION PRESENTATION ON DISADVANTAGED COMMUNITY OUTREACH AND COMMUNITY VULNERABILITY STUDY

Presentation and discussion of the integration of the community vulnerability study and disadvantaged community outreach and projects. Information, discussion, and accept final community vulnerability study.

5. DRAFT REGIONAL RESOURCE MANAGEMENT STRATEGIES CHAPTER

Presentation and discussion of the Draft Resource Management Strategies chapter. Request for discussion and direction to staff.

6. DRAFT PLAN IMPLEMENTATION, PERFORMANCE, MONITORING, DATA MANAGEMENT CHAPTER

Presentation and discussion of the Draft Plan Implementation, Performance, Monitoring, Data Management chapter. Request for discussion and direction to staff.

7. NEXT MEETING

Discuss remaining tasks and tentative topics for next RWMG meeting or provide direction to staff.

ADJOURNMENT

Upper Feather River IRWM
Regional Water Management Group

DRAFT SUMMARY MINUTES

May 20, 2016

Meeting materials and video recording link are available on the website at:
http://featherriver.org/rwmg_meetings/

Call to Order and Roll Call
Sherrie Thrall called the meeting to order on May 20, 2016 at 1 pm at the Plumas County Planning Conference Room, 555 Main Street, Quincy, California.

Members Present:
Sherrie Thrall, Plumas County Flood Control and Water Conservation District
Russell Reid, Feather River Resource Conservation District
Jim Roberti, Sierra Valley Groundwater Management District
Trina Cunningham, Maidu Summit Consortium
Roger Diefendorf, Plumas County Community Development Commission
Jeffrey Greening, Public Member
Joe Hoffman, Plumas National Forest (Advisory)

Members Absent:
Paul Roen, Sierra County Board of Supervisors
Terry Swofford, Plumas County Board of Supervisors
Bill Nunes, Sierra Valley Resource Conservation District
Carol Thornton, Lassen National Forest (Advisory)
Quentin Youngblood, Tahoe National Forest (Advisory)

Staff Present:
Randy Wilson, Plumas County Flood Control and Water Conservation District
Uma Hinman, Uma Hinman Consulting

Additions or Deletions from the Agenda
None noted

Public Comment Opportunity **(00:1:14)**
Greg Hines introduced himself and shared that he grew up in Graeagle and he just finished graduate school (environmental engineering degree) and moved back to the area. Greg acknowledged the RWMG's hard work in developing the draft plan chapters and offered to help out wherever he can.

Announcements / Reports
None noted

CONSENT AGENDA **(00:2:08)**

a. RWMG Approval of Meeting Minutes for April 1, 2016
Uma Hinman noted that Frank Motzkus suggested we add that the RWMG welcomes the opportunity to participate in relation to Trina's announcement for the California Water Policy Conference at the bottom

of the first page. Upon motion by (00:2:39) Russell Reid and second by Roger Diefendorf, the RWMG Meeting Minutes for April 1, 2016 were unanimously approved as amended per Frank's suggestion.

REGULAR AGENDA

1. Project Status Updates (00:2:49)

Uma Hinman presented an overview of the project schedule, tasks and budget. Uma noted, and Randy Wilson confirmed, that the Plumas County Counsel has finished their review of the Memorandum of Understanding for the DWR contract extension and that Butte County Counsel is now reviewing the MOU. No issues with the MOU have been identified to date. Uma also noted that there was an Upper Feather River Water Workshop on April 4th in Vinton at which Burkhard provided an initial presentation on the Community Vulnerability Study related to the approach and identified DACs.

2. Stakeholder Outreach Updates (00:5:38)

Uma Hinman presented an update on stakeholder outreach efforts to date including workgroups, Tribal outreach, and stakeholders. Trina Cunningham provided an update on the Tribal Advisory Committee meeting on May 16, 2016. Trina contacted Chairman Ramirez of the Mechoopda tribe to follow up since there has been no participation from Butte County tribes to date. The Mechoopda tribe is currently in formal consultation with Plumas County government. Creig Marcus, the Tribal Administrator from the Enterprise Rancheria in Butte County, was on the conference call for the recent Tribal Advisory Committee (TAC) meeting and provided helpful information. Trina noted that the TAC will continue to explore the convergence of the political and tribal boundary lines between Plumas and Butte County to ensure that the tribes in the Butte County portion of the Lake Oroville area are well represented in our Plan because they are incredibly tribally and culturally significant. Trina also noted that the tribes have not really been engaged in the process of looking at DACs through the Proposition 1 Disadvantaged Community Involvement RFP that is coming out and she spoke with Jim Branham from the Sierra Nevada Conservancy (SNC) who indicated that SNC would pay for tribes travel expenses and food to support tribal participation in IRWM regional meetings. Uma provided a brief update on the chapter review schedule and noted that there are three new chapters available for review online.

3. Proposition 1 Disadvantaged Community Involvement Coordination (00:9:22)

Uma Hinman presented an update on the current coordination efforts in response to the Proposition 1 Draft Disadvantaged Community Involvement (DACI) Request for Proposal (RFP). Trina Cunningham mentioned the coordination meeting occurring today, which is co-hosted by the Sierra Water Workgroup (SWWG) and the Inyo-Mono IRWM region to bring IRWM practitioners from the Sierra, eastern California and beyond together to discuss meaningful engagement, involvement and capacity building of DACs and broader regional coordination for moving forward with Proposition 1 funding.

4. Update on Community Vulnerability Study (00:13:00)

Uma Hinman presented an update on the content and progress of the Community Vulnerability Study and DAC outreach. Sherrie Thrall asked for clarification regarding DAC outreach efforts and whether staff is working with municipal service providers in the DACs. Randy and Uma confirmed that initial contact with the DACs is made to the municipal service providers prior to DAC outreach occurring on a community-scale. Trina Cunningham confirmed that they have not encountered a community without a service provider, although some communities have very few service connections which has raised the question of

what is a community and how do we represent it. Jeffrey Greening commented that it is interesting that the designation of Brownfields is not used in DAC reviews and asked why, especially since it is such a powerful word for State funding. Uma responded that Brownfields designation is more common when working in environmental justice and DACs are designated based on a median household income and do not specifically address issues of pollution. Discussion ensued regarding Brownfields designation and blight. Uma clarified that this a Department of Water Resources (DWR) based process and DWR defines DACs, which does not include a designation of Brownfields.

Sherrie Thrall asked about the status of the Community Vulnerability Study in relation to the Sierra Valley communities that were selected for further study. Uma presented background on the Community Vulnerability Study (also referred to as the Well Vulnerability Study) which supports one of the tasks for DAC Outreach in the Grant Work Plan. The Study identifies a number of DACs in the Sierra Valley and analyzes their vulnerability to groundwater pollutants. Nine DACs were reviewed in the study and four communities were selected for more intensive analysis. Burkhard has prepared an administrative draft of the study, which is currently being reviewed internally. The purpose of this task is to incorporate the drinking and wastewater treatment needs of the disadvantaged communities. This will be very important for the projects that come out of the next round of Proposition 1 funding available from DWR for DAC projects; Prop 1 Round 1 is for DAC involvement and Round 2 is for DAC implementation projects focused on water and wastewater needs. Robert Meacher asked if the focus was on nitrates only. Uma responded that the study did focus on the risk of nitrate pollution based on the scope of the work plan. Randy Wilson added that when the work plan was originally prepared, nitrates were the primary concern, and currently there are concerns regarding other pollutants which were not anticipated when DWR approved the work plan. Discussion ensued regarding the regulatory basis for monitoring and reporting nitrate levels in groundwater related to agricultural activities. Uma noted that Proposition 1 requires additional water quality discussion in the Plan regarding arsenic and a number of other water quality constituents; those issues in the watershed can be addressed in those sections.

5. Update on Project Development Process (00:25:45)

Uma Hinman presented the IRWM Plan implementation project review process to date, the draft project list, and next steps. All projects on the list have been determined to meet the minimum requirements per Proposition 84. Upon approval by the RWMG, the next step is to release the draft project list to the workgroups and general public for review and comment. Upon motion by Jeffrey Greening and second by Trina Cunningham, the Upper Feather River IRWM Plan Implementation Projects were unanimously approved to be released to the general public for review and comment.

6. Draft Regional Water Issues Chapter (00:29:00)

Uma Hinman explained an added step in the chapter development process. All public comments on the draft chapters will be consolidated into a single document and provided to the RWMG for information. The revised chapters, in which staff addresses the comments received as appropriate, are provided to the RWMG in the meeting agenda packets. RWMG members are encouraged to bring forward any comments that they feel were not adequately addressed in the revised chapter. Uma also reminded all that there will be another opportunity to comment during the Public Review Draft stage.

Uma Hinman presented the Draft Regional Water Issues chapter. Jeffrey Greening asked about involvement from college students to assist with implementation of the Plan. Randy Wilson responded that the level of experience with undergraduate students would not necessarily meet our needs. Sherrie Thrall asked about solutions beyond monetary approaches to address the issue of capacity building which seems to be coming up across the board. Jeffrey Greening commented that is why he suggested Chico State students. Discussion ensued regarding who will apply for and administer grant funding once Uma's

professional services are no longer under contract. Russell Reid expressed concern about how funds for implementation projects will be identified and pursued. Uma noted that the issue of capacity is being discussed at the SWWG meetings.

7. Draft Land Use and Water Planning Chapter (00:47:18)

Uma Hinman presented the Draft Land Use and Water Planning chapter, providing an overview of the Proposition 84 standards for Land Use and Water Planning and approach taken on the chapter.

8. Sierra Water Workgroup Memorandum of Understanding (00:52:15)

Uma Hinman presented the Memorandum of Understanding (MOU) with the Sierra Water Workgroup (SWWG); a non-profit organization that focuses on water issues of concern in the region through coordination between local and regional water planning efforts and promoting the exchange of information and tools amongst stakeholders in the region. Jeffrey Greening asked how far south SWWG covers in relation to advocating for IRWM regions. Uma responded that SWWG covers the Inyo-Mono area and possibly as far as the southern Sierra. Jeffrey Greening asked if they currently have access to SWWG's data management system. Uma confirmed that anyone can access their data management system online. Sherrie Thrall raised concerns regarding item 6 of the MOU Principles of Agreement requiring active member participation in order to be eligible to take part in SWWG decision making, including the RWMG process for selecting a SWWG representative and covering travel expenses. Discussion ensued regarding the types of people representing signatories of the SWWG MOU, logistics for SWWG representation, and the risks and benefits of membership. Uma and Trina noted that the SWWG is primarily focused on sharing of information and collaboration. RWMG directed staff to invite the SWWG Executive Director to a future RWMG meeting to share the advantages of being an MOU signatory and to define active member participation. Discussion ensued regarding the Proposition 84 contract extension from June 4, 2016 to October 4, 2016 and the estimated completion of an Administrative Draft of the Plan in July 2016.

9. Next Meeting (1:07:04)

The next meeting is scheduled for Friday, June 24th at 1pm.

Adjournment (1:08:50)

The meeting was adjourned at 2:25 pm.

ITEM NO. 1

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: UFR IRWM Plan Update Project Schedule, Task and Budget Update

Date: June 17, 2016

SCHEDULE

Based on the contract date between Department of Water Resources (DWR) and the Plumas County Flood Control and Water Conservation District, we are currently in the 24th month of the 2-year project. All Workgroups have held at least five meetings; consistent with the Grant Work Plan. The next few months will be focused on the developing the Draft Plan. A four-month extension of time has been granted by DWR to allow time to incorporate additional IRWM standards being required for compliance with Proposition 1 IRWM Guidelines. The new standards will be required in order to be eligible for upcoming Proposition 1 IRWM funding opportunities. The deadline for project completion is October 4, 2016.

MEMORANDUM OF UNDERSTANDING (MOU)

The MOU is posted on the website and has been presented at each of the Workgroup meetings. Additionally, copies have been provided to requesting agencies and organizations through the Workgroups. To date, 35 signed MOUs have been returned.

On September 16, 2015, Randy Wilson, Uma Hinman, and Trina Cunningham met with Butte County representatives to discuss an MOU to address planning and management in the overlap area, determine areas of responsibility, and provide for appropriate consultation as needed. The MOU has been drafted, approved in form by Plumas County counsel, and sent to Butte County for consideration.

BUDGET AND TASK UPDATE

The overall expenditures on the grant project to date are consistent with the project accomplishments, and demonstrate very efficient use of funds.

In October 2014, Plumas County and its partners provided documentation of $237,489 in match funds, which fulfills the match requirement for the grant contract in its entirety. To date, Uma Hinman Consulting has submitted 21 invoices to DWR totaling $558,518.48 in reimbursable services, equipment purchases, and operating expenses. Approximately 80 percent of project work has been completed and the $515,995.35 invoiced to date for professional and consultant services represents 81 percent of the $635,708 budget for those services. Additionally, the total grant amount invoiced to date includes county equipment and operating costs, for an overall billing of 82 percent of the total grant budget. See attachment for budget summary.

The following are summaries of work progress by task.

Task 1: Stakeholder Outreach/RWMG/Workgroups/Tribal Engagement/IRWM Coordination
The Stakeholder Outreach efforts have included coordinating, publicizing, and preparing outreach materials and presentations for and conducting eleven regular RWMG meetings; conducting a special meeting to review, discuss and approve the Draft Monitoring Policy and the Draft Project Selection and Scoring Criteria; reviewing and vetting the first and second phases of implementation project submittals; chapter reviews; special studies; and inter-regional integration discussions and presentations. Tasks and efforts that have been in progress through the grant process and are now completed included developing the Stakeholder Outreach Plan (SIP); drafting the stakeholder contact lists and an MOU; updating the tribal contact list and drafting the Tribal Engagement Plan; developing and discussing the draft Project Eligibility Worksheet to vet Conceptual Projects; and coordinating and scheduling individual workgroup meetings.

Ongoing project efforts include collaborating with the Mountain Counties Funding Area IRWM regions to address the Draft Proposition 1 DAC Involvement RFP; and coordinating completion of three special studies: Forest-Water Balance Study, Community / Well Vulnerability Study, and the Disadvantaged Community outreach. The workgroups and Tribal Advisory Committee have held five to six meetings, focused recently on developing projects proposed for implementation in the IRWM region and recommending resource management strategies..

A half-day Upper Feather River Watershed Water Workshop was hosted by the University Agricultural Extension for stakeholders on April 4, 2016 to provide information about how regulations and state-wide concepts apply to the local community; to provide updates on the IRWM-funded Community Vulnerability Study, which is looking at disadvantaged community well nitrate vulnerabilities; the Irrigated Lands Regulatory Program; the California Department of Water Resources Water Master Fees; and planned activities in the Feather River Watershed and Sierra Valley. Additionally, the Workshop presentations covered the California Sustainable Groundwater Management Act and what it means to the local communities and local groundwater basins, as well as a discussion of groundwater banking – how it works, examples from other communities, and local possibilities.

On September 16, 2015 there was an Upper Feather River IRWMP – inter-regional coordination meeting with attendees from Plumas County Flood Control and Water Conservation District (UFR IRWMP Project Manager), Butte County Department of Water and Resource Conservation (Northern Sacramento Valley

IRWMP), Maidu Summit Consortium, and Uma Hinman Consulting (UFR IRWMP Update Coordinator). The purpose of the meeting was to discuss coordination process and needs for the regional overlap area that occurs between the UFR IRWMP and NSV IRWMP. Coordination is needed for project development and implementation, and for Tribal outreach within the overlap area. The MOU has been reviewed by Plumas County and is currently being reviewed by Butte County.

Upon request for consultation, Randy Wilson and Uma Hinman met with members of the Mechoopda Tribe and Enterprise Rancheria on Wednesday, June 15, 2016 in Oroville. Another meeting was requested for August 2016.

As part of the DAC outreach, Plumas Geo-Hydrology prepared a draft DRASTIC analysis for select DACs including mapping the selected communities in Sierra Valley. The consultants reviewed an American Valley Ground Water Protection Study and Sierra Valley groundwater nitrate data collected by DWR to attempt a trend analysis and prepare a cumulative frequency plot and maps for nitrate and boron. They also generated a DRASTIC map for Chilcoot Basin and developed a spreadsheet to calculate DRASTIC ratings. Plumas Geo-Hydrology presented a summary of the DRASTIC method of assessing well vulnerability at the April 4, 2016, UFR Water Workshop. The Study has been completed.

Staff continues to post articles of interest under the NEWS section on the website, and maintains the calendar and meeting pages with meeting schedules and materials. Please remember to check the website periodically for new posts and information. On the website, DRAFT IRWM PLAN, a subcategory under the section, DOCUMENTS, contains the staff Draft Plan chapters for review and includes deadlines for comments.

Task 2: Baseline Technical Study

The RWMG and Workgroups have reviewed and provided input on the Draft Baseline Technical Study Report. The Administrative Draft Baseline Technical Study report was been posted on the website and includes a database of background materials collected and catalogued to date. It is anticipated that additional studies and information will be added to the draft document as the project progresses. The consultant team also developed a data management site on the website, which catalogs studies and projects in the region. The database is linked via GIS to a map that provides a visual catalog of studies and projects in the region (similar to the SWIM site). Time was spent compiling, categorizing, summarizing, and uploading baseline studies. The Baseline Technical Study constitutes the Technical Analysis chapter of the Plan.

Task 3: Data Management Strategy, System Development and Implementation

The Consultant team recently provided recommendations for data collection for future IRWM Plan updates. Additional tasks include working to prepare mapping for the Community Vulnerability Study and Plan chapters.

The website/web portal of the UFR IRWM Project (http://featherriver.org/) is up-to-date and kept current. The RWMG meeting agendas, packets, and archived videos of the meetings are and will be available on the site, as will project information and updates.

During May and June 2015, consultants attended the emergency planning committee meeting regarding the Feather River geographic response plan and communicated with California Department of Fish and Wildlife (CDFW) about parallel data collection efforts; added a Tribal Advisory Committee Workgroup page to the website; and wrote a manual on how to record and video stream meetings. Staff tasks included incorporating new layers into maps (such as land managers, precipitation, fire hazard and severity zone, and fire threat layers).

The consultant team has developed an online, map-based catalog of studies and projects in the region. The database is linked via GIS to a map that provides a visual catalog of studies and projects in the region (similar to the SWIM site). Time was spent compiling, categorizing, summarizing, and uploading baseline studies. The catalog is available on the website at: http://featherriver.org/catalog/index.php.

The Step 2 project submittal data have been incorporated into an online map, http://featherriver.org/proposed-projects/. The database includes a summary of the information submitted for each project.

Task 4: Climate Change

The August 21, 2015 Climate Change Workshop consisted of a working session to present and discuss climate change scenarios, regional vulnerabilities, and recommended adaptation strategies. The workshop had excellent attendance and very productive discussion/participation in both the morning and afternoon sessions. Workgroup comments, and those received during the August 21, 2015 workshop, were incorporated into the vulnerability assessment. The Consultant team has completed the vulnerability to climate change assessment, a project worksheet for calculating GHG emissions, and the draft climate change chapter. Further, the Consultant Team has reviewed the new climate change requirements in the Draft Proposition 1 IRWM Guidelines and believes the Plan chapters have been updated to meet the new requirements. Strategies to address climate change vulnerabilities have also been incorporated into the staff Draft Resource Management Strategy Chapter.

Task 5: Project Development Process

Workgroups and Project Proponents completed development and refinement of IRWM implementation projects to ensure forms address required review factors and include completed GHG emission worksheets. Workgroup Coordinators also worked on project integration across workgroups. The final draft Project forms and a spreadsheet summarizing the status and integration of the Projects was presented to the RWMG for review May 20, 2016 RWMG meeting and has been posted on the website for public review and comment.

The deadline for the first stage of the project submittal process was June 1, 2015 at 5:00 p.m. Approximately 80 conceptual projects submittals were received. The eligible conceptual project proposals were reviewed by the RWMG during a special meeting on June 15, 2015.
The deadline for Step 2 IRWM Project Information Forms was Monday, August 3, 2015 at 5:00 p.m. Eight-one (81) projects were received. The Step 2 project submittals were discussed during the August 21, 2015 Workgroup Integration and Climate Change Workshop with a focus on recommendations for project integration.

Task 6: IRWM Plan Update

Based on collected information and what is generated through the workgroup meetings, chapters are drafted by staff and reviewed by workgroups, stakeholders and the RWMG. The following table indicates the status and progress of chapter development.

Chapter Review

Ten draft Plan chapters have been released for public review and comment, as indicated in the table below. Two chapters are under internal review and will be released in the next two weeks for public review and comment. Comments are due by 5:00pm on the date indicated in the table below. All comments should be submitted to UFR.contact@gmail.com. Chapters and timelines are posted on the website: http://featherriver.org/draft-irwm-plan/.

Staff Draft Chapter	Release Date/Status	Deadline for Comments
Technical Analysis	March 27, 2015	n/a
Governance, Stakeholder Involvement, Coordination	October 8, 2015	November 11, 2015
Climate Change	October 14, 2015	November 13, 2015
Region Description	December 7, 2015	January 11, 2016
Impacts and Benefits	January 17, 2016	March 18, 2016
Regional Water Issues, Integration and Capacity	March 10, 2016	April 11, 2016
Water and Land Use Planning	April 11, 2016	May 10, 2016
Resource Management Strategies	April 21, 2016	May 23, 2016
Plan Implementation, Performance and Monitoring	April 28, 2016	May 30, 2016
Goals and Objectives	June 20, 2016	July 20, 2016
Project Development and Review Process	In Process	
Plan Development Process	In Process	
Finance	In Process	

Task 7: Grant Administration

Work under Task 7 has included the documenting of matching funds and polishing invoicing and reporting procedures. We have submitted 21 project progress reports and invoices to date. See attached budget summary for details. The grant management/coordination team met with Debbie Spangler, the Grant Manager from DWR, on May 31, 2016 to discuss tasks and timelines for completing the grant by October 4, 2016.

SPECIAL STUDIES

Forest-Water Balance Study: Plumas Geo-Hydrology is nearing completion of the draft Forest-Water Balance Study on infiltration potential from forest fuels thinning projects. An executive summary and

literature memorandum from Plumas Geo-Hydrology Land and Water Resources dated January 1, 2016 summarizes groundwater management in the Feather River Basin (FRB) (submitted with Progress Report No. 19). The memorandum indicates that from a watershed management standpoint it is desirable to reduce evapotranspiration and minimize interflow. This implies reduction of canopy interception and eliminating land surface disturbances to minimize groundwater discharge via interflow.

Community/Well Vulnerability Study: The Community Vulnerability Study is intended to better identify drinking water pollution risks for the approximately 40 percent of groundwater-dependent households in the region. In preparing the study, Plumas Geo-Hydrology will assess nitrate pollution risks to municipal and domestic drinking water in high groundwater table areas with septic systems and agricultural livestock production. There are also significant outreach efforts to Disadvantaged Communities (DAC) and Tribal communities associated with this study. The timeframe for this study is January through May 2016. The draft study will be presented to the RWMG at the June 24, 2016.

Disadvantaged Community Assessment: Sierra Institute has completed a Socioeconomic Assessment of the Upper Feather River Watershed, which was presented at the April 1, 2016 RWMG meeting. The Assessment includes identification of the DACs within the region, which will focus and support the continued DAC outreach efforts including the Community Vulnerability Study discussed above. The accurate identification of DACs within the region also becomes particularly important for funding opportunities under Proposition 1, which includes two rounds of targeted DAC funding opportunities.

SCHEDULE

The deadline for project completion, including reporting and final invoicing, is October 4, 2016.

Task	Start	End
Final chapters (Goals and Objectives, Finance, Project Development, Plan Development)	June 20, 2016	July 20, 2016
Administrative Draft (internal review)	July 5, 2016	July 22, 2016
Public Draft Released (45 day review)	July 29, 2016	September 2, 2016
Public Meetings (2)	August 12-23	August 12-23
Final Hearing	Mid-September	Mid-September
Project Completion Report (Grant requirement)	August 1, 2016	September 23, 2016
Final Invoicing		October 3, 2016
Project completed		October 4, 2016

REQUEST

Informational.

Attachment: Budget Summary

Agreement No.: 4600010066
Grantee: Plumas County Flood Control and Water Conservation District
Awarding Body: California Department of Water Resources
Program: Prop 84
Encumbrance FY: 2012

Award Budget	Match
$679,657.00	$237,489.00

Invoice No.	Billing Period	Personnel Services	Operating Expenses	Equipment	Professional/ Consultant Services	Total	10% Withholding	Overhead	Match Total
Line Item Prop 84 Allotments		**$ 34,220.00**	**$ 4,731.00**	**$ 4,998.00**	**$ 635,708.00**	**$ 679,657.00**			
1	10/1/08-9/30/14	$ -	$ -	$ 4,853.84	$ 30,510.98	**$ 35,364.82**	**$ 3,536.48**	**$ 1,224.98**	$ 237,489.00
2	9/1/14-10/31/14	$ -	$ -	$ -	$ 22,925.60	**$ 22,925.60**	**$ 2,292.56**	**$ 1,675.85**	$ -
3	9/1/14-11/30/14	$ -	$ -	$ -	$ 13,009.60	**$ 13,009.60**	**$ 1,300.96**	**$ 513.61**	$ -
4	12/1/14-12/31/14	$ -	$ -	$ -	$ 4,867.88	**$ 4,867.88**	**$ 486.79**	**$ 255.38**	$ -
5	10/1/14-1/31/15	$ 3,892.97	$ -	$ -	$ 25,774.11	**$ 29,667.08**	**$ 2,966.71**	**$ 1,383.10**	$ -
6	7/1/14-2/28/14	$ 2,971.73	$ 1,427.55	$ -	$ 7,285.95	**$ 11,685.23**	**$ 1,168.52**	**$ 225.20**	$ -
7	11/1/14-3/31/15	$ -	$ -	$ -	$ 40,142.35	**$ 40,142.35**	**$ 4,014.24**	**$ 2,656.35**	$ -
8	3/1/15-4/30/15	$ -	$ -	$ -	$ 12,887.40	**$ 12,887.40**	**$ 1,288.74**	**$ 585.90**	$ -
9	3/1/15-5/31/15	$ 4,963.08	$ 874.41	$ -	$ 15,654.75	**$ 21,492.24**	**$ 2,149.22**	**$ 538.00**	$ -
10	9/1/14-6/30/15	$ -	$ -	$ -	$ 42,778.71	**$ 42,778.71**	**$ 4,277.87**	**$ 2,806.45**	$ -
11	6/1/15-7/31/15	$ 3,926.40	$ 313.37	$ -	$ 18,565.35	**$ 22,805.12**	**$ 2,280.51**	**$ 1,014.35**	$ -
12	3/1/15-8/31/15	$ 3,886.74	$ 110.54	$ -	$ 21,676.15	**$ 25,673.43**	**$ 2,567.34**	**$ 1,458.33**	$ -
13	1/1/15-10/31/15	$ 2,004.15	$ 564.52	$ -	$ 65,808.38	**$ 68,304.15**	**$ 6,830.42**	**$ 4,372.28**	$ -
14	9/1/15-10/31/15	$ -	$ -	$ -	$ 13,285.17	**$ 13,285.17**	**$ 1,328.52**	**$ 1,180.38**	$ -
15	8/1/15-11/30/15	$ 2,125.99	$ 68.09	$ -	$ 22,007.91	**$ 24,201.99**	**$ 2,420.20**	**$ 1,276.93**	$ -
16	12/1/15-12/31/15	$ -	$ -	$ -	$ 9,932.38	**$ 9,932.38**	**$ 993.24**	**$ 680.75**	
17	12/1/15-1/31/16	$ 4,815.07	$ 56.66	$ -	$ 18,153.85	**$ 23,025.58**	**$ 2,302.56**	**$ 824.16**	
18	3/1/15-2/29/16	$ 953.85	$ 87.73	$ -	$ 33,183.53	**$ 34,225.11**	**$ 3,422.51**	**$ 2,100.80**	
19	7/1/15-3/31/16	$ 2,511.11	$ 28.38	$ -	$ 30,321.27	**$ 32,860.76**	**$ 3,286.08**	**$ 1,925.53**	
20	11/1/15-4/30/16	$ 1,074.35	$ 137.86	$ -	$ 46,786.49	**$ 47,998.70**	**$ 4,799.87**	**$ 3,233.25**	
21	5/1/16-5/31/16	$ 863.81	$ 83.83	$ -	$ 20,437.54	**$ 21,385.18**	**$ 2,138.52**	**$ 1,332.80**	
Total Amount Spent		**$ 33,989.25**	**$ 3,752.94**	**$ 4,853.84**	**$ 515,995.35**	**$ 558,518.48**	**$ 55,851.85**	**$ 31,264.37**	
Allotment Remaining		**$ 230.75**	**$ 978.06**	**$ 144.16**	**$ 119,712.65**	**$ 121,138.52**			
% Budget Invoiced		**99.33%**	**79.33%**	**97.12%**	**81.17%**	**82.18%**			

ITEM NO. 2

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Sierra Water Workgroup Presentation

Date: June 15, 2016

INTRODUCTION

The Sierra Water Workgroup (SWWG) is a 501(c)(3) whose mission is to assist regional efforts to protect and enhance water quality, water supply, and watershed health; to develop cooperative regional responses; and to facilitate reinvestment in Sierra watersheds and water resources by all beneficiaries (http://www.sierrawaterworkgroup.org/). The SWWG was formed to promote and facilitate inter-regional cooperation and communication amongst the IRWM regions.

The SWWG addresses water issues of concern to the Sierra by:

- Coordinating amongst local and regional water plans;
- Exchanging information and tools for water and watershed management amongst stakeholders in the region;
- Serving as an information source regarding state and federal water policy issues for local governments, nonprofits, and other stakeholders; and
- Raising the profile of the Sierra to increase private, state and federal funding opportunities
- Advocating for Sierra water issues in state and federal legislative and administrative forums.

Although the Upper Feather River IRWM Region's membership in SWWG has not been formalized, individuals from the Upper Feather River region have been participating in SWWG's coordinating meetings and annual conferences over the years. Approval of the attached Memorandum of Understanding (MOU) would formalize the UFR Region's membership and participation in the SWWG.

REQUEST

Consider and authorize signature of the Sierra Water Workgroup MOU.

Attachments: Sierra Water Workgroup Memorandum of Understanding

Memorandum of Understanding (MOU)
Regarding coordination among participants in the Sierra Nevada Water Workgroup

Recitals

WHEREAS the Sierra Water Workgroup (hereinafter collectively referred to as the "SWWG") was formed to provide a collaborative multi-stakeholder, Sierra-wide, flexible approach to assisting regional efforts in protecting and enhancing water quality, water supply, and watershed health;

WHEREAS, the SWWG geographic boundary includes all or part of the twenty-two counties that make up the Sierra Nevada region and is organized into six sub-regions: North: Modoc, Lassen, Shasta Counties; North Central: Tehama, Butte, Plumas, Sierra Counties; Central: Yuba, Nevada, Placer, El Dorado Counties; South Central: Amador, Calaveras, Tuolumne, Mariposa Counties; South: Madera, Fresno, Tulare, Kern Counties; East: Alpine, Mono, Inyo Counties;

WHEREAS, the SWWG is comprised of representatives from each Integrated Regional Water Management Planning region (IRWMP) in the Sierra Nevada and advisory members that include regional organizations representing diverse water interests: sovereign Tribal nations, non-profit/non-governmental organizations, local, state, and federal agencies, and private citizens;

WHEREAS the SWWG objectives include coordinating amongst IRWMP; coordinating and collaborating with local and regional agencies, organizations and other stakeholders interested in Sierra water; exchanging information and tools for water and watershed management; serving as an information source regarding state and federal water policy issues for local governments, non-profits, and other stakeholders; raising the profile of the Sierra to increase private, state and federal funding opportunities;

WHEREAS the SWWG will advocate for Sierra water issues in state, federal and legislative administrative forums as it relates to educating Californians on the importance of the State's primary watershed, investing resources and funding to headwater stewardship; protecting water quality through watershed management; protecting the principles of the area of origin and watershed protection laws; supporting sustainable forest management practices; and improving headwater stewardship by coordinating state, federal, local and regional resource management agencies with regional stakeholders in the Sierra Nevada;

WHEREAS the SWWG represents a collaboration of IRWMP stakeholders in the Sierra, while recognizing that each IRWMP and participant in the Sierra region has different and unique issues of concern;

WHEREAS the SWWG recognizes that important relationships and mutual interests exist between the upper and lower watersheds, and in some cases, the objectives of one region are dependent on actions in the other;

WHEREAS the SWWG believes that collaborative communication and coordinated regional responses to water resource management within the Sierra Nevada will enhance watershed management activities and resource sustainability overall;

THEREFORE, be it resolved that each of the undersigned participants in SWWG agree to work in cooperation with the SWWG pursuant to the following Principles of Agreement and Procedural Understanding:

Principles of Agreement

1. The IRWMPs in the Sierra will select one formal designee to represent them on the SWWG. The designee will represent the views of the region that selected them to participate in the process.

2. SWWG members will attend meetings consistently and, if unable to attend, will send an alternate also designated by their participating region. However, use of alternates is not encouraged as this can interfere with the continuity of discussion and decision-making.

3. The SWWG is the decision-making body of the SWWG process, and its members will achieve consensus (agreement among all participants) in all of its decision-making.

4. Definition of “Consensus”: In reaching consensus, some Workgroup members may strongly endorse a particular proposal while others may accept it as "workable." Others may be only able to “live with it.” Still others may choose to “stand aside” by verbally noting a disagreement, while allowing the group to reach a consensus without them if the decision does not compromise their interests. Any of these actions still constitutes consensus.

5. SWWG members will regularly communicate information about the process and programs to their regional groups, which should include organizations and agencies, as well as the individual constituencies and communities they represent.

6. A SWWG member’s eligibility to take part in SWWG decision-making depends on active participation by that member or alternate. “Active Participation” is defined as a member or alternate attendance of a minimum of three of the four previous meetings in person or by phone.

7. Regional stakeholders are non-voting members, who are regional organizations. They may choose to formally support any programs, projects, policies, or documents produced by the SWWG.

8. Regional Stakeholders will consist of regional organizations, state and federal agencies, and tribal interests.

9. Definition of a “regional organization”: intended to describe an organization whose jurisdiction

and/or boundaries extend over multiple IRWMP regions in the Sierra Nevada.

10. One formal designee and alternate will be selected, and will represent the views of the regional organization that selected them to participate in the process.

11. Nothing in this MOU shall obligate any signatory to transfer or commit any funds. Specific work projects or activities that involve the transfers of funds, services, or property among and/or between the various SWWG participants require the execution of a separate written agreement;

Procedural Understanding

1. The signatories to this MOU may extend, terminate, or otherwise amend this MOU at any time in their discretion by mutual written consent signed by all signatories to this MOU. This MOU will be reviewed and updated as needed.

2. Any signatory to this MOU may terminate its participation in this MOU at any time.

3. This MOU shall commence as of the Effective Date and continue for five (5) years thereafter, unless earlier terminated as provided herein.

4. Any group or individual with an interest in the SWWG may become a signatory to this MOU.

5. This MOU does not, in itself, provide such authority to bind any signatory hereto to any future project or activity. Negotiation, execution, and administration of each such agreement for future projects or activities must comply with all applicable statues and regulations.

6. To the fullest extent allowed under State and federal law, including without limitation the Federal Tort Claims Law, each signatory to this MOU shall defend, indemnify, and hold harmless each of the other signatories to this MOU (and their officials, employees, agents and representatives) from and against any and all liability, loss, expense, and/or claims for any injury or damages to any person (including without limitation death of any person) or property (real, personal or financial) arising out of any activity under this MOU but only in proportion to and to the extent that such liability, loss, expense, and/or claims are caused by or result from the negligent or intentional acts or omissions of the indemnifying party.

7. Because of the participation of several governmental organizations in the proceedings of the SWWG activities, any information shared or indicated within SWWG meetings or other meetings including SWWG agenda items and/or discussions may be subject to public disclosure under the Freedom of Information Act (5 U.S.C. § 552) and/or California Public Records Act (Gov. Code § 6250, et seq.).

8. The original MOU, including signature pages of all original and subsequent signatories, will be kept on file at the Sierra Water Workgroup Headquarters located at 3500 Valley View Road, Rescue, CA 95672 under the custody of Liz Mansfield, Sierra Water Workgroup Director (916) 273-0488. Complete copies will be made available upon request.

I have read the MOU, and agree to follow the established guidelines and perform the established tasks.

_____ _____

Liz Mansfield DATE

Director, Sierra Water Workgroup

_____ _____

DATE

Designated

Representative:_____

IRWM: _____

_____ _____

Designated DATE

Alternate: _____

IRWM: _____

ITEM NO. 3

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Proposition 1 Disadvantaged Community Involvement Draft Request for Proposals

Date: June 15, 2016

INTRODUCTION

The focus of this agenda item is to update the RWMG on outreach and coordination efforts with other IRWM regions in the Mountain Counties Funding Area. A presentation on the current Draft Proposition 1 Disadvantaged Community Involvement (DACI) request for proposals (RFP) was provided during the February 26th RWMG meeting, with updates on the process presented to the RWMG at its April 1 and May 20, 2016 meetings. The RFP requires a single coordinated proposal for the Mountain Counties Funding Area. Representatives of the Upper Feather River region have been attending Mountain Counties Water Resources Association and Sierra Water Workgroup coordination meetings to track and participate in the process.

BACKGROUND

The first two rounds of Proposition 1 IRWM funding will be targeted to disadvantaged community (DAC) involvement and implementation (projects); each has been allocated 10 percent of the funding regions' total. Round 1 will be focused on DAC involvement and a draft solicitation package was released for public comment on January 22, 2016 with comments due on April 8th. The intent of this first round is to help ensure involvement of DACs, economically disadvantaged areas (EDAs), or underrepresented communities within the regions.

Milestone/Activity	**Schedule**
Release of Draft DAC Involvement RFP and public comment period opens	January 22, 2016
Public workshops (Sacramento)	February 22, 2016
Public comment period closes	April 8, 2016
Release of Final DAC Involvement RFP	*June 2016?*
Funding Area coordination meetings	*July 2016?*
Approval of funding awards	*September 2016?*

Source: http://www.water.ca.gov/irwm/grants/docs/p1DACinvolvement/2016Prop1IRWM_DACI_RFP_PublicReviewDraft.pdf

The Department of Water Resources (DWR) is seeking a single Funding Area-wide proposal from each of the 12 Proposition 1 Funding Areas. The Upper Feather River Region is located within the Mountain Counties Funding Area, which has an allotment of $1.3 million for this round. There are 10 IRWM regions wholly or partially within the Mountain Counties Funding Area [Upper Feather River, Northern Sacramento Valley (partial), Yuba County (partial), Cosumnes-American-Bear-Yuba, American River Basin (partial), Mokelumne-Amador-Calaveras, Tuolumne-Stanislaus, Yosemite-Mariposa, Madera (partial), Southern Sierra (partial)].

Entities eligible for receiving funding include the following:

- Public agencies
- Non-profit organizations
- Public utilities
- Federally recognized Indian Tribes
- State Indian Tribes listed on the Native American Heritage Commission's Tribal Consultation list
- Mutual Water Companies

FUNDING AREA COORDINATION

On May 20, 2016, the SWWG co-hosted a coordination meeting with the Inyo-Mono IRWM region to bring IRWM practitioners from the Sierra, eastern California and beyond together for a day of discussions centered around improving meaningful engagement, involvement and capacity building of DACs Additionally, our hope is to provide a forum for discussions regarding broader regional coordination moving forward with Proposition 1 funding.

The workshop included presentations from IRWM regions highlighting DAC related activities as well presentations from a few agencies about the types of projects/needs they support, fund and/or implement relating to DAC engagement, involvement and capacity building. Additionally, networking and group discussions were held with a goal being to identify projects/activities for specific regions along with opportunities for intra-Funding Area collaboration and potential inter-Funding Area collaboration. Leah Wills and Liz Mansfield, SWWG, will be presenting about the workshop.

The next DACI coordinating meeting is being scheduled for late August in Auburn.

Leah Wills and Liz Mansfield, Sierra Water Workgroup, will be presenting an update on the process and coordination efforts.

REQUEST

Informational.

ITEM NO. 4

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Integration Presentation of Community Vulnerability Study and Disadvantaged Community Outreach

Date: June 16, 2016

INTRODUCTION

A task of the RWMG's Grant Agreement (Task 1.3 DAC Outreach) is to identify disadvantaged communities (DACs) and vulnerable groundwater dependent households, and to incorporate the drinking and wastewater treatment needs of DACs into the Plan implementation. A major focus of the IRWM Program in general, as well as the Proposition 1 funding opportunities, is to support the needs of disadvantaged communities (DACs). The list of DACs identified in Appendix 1 of the Socioeconomic Assessment for the Upper Feather River IRWM Region is the basis for DAC outreach and the Community Vulnerability Study, a special study of well vulnerabilities to nitrates for targeted DAC communities within the region.

Community Vulnerability Study

The purpose of the Community Vulnerability Study is to better identify drinking water pollution risks for the approximately 40 percent of groundwater dependent households in the UFR Region that rely on individual wells and/or septic systems for their water and wastewater needs. The study assesses nitrate pollution risks to municipal and domestic drinking water wells in high groundwater table areas where septic systems and agricultural livestock production could affect drinking water quality based on soil and geology characteristics. Plumas Geo-hydrology prepared the Study, which is similar in methodology to the previously prepared American Valley DRASTIC Study.

A preliminary well vulnerability assessment was developed for nine[1] DACs in the Mohawk Valley and Sierra Valley areas using the DRASTIC[2] methodology. Subsequently, using professional judgment and existing information about the characteristics of community water and wastewater systems and other

[1] The nine DACs assessed for inclusion in the Study included: Cromberg, Clio, Sierraville, Loyalton, Vinton, Chilcoot, Sierra Brooks, Calpine, and Delleker.

[2] DRASTIC is a standardized system developed by the EPA for evaluating groundwater pollution potential using hydrogeologic settings.

factors, four of the nine communities were selected for more intensive DRASTIC analysis. The Study focuses on the following four Sierra Valley communities: City of Loyalton, Chilcoot-Vinton, Sierraville, and Calpine. The study approach and community selection process was presented to over 60 attendees during the Water Workshop held on April 4, 2016 at the Sierra Valley Grange in Vinton.

The Draft Community Vulnerability Study has been circulated to environmental heath staff in Plumas and Sierra Counties for review. The study has also been sent to community services boards in Calpine, and Sierraville, and a presentation is scheduled in Sierraville for the end of June to present the Community Well Vulnerability Study.

Targeted DAC Outreach

In conjunction with the Community Vulnerability Study, DAC outreach identified in the Grant Agreement Work Plan includes the following:

a. Identify up to three potential DAC outreach targets in addition to those identified above, such as groundwater dependent DACs.
b. Interview up to eleven identified DAC outreach targets. Each entity will be contacted up to three times to gather information, especially with regard to DAC water needs.
c. Schedule up to four site meetings with groundwater-dependent DAC households and/or communities to obtain additional information, or to reach and serve the needs of those unable to attend the bi-monthly RWMG meetings.
d. Assist DACs with completing Project Information Forms for consideration in the Project Review Process.
e. Provide DACs with technical resources to develop up to four projects for inclusion in the Plan.

Based on the DAC list developed by Sierra Institute (Socioeconomic Assessment for the Upper Feather River IRWM Region, Appendix 1), targeted outreach to those DACs not already involved in the Municipal Services Workgroup and/or included in the Community Vulnerability Assessment is underway. Staff met with Plumas and Sierra County Environmental Health staff to discuss DAC needs and identify contacts for outreach. Outreach interviews have been conducted with community service districts in Greenville, Crescent Mills, Greenville Rancheria, East Quincy, Mooretown Rancheria and Portola. Loyalton and Chester have also been contacted. A meeting with Butte County Environmental Health is being scheduled.

Upper Feather River IRWM Region Disadvantaged Communities				
County	**DAC**	**Services**	**Status**	**Participant in Municipal Services Workgroup?**
Butte	Berry Creek		DAC	No
Butte	Concow		Severe DAC	No
Butte	Kelly Ridge		DAC	No
Butte	Magalia		DAC	No
Butte	Yankee Hill		Severe DAC	No

Lassen	Westwood		Severe DAC	No
Plumas	Belden (Old Mill Ranch)		DAC	Yes*
Plumas	Chester (PUD)	Water/wastewater	DAC	No
Plumas	Chilcoot-Vinton		DAC	No
Plumas	Clio	Water	DAC	Yes
Plumas	Crescent Mills		Severe DAC	No
Plumas	Cromberg		Severe DAC	No
Plumas	Delleker (Grizzly Lake Resort Improvement District)	Water/wastewater	Severe DAC	No
Plumas	East Quincy (CSD)	Water/wastewater	DAC	Yes*
Plumas	Graeagle		DAC	No
Plumas	Greenville (IVCSD)	Water/wastewater	Severe DAC	No**
Plumas	Lake Almanor Peninsula		DAC	No
Plumas	Portola	Water/wastewater	Severe DAC	Yes*
Plumas	Quincy (CSD)	Water/wastewater	DAC	Yes*
Sierra	Calpine		Severe DAC	No
Sierra	Loyalton	Water/wastewater	DAC	No
Sierra	Sierra Brooks		Severe DAC	No
Sierra	Sierraville (PUD)	Water/wastewater	DAC	Yes*

Orange highlighting indicates community/service provider identified in the Grant Agreement for outreach.

** indicates that the community/service provider submitted IRWM Plan implementation project application(s)*

***Indian Valley Community Services District (IVCSD) was involved early in the Municipal Workgroup process but did not participate in the project solicitation phase of Plan development.*

NEXT STEPS

Upon RWMG approval, the study will be posted on the UFR IRWM Plan website, and included in the IRWM Plan as an appendix.

REQUEST

Informational.

Attachment: Community Vulnerability Study

Assessing the Potential for Groundwater Pollution in Four Sierra Valley Disadvantaged Communities: An Exploratory Study of Community Well Vulnerability

Burkhard Bohm
Hydrogeologist, CCH 337

June 1, 2016

Table of Contents

Introduction

Need and Purposes for this Study

This Community Groundwater Pollution Vulnerability Study (Study) is one of two exploratory studies undertaken as part of the update of the Upper Feather River Integrated Regional Water Management (UFR IRWM) Plan. The final versions of these two studies will be included as appendices in the final UFR IRWM Plan.

This study was developed for the UFR IRWM Plan Update due to local concerns related to anticipated nitrate pollution control rules and regulations as they might relate to irrigated agriculture and septic wastewater systems in the UFR Region. The Irrigated Lands Regulatory Program (ILRP) is in the process of drafting new groundwater nitrate monitoring and abatement requirements. Additionally, new monitoring requirements are currently being issued for county environmental health departments related to the monitoring and management of individual wastewater treatment systems (i.e., septic systems). Counties will be required to comply with these new monitoring requirements by 2023, which is within the UFR IRWM Plan's 20-year planning period.

The Study demonstrates the application of an Environmental Protection Agency (EPA) approach for assessing nitrate pollution potential known as "DRASTIC" in four Sierra Valley disadvantaged communities[1] (DACs). DRASTIC[2] is a standardized system developed by the EPA for evaluating groundwater pollution potential using hydrogeologic settings. The purpose of the Study is to assess pollution potential, specifically of nitrate.

It is important to note that under current land and water use conditions in the Sierra Valley, there are currently no documented exceedances of nitrate pollution in active community public wells in the Sierra Valley.[3] Given that there are no current instances of nitrate pollution parameter exceedances in public community wells, the purposes of this Study are diagnostic and proactive rather than reactive in response to regulations and rules. The Study purposes are as follows:

1. Provide precautionary information for assessing changing conditions in land and/or water uses within or surrounding four Sierra Valley communities. The Study is focused on communities with higher than average risks for nitrate pollution based on soil, geology, and hydrology factors.

2. The Study focuses on applying the DRASTIC assessment approach to four DAC communities in Sierra Valley that rely on groundwater wells for drinking water.

[1] Disadvantaged communities (DAC) are defined by the Department of Water Resources as those communities with a median household income of 80 percent of the statewide average.
[2] DRASTIC is an acronym that stands for **D**epth to water, net **R**echarge, **A**quifer media, **S**oil media, **T**opography, **I**mpact of the vadose zone, and hydraulic **C**onductivity.
[3] Personal communication with Elizabeth Morgan, Sierra County Environmental Health Department and Jerry Sipe, Plumas County Environmental Health Department, April, 2016

The Department of Water Resources Proposition 84 and Proposition 1 Guidelines for IRWM Planning emphasize understanding the special water and wastewater needs of DACs.

A preliminary well vulnerability assessment was developed for nine disadvantaged communities (DACs) in the Mohawk Valley and Sierra Valley areas using the DRASTIC methodology. Subsequently, using professional judgment and existing information about the characteristics of community water and wastewater systems and other factors, four of the nine communities were selected for more intensive DRASTIC analysis.

COMMUNITIES RATED BY SEVERITY:

	rank		Preliminary DRASTIC index	DRASTIC scaling
Cromberg	1		186	80%
Clio	2		185	80%
Sierraville	3		173	74%
Vinton	4		164	69%
Loyalton	5		158	66%
Chilcoot, alluvium	6		155	65%
Sierra Brooks	7		153	64%
Calpine	8		144	59%
Chilcoot, bedrock	9		135	55%
Delleker	10		128	51%

Other factors considered in selecting the four DAC communities included:

- Estimated effectiveness of isolation between wastewater and drinking water systems (age and other legacy design factors).
- Data availability.
- Estimated potential for residential growth in and around the community.
- Estimated potential for highly fertilized, concentrated, and irrigated agricultural operations within or immediately adjacent to the community.
- Estimated potential overlying groundwater recharge zone for downstream or downslope valleys.
- Proximity to existing irrigated agriculture operations surrounding the community.
- Proximity to other potential point sources or non-point sources of nitrate pollution.

POINT SOURCES OF GROUNDWATER POLLUTION - examples

- underground septic tanks and leachfields
- leaking underground storage tanks (fuel and possibly non-fuel?)
- leaking above-ground storage tanks
- leaking transformers
- graveyards
- improperly constructed wells (abandoned and used)
- accidental spills

NON-POINT SOURCES OF GROUNDWATER POLLUTION - examples

- leaking wastewater disposal lines
- livestock waste
- storm water runoff
- winter road salt
- fertilizers
- drainage ditches

Communities were evaluated for these risk factors based on available data and professional judgment.

For example the community of Cromberg, although ranked highest on the preliminary DRASTIC index scale, has insufficient data to allow develop a more specific DRASTIC rating due to its extremely complex soils and geology. Although other risk factors are relatively low Clio has a high nitrate pollution potential, but the source of drinking water is a developed spring located about three miles to the southwest on the opposite side of Mohawk Valley. Delleker has other drinking water supply options including completing the five mile pipeline to the Lake Davis water treatment facility which has been approved for state funding. Sierra Brooks and Calpine have similar risk potentials; however, Calpine is located in an area that is an important groundwater recharge zone for west-central Sierra Valley. Furthermore since 2011 the Calpine community has been searching for an additional drinking water source since arsenic in one of its community wells exceeds the federal drinking water standards. Calpine has received a State order to mitigate this problem by the end of the year 2016.

Therefore, **the four DAC communities selected for intensive DRASTIC analysis are: Sierraville, Chilcoot-Vinton, Loyalton, and Calpine.**

The community selection process and the draft community selections were presented to the Plumas-Sierra Counties agricultural community on April 4, 2016, as a single presentation in an intensive, half-day agricultural water forum. Feedback was requested on the community selection criteria and process, as well as the overall Study purposes

and methodology. The meeting was well-attended and the feedback received on the Study was neutral to positive.

Further community outreach to the four selected communities will include review of the draft Study with community representatives. The draft Study will also be shared with the agricultural community at a future community event. Feedback received from focused outreach and review comments on the administrative draft UFR IRWM Plan and Appendices will be used to finalize the Study.

Assessing groundwater pollution potential

Community drinking water well drilling locations are usually identified based on geologic assessment and analysis of optimal groundwater yields. Considerations of new well susceptibility from existing or future groundwater contamination will become increasingly important as new regulations are developed.

Under certain hydrogeologic conditions, land and water uses over large areas that are within the well's recharge zone can potentially affect groundwater quality and well vulnerability. Therefore, assessing the actual rather than potential drinking water risks within high pollution risk areas becomes important at the project level.

One way to assess the risk of groundwater pollution to domestic wells is by using systematic risk assessment procedures, with readily available data. Usually, groundwater data are spotty (limited to areas near wells and intermittently collected). Interpretation of pollution risks from limited data points to the larger landscape and water management systems is usually accomplished using professional judgment. Most importantly, the result of any pollution vulnerability assessments have to be undertaken by professionals using methods and analytic procedures that are acceptable and credible to regulatory entities, and that produce cost-effective results that are understandable to potentially affected landowners and water managers, existing and new community well users, land use planners, and to the public.

The "DRASTIC" well pollution vulnerability assessment approach was developed by the National Ground Water Association (NGWA) in the 1980's under a contract with the U.S. Environmental Protection Agency (EPA) (Aller et al., 1987). The "DRASTIC" acronym is the first letter of the seven most important hydrogeologic factors used for determining an area's vulnerability to ground water contamination. The DRASTIC document and procedures manual was prepared by six authors (Aller et al., 1987). They were supported by a 26 member technical advisory committee, including individuals with groundwater expertise from federal and state agencies, the Canadian government, and private consultants. The objective was to create a standardized system of consistent quantitative measures, which can be used to evaluate groundwater pollution potential. The DRASTIC system was developed to provide a numerical rating of pollution potential. The system was designed so that even users not well-versed in hydrogeology could use

readily obtainable geologic, soil, and ground water data to develop a preliminary and semi-quantitative measure of groundwater pollution potential.

Understanding the DRASTIC methodology

The DRASTIC system is based on rating seven hydrogeologic parameters and weighing them appropriately. The sum total of these ratings provides the DRASTIC pollution potential rating. High DRASTIC scores indicate an area that is very sensitive to ground water pollution, and vice versa, a low DRASTIC score indicates less sensitivity.

The seven factors used to estimate relative ground water pollution potential are:

1. **D** – depth to ground water table
2. **R** – net recharge rate
3. **A** – nature of the aquifer
4. **S** – soil types
5. **T** – topography (slope)
6. **I** – impact of the unsaturated zone material
7. **C** – Hydraulic conductivity (permeability) of the aquifer

Table 1: The DRASTIC system for rating ground water pollution potential.

The DRASTIC system for rating ground water pollution potential.

	Parameter:	Ratings: minimum	Ratings: maximum	Weight factor
D	**depth to water**	1	10	5
R	**recharge, net**	1	9	4
A	**aquifer media**	2	10	3
S	**soil media**	1	10	2
T	**topography**	1	10	1
I	**impact of vadose zone**	1	10	5
C	**conductivity, hydraulic**	1	10	3

Ratings range from 1 to 10. Weights range from 1 to 5.

GW Pollution potential = sum of (ratings x weights)

Each parameter is rated between one and ten, except for “recharge” (1 – 9) and “aquifer media” (2 – 10). Each rating is then multiplied by a weight factor between one and five. The DRASTIC index is the sum of the products of the ratings and their respective weight factors. The parameters, their ratings, and their weight factors are summarized in Table 1.

The DRASTIC parameter ratings are tabulated in Attachment B. The minimum and maximum possible DRASTIC ratings are 26 and 226.

Applications and limitations with using DRASTIC

According to the original DRASTIC document (Aller et al., 1987), "the primary charge of DRASTIC is to provide assistance in resource allocation and prioritization of many types of groundwater related activities as well as to provide a practical educational tool." The DRASTIC index is a relative measure of groundwater pollution potential. It does not indicate suitability of a site for waste or liquid waste disposal, or other land use activities. While not the primary criteria for selecting well-drilling sites, as discussed above, it could be at least one criterion in assessing compliance with new groundwater quality regulations.

Public “groundwater awareness” is probably equally effective at preventing aquifer contamination as new regulations, especially for non-point source pollution. DRASTIC seems to be particularly useful for that purpose since it shows which hydrogeologic features are essential in creating an effective barrier between common land use activities and the groundwater resource. Conversely, in the absence of effective barriers, DRASTIC is helpful in identifying preventative measures to maintain drinking water quality in areas vulnerable to groundwater pollution.

Applications

DRASTIC is useful for identifying areas that should be monitored if changing conditions indicate higher nitrate pollution potential. Given that there are currently no known contaminated community drinking water wells in the study area, a potential beneficial application of DRASTIC in Sierra Valley is mapping areas of groundwater pollution risk/concern to address possible future changes in land use or water use conditions in this “medium priority” basin. High DRASTIC ratings indicate areas where locating new drinking water wells in areas that are relatively safe from accidental spills or potential contamination could be assisted by qualified professional advice. In areas with high DRASTIC ratings and without geologic or soils barriers, significant changes in surrounding land and water uses may suggest that further professional analysis is a prudent consideration.

Limitations

DRASTIC cannot be used to pinpoint the exact areas where contamination has occurred or will occur. It is important to understand that DRASTIC cannot be used to replace detailed site-specific hydrogeologic investigations, such as assessing the extent of on-site contamination, such as a spill. DRASTIC cannot be used to determine the potential impact of a specific contamination event. DRASTIC also cannot be used to determine the specific impacts on quantity and quality of existing or new groundwater drinking sources resulting from new projects such as urban developments or new intensive

fertilizer applications or conditions. DRASTIC indicates where pollution risks may be highest but cannot quantify those impacts.

In summary, DRASTIC suggests potential risks associated with significant changes in land uses or water uses over a large geographic area, rather than determining actual risks from a specific project or action.

Practical aspects when preparing DRASTIC rating index maps

The DRASTIC guidance document contains many examples of mapping groundwater pollution potential over large areas, like entire groundwater basins and counties.

Developing a DRASTIC index map requires preparation of seven hand drawn contour maps. The final product is created by superposing all seven contour maps to prepare a final DRASTIC rating contour map. Since the contour maps are drawn by hand, this is a very time consuming approach.

An alternative and more practical and cost-effective approach is to divide a map into an equal spaced grid with equal sized squares (or "cells"), and determine DRASTIC ratings for each grid cell. Each grid cell can then be assigned a "severity index" of groundwater pollution vulnerability. The severity can be displayed either as a percentage on a scale of possible DRASTIC ratings, or by using a color code. This gridded approach is much more flexible and cost-effective at larger groundwater basin scales or for important groundwater recharge areas. The DRASTIC maps can be updated as new data becomes available.

It is important to keep in mind that most hydrogeologic data used for DRASTIC are localized. In other words they are represented only by spot measurements from which an aerial continuum has to be interpolated. The spotty data occurrence that provides the factual foundation for a DRASTIC map is not evident when looking at the final product. For example, using too small grid cell sizes creates an illusion of high resolution and a high degree of accuracy. Because usually, the amount of groundwater data is limited, requiring so much interpolation based on professional judgment, the authors of the DRASTIC manual recommend that the parcel size should not be smaller than 100 acres.

Data locations shown on maps of the California groundwater basins (including Sierra Valley) are based on the grid of the "township-range-section" (TRS) system, which divides the State into a grid with approximately one square-mile spacing. For example well locations are identified by "well number", which identifies an approximate location in an area down to 1/16th of a square mile (an area about 1320-by-1320 ft). For the purpose of this project a grid cell size of 160 acres is chosen, i.e. the size of a quarter section. Professional judgment associated with interpolation has to be utilized to derive a balanced picture of drinking water well vulnerability in the four selected communities.

Groundwater conditions in four Sierra Valley disadvantaged communities

Groundwater conditions in the Chilcoot-Vinton area

Background

Since the mid-1980's, the Chilcoot-Vinton area has experienced significant suburban growth. Beginning around 1985 a number of suburban land development proposals were submitted to Plumas County. Under the rules of the newly established Sierra Groundwater Management District (SVGMD), each one of these subdivisions were required to conduct formal groundwater resource evaluations, subject to the following requirements:

- Determination if the available groundwater resources were sufficient to meet the demand of the proposed number of parcels.
- Determination of the impact of the proposed project, most importantly impacts of groundwater pumping in the proposed project area and adjacent areas, and impacts of wastewater disposal on groundwater quality.

As a result, the developers had to drill several test wells that were subjected to pumping tests in order to investigate groundwater conditions in the fractured bedrock and alluvial aquifers. Typically, the bedrock formations required more wells than the alluvial formations. By 1995, about five (5) large subdivision proposals were approved and a number of individual lots were developed. Eventually, in 1995, at least four of the proposed subdivisions were consolidated into one project, motivating one developer to collect data that would later become the basis of a more comprehensive groundwater management plan for a larger part of the Chilcoot sub-basin. Due to the late 1990's real estate market decline, this combined project went bankrupt, and the parcels were sold off to individual land owners. Consequently, the prospect of a comprehensive groundwater management plan in the Chilcoot sub-basin came to an end.

Nevertheless, a fair amount of aquifer data was collected; data that is still helpful to further our understanding of the northeastern Sierra Valley hydrology and groundwater quality dynamics.

Chilcoot sub-basin groundwater conditions

The bedrock underlying the Chilcoot sub-basin is fractured granite and contact metamorphic rocks, which are blanketed by silty sand in the low elevation areas north of Chilcoot and south of Beckwourth Pass (Walters, 1986; Juncal and Bohm, 1986 & 1992; Bohm, 2002). The bedrock outcrops north of Chilcoot and the surrounding mountains indicate that the bedrock formations are well jointed and fractured and are of sufficient strength to hold open fractures. The silty sand is apparently deposited by wind (evident in the wind-carved bedrock outcrops north of the town of Chilcoot) and is probably derived from shoreline deposits (beach sand) formed in the lake that once occupied Sierra Valley (Durrell, 1986).

The Chilcoot sub-basin is deemed a groundwater recharge area (DWR, 1983; Bohm, 1996). The sand contains only poorly developed soils with a high percolation rate for groundwater recharge and wastewater leachate. The percolation rates quite frequently exceed the permissible limits adopted by Plumas County.

Observation well water level data collected in February 1986 and from January till May 1996 indicated that the timing of bedrock water level response to major recharge events depends on the depth of water level below land surface (Bohm, 1996). The alluvial aquifers in the low elevation areas are apparently recharged by the underlying bedrock formations, as is indicated by the artesian flow conditions increasing with depth (Juncal and Bohm, 1986; Bohm 1996b).

Wastewater disposal

Before 1986, the entire Chilcoot sub-basin north and northeast of Chilcoot and the area between Chilcoot and Vinton were zoned mostly “agricultural,” with the only residential lots occurring in the communities of Chilcoot and Vinton. Currently, the entire Chilcoot sub-basin contains more than 250 individual parcels and more than 150 existing homes, based on a review of Plumas County and Sierra County Assessors maps. Assuming an average disposal of 200 gallons per day (gpd) per parcel, at full build-out approximately 50,000 gpd or 55 acre-feet (AF) per year of wastewater could be disposed into the subsurface in the Chilcoot sub-basin. Each of these lots is served by individual wells, often on small lots where it can be difficult to meet the Plumas County and Sierra County setback requirements for wells and leach fields.

No known anomalous nitrate values have been reported from the Chilcoot-Vinton area. Nor have comparisons of before-and-after development of groundwater quality have been developed from data collected from test wells drilled in the 1980’s. No professional assessment of the impact of cumulative individual parcel development on groundwater quality is available. High density unsewered suburban growth in an important groundwater recharge area of Sierra Valley raises the question if someday, whether the water quality in some of the shallow valley floor wells in northeastern Sierra Valley will be affected by ongoing residential development in the Chilcoot-Vinton area.

Groundwater conditions in Calpine

Hydrogeologic setting

Calpine is located in southwestern Sierra Valley, on a gentle east-facing slope. The community is underlain by less than 200 ft of lacustrine sediments, overlying fractured granite. Groundwater recharges in the highlands to the west. The layout of the community is elongated east-west, bracing a northeast-trending draw with an ephemeral stream. In the east, the gentle draw is essentially a meadow with shallow groundwater, suggesting this may be a zone of significant underground water flows.

Quasi-linear northeast (NE) trending streams are a conspicuous feature in this part of Sierra Valley, suggesting NE striking faults in the bedrock underlying the lacustrine sediments. Detailed hydrogeologic analysis may find that the zone around the ephemeral stream in Calpine may be a fault related feature suitable as a deep bedrock drilling area. The production capacity of the two existing production wells is encouraging for this type of aquifer, suggesting that further exploration in the deep granite has a chance of success.

Calpine water supply

The Sierra County Waterworks District No. 1 (SCWD1) is an entity of Sierra County specially formed to serve the water needs of the community of Calpine; currently serving 136 hookups. Originally Calpine relied on surface water from Fletcher Creek. This was abandoned due to stringent surface water treatment requirements adopted in the early 1980's in favor of two more than 600 ft deep community wells, which were drilled west of the community and produce good quality water from fractured granite.

Though initially adequate, increasing demand due to community growth eventually exceeded the well water supply. Based on several engineering studies, the two wells are sufficient to meet current levels of summer peak day water demand. However, the current moratorium on new connections will stay in place until additional supplies can be obtained. Additionally, implementation of water conservation measures such as water efficient appliances and water efficient outdoor landscaping and distribution leak audits will be necessary. Thirty vacant lots are affected by the building moratorium. High arsenic levels in one community well may eventually require treatment.

Well water supplies

Information obtained from well drillers logs (Bohm, 2000) indicates that domestic wells in the Calpine area are between 110 and 160 ft deep, apparently producing from a shallow sandy formation between 60 and 140 ft and under confined (artesian) conditions. A clay aquitard between 140 and 190 ft is underlain by granitic sand to 240 ft, which is then underlain by fractured granite. The lower confined aquifer is comprised of the fractured granite and the overlying granitic sand (Bohm, 2010).

With average pumping capacities of 20 to 40 gpm, the shallow domestic wells reportedly commonly have problems with high iron, manganese, and hydrogen sulfide, which is supported by information gleaned from the community well drilling reports. In 1983/84 the community of Calpine drilled four exploration wells west of the community (George Ball 2007, personal communication). Two of these exploration wells were completed as production wells, which are still in service. The wells were reportedly flowing artesian before they were put into service.

Wastewater disposal: existing underground septic leachfields

The Calpine community constitutes more than 60 small parcels spread across less than 80 acres. Without a wastewater treatment plant, the community has to rely on on-site wastewater disposal (individual homeowner septic leachfields). Many parcels are affected by seasonally high groundwater tables and percolation tests can fail due to poorly drained, fine-grained soils. The small lots, which are underlain by lacustrine sediments (medium to fine-grained silty sands), are seasonally impacted by high groundwater table conditions, and have difficulties finding locations with adequate percolation rates. In situations with inadequate separation between leachfields and seasonally high groundwater, interference between leachfields and ambient groundwater can become a potential leachfield performance problem that can be aggravated by imported community well water.

Future developments: water and wastewater considerations.

A groundwater resource evaluation was prepared in 2007 for the proposed Meadow Ranch Project, a proposal to develop 30 unit single-family residential parcels immediately south of Calpine (Smith, 2007). With its community wells, the Meadow Ranch Project could eventually further stress Calpine's existing water supplies. On the other hand if new community wells in the Meadow Ranch project are productive enough, they may eventually be able to help alleviate the Calpine community's water supply difficulties, including the town's search for a low arsenic water source. (Calpine is currently under a State order to mitigate arsenic exceedance in their water supply). Wastewater management will be an important consideration for further suburbanization of the Calpine area and for assessing potential nitrate pollution for land and water uses downstream and downslope of the developments.

As part of the UFR IRWM Plan update, Calpine will be asked to participate in a region-wide DAC water and wastewater needs assessment survey to support DAC funding proposal development for Proposition 1 IRWM DAC funding.

Groundwater conditions in Sierraville

Southern Sierra Valley groundwater conditions

The community of Sierraville is located on the far southern periphery of Sierra Valley, at the junction of State highways 89 and 49. The town is located on a gently north sloping alluvial fan formed by Cold Creek and other streams which enter Sierra Valley through a narrow north-northwest (NNW) trending ravine. Groundwater is recharged in the elevated areas to the south and either discharged into the perennial streams or migration through the fractured bedrock formations into the deeper portions of the Sierra Valley Basin.

Although more than 30 wells have been drilled in the vicinity of Sierraville, not much information is available about the subsurface soil and geology characteristics under the community, although studies are being proposed at this time. Please see the UFR IRWM Plan website @ featherriverwater.org for more information on Sierraville Public Utilities

District's (SPUD) priority projects, such as MS-35 SPUD Alternative Water Source Analysis and Development project; MS-38 SPUD Leak Detection and Repair project, and MS-40; and MS-41 SPUD Pump house and Storage Tank Upgrade projects. As part of the UFR IRWM Plan update, Sierraville will be asked to participate in a region-wide DAC water and wastewater needs assessment survey to support DAC funding proposal development for Proposition 1 IRWM DAC funding.

Drilling data collected near the community and along West Willow Road (west of Randolph Hill) indicate alluvial fan deposits (presumably a mix of colluvium, lake deposits, and glacial outwash (Grose, et al., 2000)), and cobbles and boulders derived from the volcanic rock outcrops to the south. Drilling data collected for a land development project south of Willow Road indicate that these deposits are underlain by a shallow volcanic bedrock ledge no more than 75 ft deep (Bohm, 2006). Therefore, the wells in the southern area pump mostly from fractured volcanic bedrock and less from the overlying alluvial deposits. Apparently the alluvium here is too thin to yield substantial amounts of water. Well yields range between 5 and 30 gpm.

Some drilling logs indicate less than 5 ft to the static groundwater table; while others indicate more than 25 ft. Seasonally high water tables may be augmented by flood irrigation water imported from the Little Truckee River in the spring and early summer, as well as other seasonal surface water diversions.

Potential causes of groundwater contamination

While homes outside the community of Sierraville rely on individual wells for their water supply, the homes and businesses in Sierraville are tied into a community water supply system, which is fed by two developed springs. The springs are located in the eastern portion of section 23, immediately southwest of Randolph Hill. Sierraville is not sewered, and the residences depend on on-site wastewater disposal by means of septic leachfields. Many parcels in the downtown area are underlain by a clay-rich layer causing low percolation rates. As a result the newer leachfields are required to be designed by an engineer as "mounded" leachfields or in installations where the leachfields excavations are dug deep enough to allow leaching into the underlying gravel layers.[4] Given the high groundwater table and the potential of individual domestic wells to become affected by leachfields, the community was able to develop a community water supply outside the community area. However, existing shallow groundwater conditions are aggravated by on-site effluent discharge, which acts as a source of "artificial groundwater recharge" that is imported from community wells located outside the community area. In summary, the Sierraville community, the SPUD, and Sierra County are actively engaged in developing studies and projects to address identified and future water supply and quality concerns that may potentially be eligible for additional support from Proposition 1 DAC funding.

[4] Elizabeth Morgan, personal communication, April, 2016.

Groundwater conditions in the Loyalton area

Aquifer conditions

The city of Loyalton is located in the southeast corner of Sierra Valley, at the northwestern periphery of the alluvial fan formed by Smithneck Creek. The deeper aquifer is likely recharged from fractured bedrock at depth, whereas the shallow aquifer is likely recharged by infiltration of Smithneck Creek water into the alluvial fan deposits. As a result, the static water level in the city area is probably about 5 to 10 ft below land surface. The pumping levels in the city wells and the industrial wells (Sierra Pacific Industries/SPI) are about 50 to 100 ft below land surface (Bohm, 1997).

A transmissivity of 13,000 gpd/ft was calculated from pumping test data from the SPI well #3 (Bohm, 1997). Assuming the 100 ft screened interval is representative of the aquifer thickness, the estimated unconsolidated aquifer hydraulic conductivity is approximately 1,300 gpd/ft^2 (to be used for DRASTIC rating).

Wells in the Loyalton area

More than 100 wells are located in the vicinity of Loyalton, within the perimeter four miles west, two miles north, and approximately two miles east and southeast of Loyalton. The deeper wells are used for agricultural irrigation, municipal (City of Loyalton), and industrial (SPI cogeneration plant) purposes. More than 90 percent of the Loyalton area wells are less than 400 ft deep. Very few wells pump from bedrock. Well yield is largely dependent on depth. Wells less than 200 ft deep yield not more than 50 gpm, whereas yields range between 300 and 2,000 gpm from wells deeper than 200 ft.

Loyalton relies on three wells (with depths of 200, 260, and 410 ft) and one spring for its water supply. One of these wells is located at the north end of town, and two are located approximately one mile south of the city. Lewis Spring is located about 1.5 miles to the south of the City at an elevation of 5200 ft. Three deep industrial wells are located approximately ½ mile south of Loyalton on the same property on which the cogeneration plant (SPI) is located.

Most of the wells in the Loyalton area serve single residences outside the municipal service area. These wells are mostly producing from alluvial fan deposits and lacustrine sediments (sand and gravel). Only very few wells are drilled into bedrock. The residential wells, presumably serving single residences, are typically less than 200 ft deep. The highest concentration of domestic wells is in section 14, with at least 25 wells (approximately ½ mile west of Loyalton).

Potential sources of groundwater contamination

The City of Loyalton is sewered and serviced by the wastewater treatment plant located approximately one mile northwest of Loyalton, on the flat valley floor. The treated effluent is discharged into a lined evaporation pond. Since this facility is operated and

maintained by the City, groundwater contamination from this facility is deemed unlikely, unless the liner in the pond becomes compromised.

A more likely source of potential groundwater contamination would be leaking sewer lines. Like many other small rural communities, leakage from aging sewer collection systems is a potential problem. Increasing sewer flows during heavy rainstorms have been observed, indicating that the Loyalton sewer system is impacted by inflow/infiltration within the collection system (Ray Kruth, Stantec Engineering, Reno, personal communication). Loyalton is interested in further development of the City's ongoing leak detection and repair program for water use efficiency and continued water quality protection. As part of the UFR IRWM Plan update, Loyalton will be asked to participate in a DAC needs assessment survey to support DAC funding proposal development for Proposition 1 IRWM DAC funding.

Onsite wastewater treatment and disposal (septic systems) on residential lots outside the City's service area are another potential source of bacterial and nitrate pollution to groundwater. To our knowledge, no data are available that could indicate groundwater contamination from septic leachfields in the Loyalton area.

Comparison of selected communities' groundwater issues

Although located in the same groundwater basin, each of the four communities selected for this study are unique in their distinct combination of groundwater and wastewater disposal issues. The table below summarizes the unique challenges faced by each community.

Table comparing selected communities' and their surroundings' water supply and wastewater issues

community	sewered?	bedrock outcrops?	perc rates often too low	perc rates often too high	high GW table	individual wells	community wells
Chilcoot-Vinton		yes		yes		yes	
Calpine			yes		yes	yes	yes
Sierraville	yes		yes		yes	yes	yes
Loyalton	yes					yes	yes

Parts of the Chilcoot-Vinton community are characterized by small parcel sizes located on poorly developed sandy soils overlying shallow fractured bedrock. With residences dependent on individual wells, this combination is generally considered problematic from a groundwater protection standpoint.

Soils in Calpine are characterized by low percolation rates and discoloration by iron hydroxide deposits (an indication of poor drainage and sometimes high groundwater

tables). Combined with high-density parcel sizes and water being imported from distant wells of a community water distribution system, the conditions for on-site wastewater disposal are expected to worsen.

The fine-grained Sierraville soils are often only marginally suited for leachfields. Further complicating the conditions, high groundwater may in part be an artifact of nearby flood irrigation augmented by stream water importation from the Little Truckee River. The high water table situation may be worsened by leachfields importing and artificially recharging water imported by the community water distribution system, creating the need for engineered leachfields (mound systems).

In the City of Loyalton, the water distribution system and the wastewater collection system do not interfere with each other. An exception may be leaks in the aging wastewater system. Whether leaks in the aging system are significant enough to become a threat to the city wells remains unanswered. However, adverse effects from septic leachfields in the outskirts of Loyalton on nearby wells remain a possibility.

General observations

While focusing on the disadvantaged communities (DAC's) of Chilcoot-Vinton, Calpine, Sierraville, and Loyalton, groundwater pollution from non-urban sources elsewhere in Sierra Valley cannot be ignored. Furthermore, single residences are common in many other areas; in particular the peripheral areas of Sierra Valley such as the Beckwourth area, the areas south and southwest of Calpine, Sattley, areas west of Loyalton, and many others. Another potential pollution source is varying natural groundwater quality parameters due to changing pumping patterns (for example boron occurrence).

Managing groundwater quality of an aquifer underlying an agricultural area with interspersed growing suburban development faces a multitude of challenges. Individual leachfields are essentially systems that recycle minimally treated wastewater into the underlying aquifer. Functioning leachfields are meant to remove solids, bacteria, and viruses. They are, however, not designed to remove solutes, like nitrate, phosphorus, TDS, chloride and common household chemicals. These solutes, when diluted, pose no concern in a well-flushed aquifer (adequate groundwater flow). But when dispersion is inadequate, alarming "spikes" will show in the monitoring data.

Given enough time on a valley floor with the right kind of underlying sediments, any human activities will eventually impact groundwater quality (as the groundwater quality data collected in American Valley show). With time, impacts on groundwater quality due to a multi-facetted range of activities are becoming an increasing probability.

Lessons learned: applying DRASTIC to American Valley

A "wellhead protection demonstration program", funded by US-EPA was conducted in American Valley in the mid 1990's (Bohm, 1998). The study entailed a review of all

available groundwater data to develop a comprehensive assessment of the groundwater conditions in American Valley. Preparation of a DRASTIC map was one part of the project, focusing on groundwater pollution potential. The final map was created with GIS software. Students from Feather River Junior College assisted with the project, making the project a significant public education benefit as well. Through the DRASTIC method, an impressive mapping product was created to draw the community's attention to the importance of groundwater protection.

Although the wellhead protection study stimulated the public interest in groundwater protection, public education to continue to inspire the community's groundwater awareness soon became superseded by more pressing immediate concerns. The drought and new legislation (SGMA) triggered needs such as drilling new wells and developing a regional groundwater authority in order to comprehensively develop and manage the groundwater resource of the entire American Valley.

What were the lessons learned for developing community groundwater resources? Although there appears to be plenty of groundwater available, perceived favorable potential drilling sites can quickly become compromised by lack of access (changing land ownership), water quality (natural and contamination), limited well yield, and pipeline cost.

Perhaps the biggest lesson was that concurrent developments that threaten (or potentially threaten) aquifer integrity can be controlled only to a limited extent. Once such complicating factors are in place, groundwater development must adjust accordingly. Under these conditions, if a well becomes contaminated there are two alternatives: continue pumping at the same location and treat the water, or drill another well at a location away from potential pollution (and protect the new resource).

Most commonly, a number of more pressing daily issues and shortage of funds tend to override long-term groundwater planning. Sometimes out of pure necessity a wellfield continues to be developed in an area that is known to be gradually deteriorating. Well site location decisions include other factors than only hydrogeologic and aquifer protection factors. In emergencies, such as accidental spills and aging well failures long-term contingency plans will be circumvented. However, managing a wellfield through long-term planning is more economically feasible rather than by a series of emergency solutions; limited time makes it difficult to acquire adequate financial resources. It becomes a vicious cycle: without long term financial and technical planning and management will be repeatedly forced into a series of short-term (more expensive) solutions.

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Attachment A: Sierra Valley DAC "DRASTIC" ratings maps

Steps in creating the DRASTIC maps

The first step in the study was to gather data sources and the possible range of each variable was surveyed, including: water level data, precipitation, evapotranspiration data, aquifer data (geologic formations), soil data, topography, and hydraulic conductivity.

Creating a DRASTIC ratings map for each community began by developing an Excel workbook. For each community, a rectangular, equal-spaced grid with 2640-by-2640 ft grid-cells (160 acres) was defined on the topographic map to cover the community and surrounding area. The ratings for each grid cell were entered into one of seven separate worksheets in the workbook. The final ratings were calculated in the 8th sheet by summation of the individual ratings multiplied by their weighting factors. Each cell in the final rating grid was then converted into a percentage scale between the minimum and maximum possible DRASTIC ratings, i.e. between 26 and 226. The grid was then printed onto a topographic map to become the final DRASTIC ratings map.

Since the topographic map already contains a lot of information, for clarity a "well vulnerability index" between 1 and 5 and a corresponding color code (green, yellow and red) were assigned to each cell in a separate map (without the topographic background).

In the end, for each community two kinds of maps were created:

A. A topographic map with a blue grid, including the percentage ratings in each grid-cell printed onto a topographic map to become the final DRASTIC ratings map.

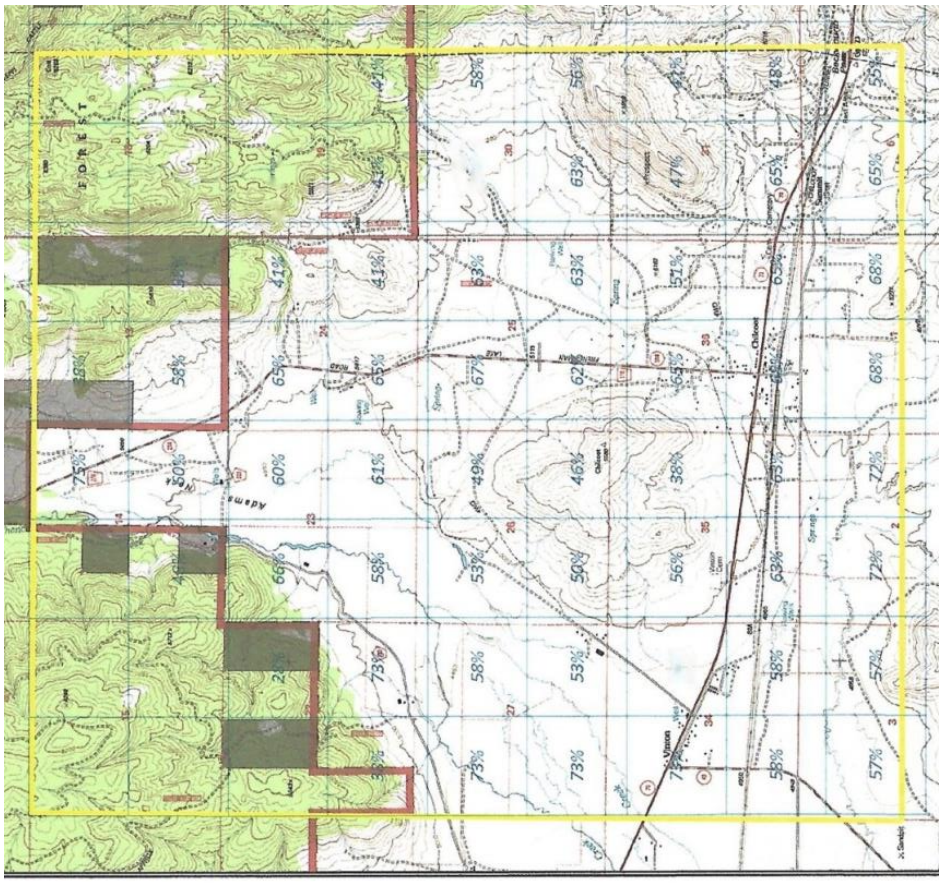
B. Since the topographic map already contains a lot of information, for clarity a "well vulnerability index" between 1 and 5 and a corresponding color code (green, yellow and red) were assigned to each cell in a separate grid-map (without topography).

The advantage of the colored grid with its "well vulnerability indices" is that it allows an immediate overview of the areas of concern.

A third map is also included:

The current (2015) County Assessors parcels maps are included to indicate the potential growth in residential water demands and wastewater outputs in an around the four selected communities. It is important to note that potential growth is not actual growth until the required development permits are issued and the developments are built and operational.

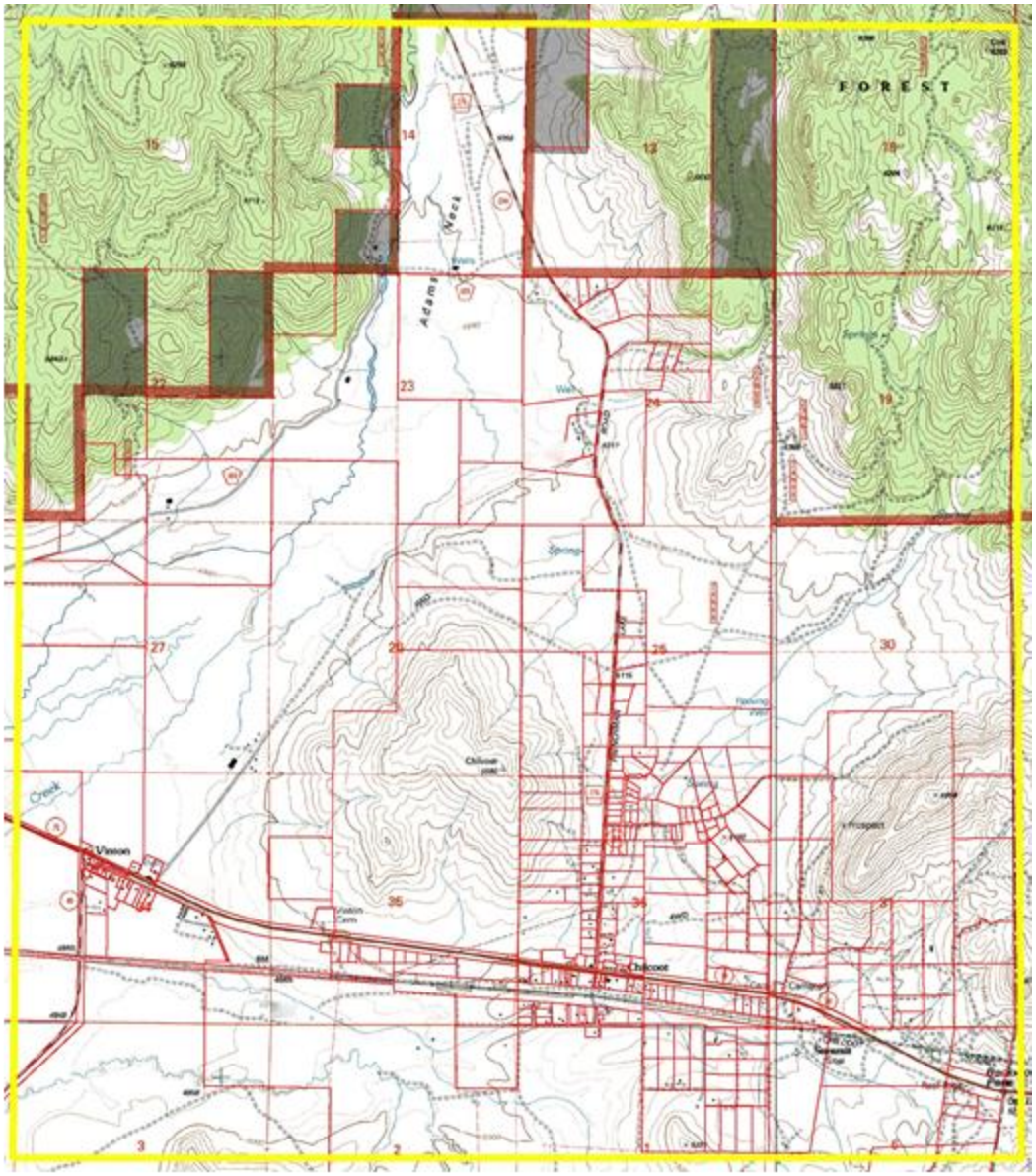
Chilcoot-Vinton well vulnerability index map



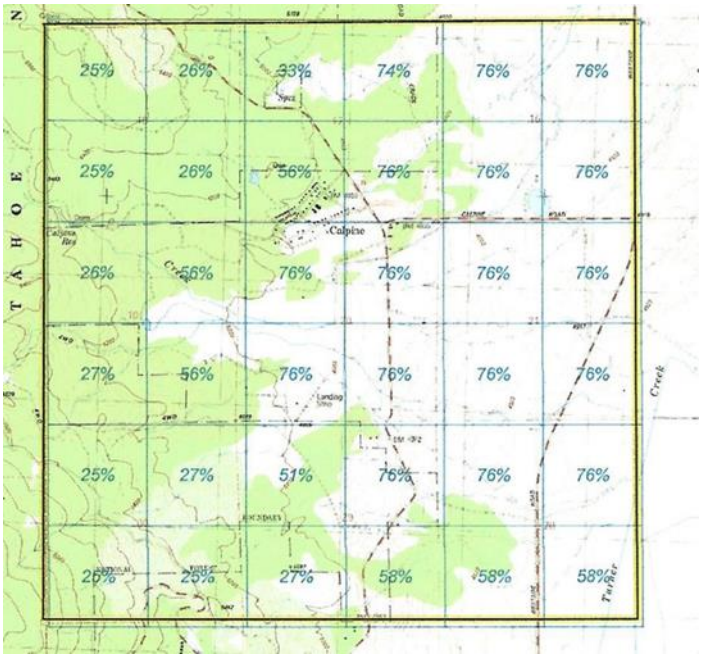
Chilcoot-Vinton									
3	3	3	3	3	3	3	3	3	2
4	4	3	4	4	3	3	4	3	2
4	4	3	4	4	3	3	4	3	2
4	4	4	4	4	4	3	3	2	2
4	4	4	4	4	3	3	3	2	2
3	3	3	3	3	3	3	3	2	2
3	3	3	3	3	4	3	3	2	2

Well Vulnerability Index:	
1	low
2	
3	medium
4	
5	high

Chilcoot-Vinton parcel map



Calpine well vulnerability index maps



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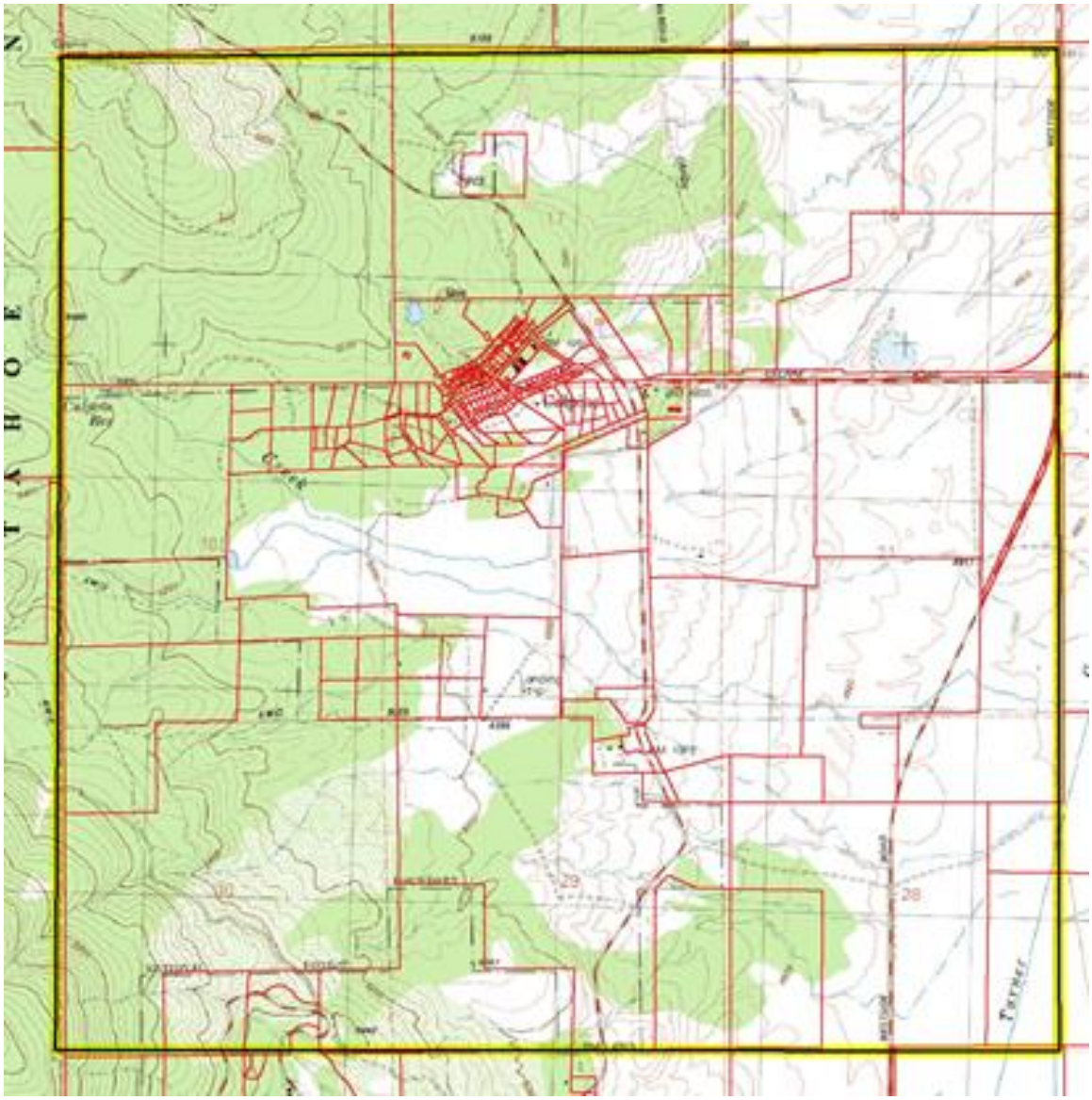
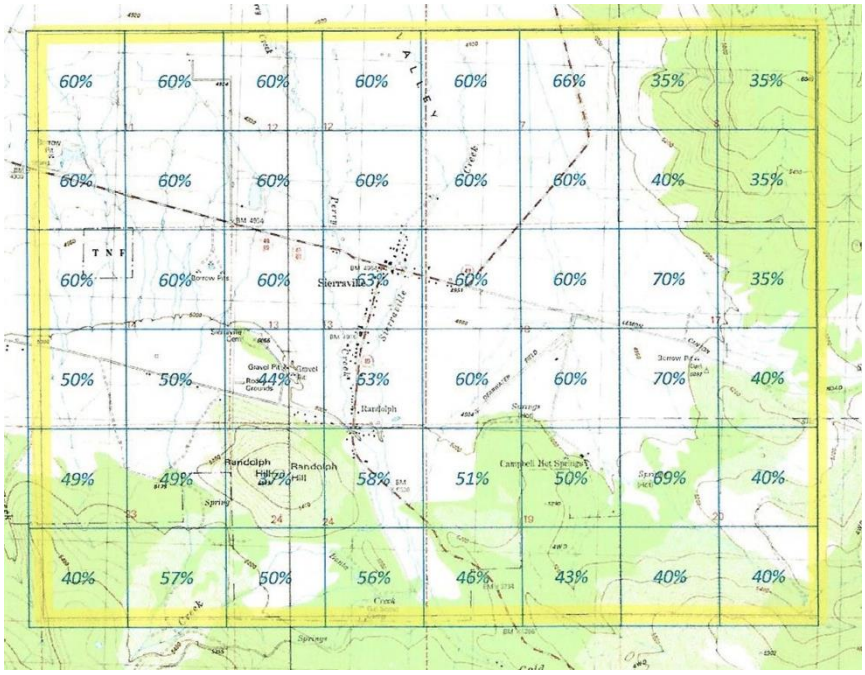
Calpine, well vulnerability index

	1	2	3	4	5
	low		medium		high

Calpine area parcel map



Sierraville well vulnerability index map



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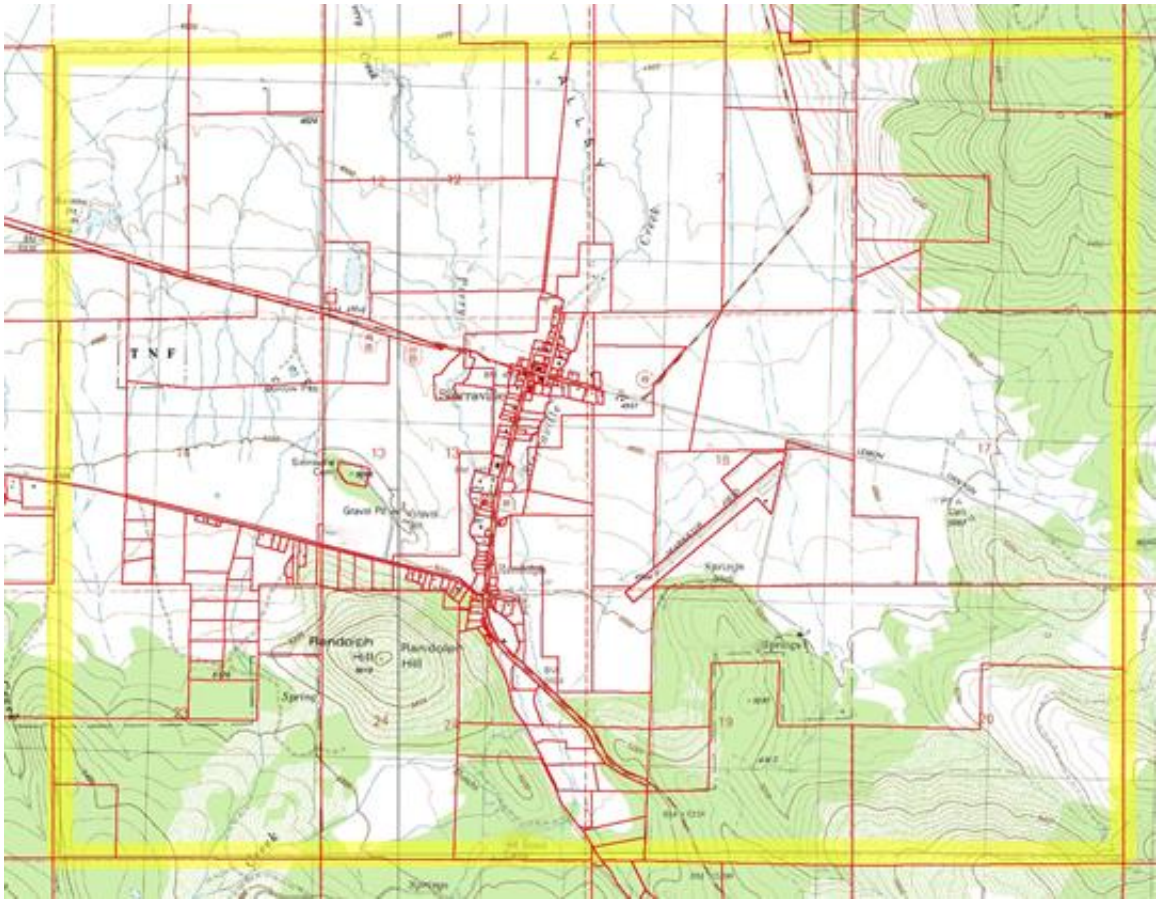
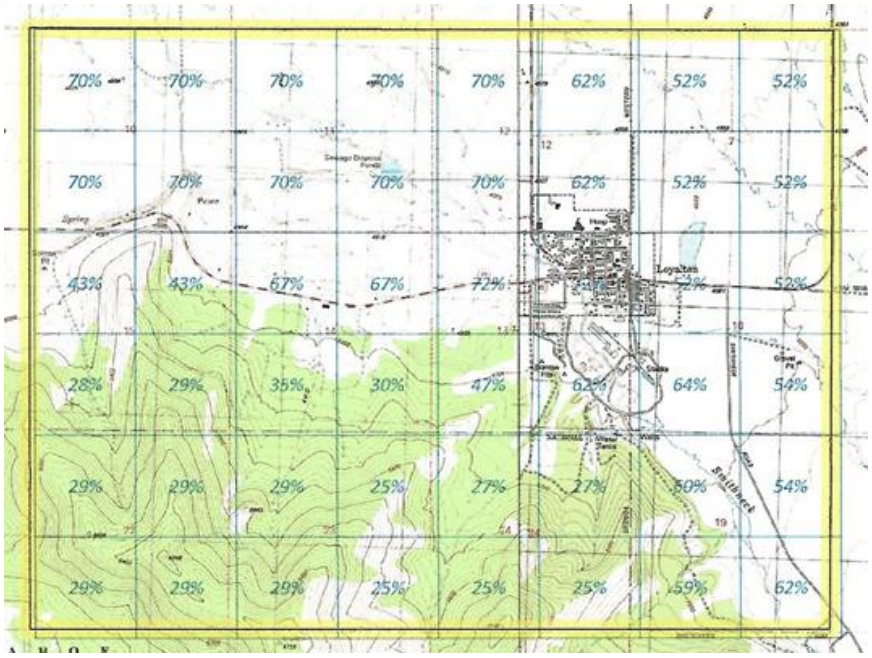
2	2	1	2	2	2	3	1
1	2	2	2	2	2	1	1
Sierraville							
Well Vulnerability Index:			1	2	3	4	5
			low		medium		high

Sierraville area parcel map



Loyalton well vulnerability index maps



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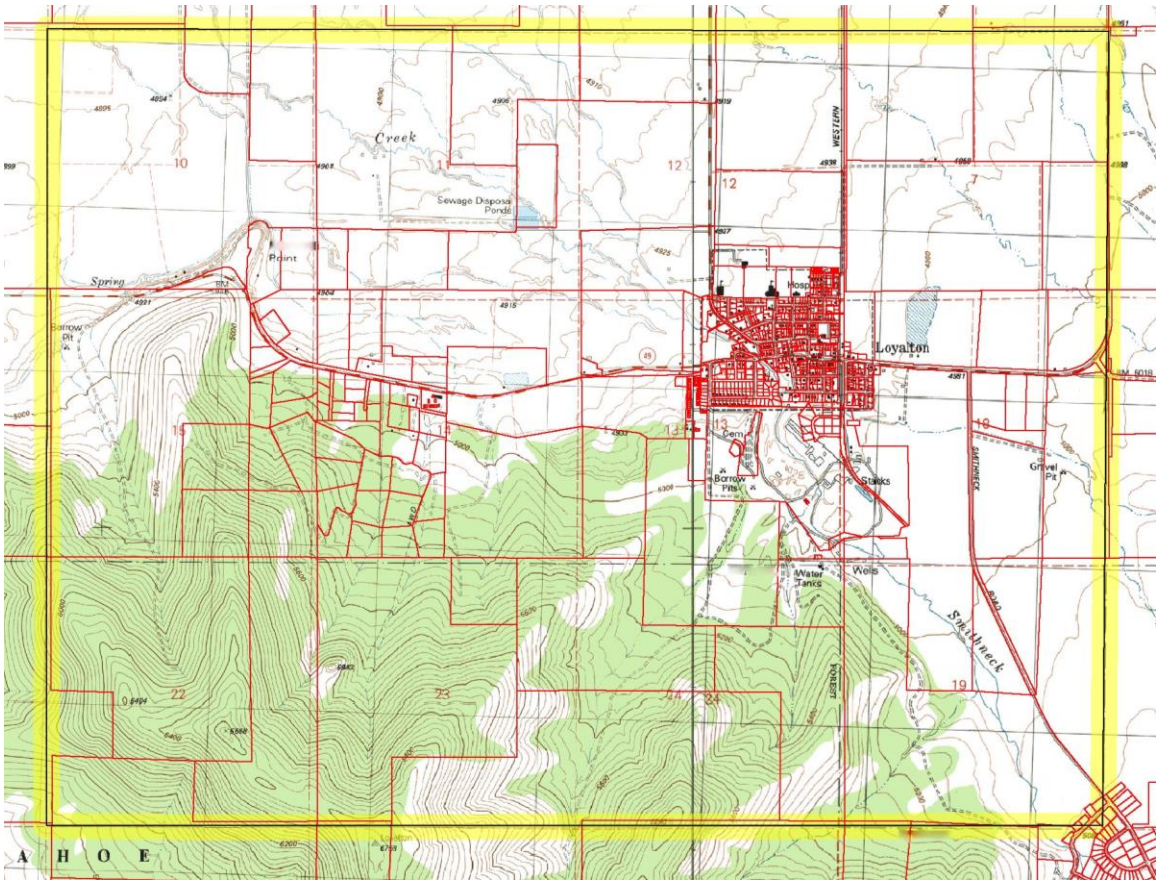
Loyalton							
Well Vulnerability Index:			1	2	3	4	5
			low		medium		high

Loyalton area parcel map



Attachment B: "DRASTIC" ranges and ratings

From Aller et al., 1985

TABLE - "DRASTIC" RANGES AND RATINGS		
DEPTH TO WATER	**(FEET)**	
Range	**Rating**	
0-5	10	
5-15	9	
15-30	7	
30-50	5	
50-75	3	
75-100	2	
100+	1	
Weight: 5	**Pesticide Weight: 5**	
NET RECHARGE	**(INCHES)**	
Range	**Rating**	
0-2	1	
2-4	3	
4-7	6	
7-10	8	
10+	9	
Weight: 4	**Pesticide Weight: 4**	
AQUIFER MEDIA	**(ROCK TYPE)**	
Range	**Rating**	**Typical Rating**
Massive Shale	1-3	2
Metamorphic/igneous	2-5	3
Weathered Metamorphic/igneous	3-5	4
Glacial Till	4-6	5
Bedded Sandstone, Limestone and Shale Sequences	5-9	6
Massive Sandstone	4-9	6
Massive Limestone	4-9	6
Sand and Gravel	4-9	8
Basalt	2-10	9
Karst Limestone	9-10	10
Weight: 3	**Pesticide Weight: 3**	

SOIL MEDIA	(ROCK MATERIAL)	
Range	**Rating**	
Soils are thin or Absent	10	
Gravel	10	
Sand	9	
Peat	8	
Shrinking and/or Aggregated Clay	7	
Sandy Loam	e	
Loam	5	
Silty Loam	4	
Clay Loam	3	
Muck	2	
Nonshrinking and Nonaggregated Clay	1	
Weight: 2	**Pesticide Weight: 5**	
TOPOGRAPHY	(PERCENT SLOPE)	
Range, %	**Rating**	
0-2	10	
2-6	9	
6-12	5	
12-18	3	
18+	1	
Weight: 1	**Pesticide Weight: 3**	
IMPACT OF VADOSE ZONE MEDIA	(ROCK MATERIAL)	
Range	**Rating**	**Typical Rating**
Confining Layer	1	1
Silt/Clay	2-6	3
Shale	2-5	3
Limestone	2-7	6
Sandstone	4-8	6
Bedded Limestone, Sandstone, Shale	4-8	6
Sand and Gravel with significant Silt and Clay	4-8	6
Metamorphic/Igneous	2-8	4
Sand and Gravel	6-9	8
Basalt	2-10	9
Karst Limestone	8-10	10
Weight: 5	**Pesticide Weight: 4**	

HYDRAULIC CONDUCTIVITY	(GPD/FT^2)	
Range	**Rating**	
1-100	1	
100-300	2	
300-700	4	
700-1000	6	
1000-2000	8	
2000+	10	
Weight: 3	**Pesticide Weight: 2**	

ITEM NO. 5

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Draft Resource Management Strategies Chapter

Date: June 15, 2016

INTRODUCTION

The intent of the RMS Standard is to encourage diversification of water management approaches as a way to mitigate for uncertain future circumstances and comply with PRC §75026(a) and California Water Code (CWC) §10541(e)(1). An RMS, as defined in the California Water Plan (CWP) Update 2013, is a project, program, or policy that helps local agencies and governments manage their water, and related resources. The IRWM Plan must document the range of resource management strategies (RMS) considered to meet the IRWM objectives and identify which RMS were incorporated into the IRWM Plan. The effects of climate change on the IRWM region must also factor into the consideration of RMS.

The Propositions 84 and 1 Integrated Regional Water Management (IRWM) Guidelines require the Plan to document regionally relevant resource management strategies (RMS) and include strategies for how the region will address them. During its March 27, 2015 meeting, the RWMG determined all but three RMS identified in the California Water Plan 2013 Update as relevant to the region. The three RMS deemed unrelated to the region included Conveyance-Delta, Desalination, and Surface Storage – CALFED/State.

The RWMG directed selection of RMS for development of recommendations to each of the workgroups, requesting that each workgroup select 5-6 RMS to address. During their third meetings, the workgroups each identified RMS for which they would develop recommendations. At its May 20, 2015 meeting, the RWMG reviewed the workgroup selections and assigned those RMS that had not been selected so as to insure that all RMS determined relevant to the region were addressed. Through a series of open meetings, the four Upper Feather River (UFR) workgroups identified RMS recommendations to address issues and objectives within the UFR Region. The RMS recommendations identified are directly tied to the Plan objectives and issues, and focus project development within four areas of long-term interest within the UFR watershed: agricultural land stewardship; uplands and forest management; floodplains, meadow, and waterbodies management; and municipal services.

The RMS Standard requires strategies be considered and recommendations developed from the perspective of maximizing the diversity of strategies as opposed to relying on a single strategy. Considering a RMS means to review a strategy and to decide how applicable it is in meeting the IRWM Plan objectives. For each strategy considered, the IRWM Plan should document the reasoning behind the decision.

The chapter must also be consistent with Proposition 1 Guidelines that require additional detail regarding climate change be incorporated. The following are in addition to Proposition 84 Standards:

- Identify and implement, using vulnerability assessments and tools such as those provided in the Climate Change Handbook, RMS and adaptation strategies that address region-specific climate change impacts.
- Demonstrate how the effects of climate change on its region are factored into its RMS.
- Reducing energy consumption, especially the energy embedded in water use, and ultimately reducing GHG emissions.
- An evaluation of RMS and other adaptation strategies and ability of such strategies to eliminate or minimize those vulnerabilities, especially those impacting water infrastructure systems.

PROCESS AND NEXT STEPS

The Draft RMS Chapter was drafted by staff with input from Workgroup Coordinators. The chapter was based on the RMS recommendations developed by the workgroups during public meetings held in 2015. The draft chapter was released to the workgroups, stakeholders, and posted on the website on April 21, 2016 for a 30-day review and comment period. The deadline for comments was May 23, 2016. Staff received three sets of comments in total. The comments were reviewed internally and with Randy Wilson, Project Manager, and revisions made accordingly. A complete set of all comments received on the chapter were emailed to the RWMG on June 10, 2016. The version included in this agenda item is the revised chapter.

The next step in the process will be to address any comments received by the RWMG at the June 24, 2016 meeting. Upon completing this process with the other draft chapters, the chapters will be incorporated into a comprehensive Public Review Draft Plan, which will be the next opportunity for public input and comment. Once the Public Review Draft Plan is ready and made available, there will be two public meetings scheduled within the public review period to present the Draft Plan and to receive comments.

REQUEST

Discussion and direction to staff.

Attachment: Draft Resource Management Strategies Chapter

Draft Resource Management Strategies

Contents

9. Resource Management Strategies

9.1. Introduction

The *California Water Plan Update 2013* presents 30 standard resource management strategies (RMS) designed to help meet the water-related goals and objectives of integrated regional water management (IRWM) plans across the state. An RMS is a technique, program, or policy that helps local entities manage their water and water-related resources. The intent of the RMS standard is to encourage diversification of water management approaches as a way to mitigate for uncertain future circumstances, rather than relying on a single strategy or approach for addressing a regional issue. The RMSs are interrelated and each is to some extent dependent upon or complementary to others. Collectively, RMSs acknowledge that water management, whether within a single watershed or statewide, is a complex challenge that must balance environmental, societal, economic, and cultural drivers in order to maximize the beneficial uses of a finite and scarce resource. These strategies include considerations of assessed vulnerabilities and projected impacts of climate change on the region (please see **Chapter XX – *Climate Change,*** for a detailed discussion of climate change vulnerabilities and projected impacts on the region). RMS are grouped into categories based on the overall objectives of the California Water Plan:

- reduce demand;
- improve flood management;

- improve operational efficiency;
- increase water supply;
- improve water quality;
- practice resource stewardship; and
- recognize the connection between people and water.

An IRWM plan must consider, at a minimum, each RMS in the *California Water Plan Update 2013*; additional RMSs can be formulated as well, in response to regional conditions. All 30 standard RMSs were considered in formulating the IRWM Plan; however, three were determined inapplicable to the Plan area. Additional strategies were formulated pertaining to fire and fuels management, wastewater treatment, snow fences, and rainfed agriculture. Workgoups identified strategy recommendations tailored to the specific goals and objectives of the Plan for each of the 27 standard RMSs considered. Please see **Chapter 8 – *Goals and Objectives*** for a detailed discussion of the intended benefits of the Plan.

Sections 9.2 and **9.3** present a brief summary of each standard RMS; how it supports the region's climate change adaptation objectives; an assessment of its applicability to the Upper Feather River (UFR) IRWM Plan area; and a brief statement of the number and nature of recommendations made by workgroups, if applicable. Specific strategy recommendations from each of the workgroups for all applicable RMSs are located in Section **9.4 – *Strategy Recommendations***.

The RMSs discussed in this chapter are incorporated into the process for development and review of individual projects under the IRWM Plan. Please see **Chapter 10 – *Project Development and Review Process*** for a detailed description of the timing and review process for individual projects.

9.2. Selected RMSs and Applicability to Region

The following standard RMS apply to the Upper Feather River IRWM Plan area.

9.2.1. Reduce Water Demand

Water conservation is defined by California Water Code (CWC) Section 10817 as "the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water." Thus, reduced water demand is not synonymous with water conservation, as increased efficiency can result from increases in benefits from the same amount of water, as well as from maintaining current levels of benefits from less water. In either case, increases in efficiency will tend to reduce waste and non-beneficial use of water resources, which will reduce present demand and/or allow for greater flexibility to meet future demand. Climate change has the potential to impact the volume and seasonal availability of water. As noted in **Chapter XX – *Climate Change***, less precipitation and snowfall mean that current levels of water demand, if sustained, can stress the watershed and reduce the economic and environmental productivity of the region. Increasing efficiency of agricultural and urban water use could reduce demand, making the region more resilient to changes in precipitation patterns.

9.2.1.1. Agricultural Water Use Efficiency

The agricultural water use efficiency strategy describes the application of scientific processes to control agricultural water delivery and use, in order to achieve a beneficial outcome. It includes an estimation of net water savings or increased production resulting from implementing efficiency measures. Improvements in agricultural water use efficiency are expressed as yield improvements for a given unit amount of water, and can be estimated over individual fields or entire regions. The net water savings is the reduction in the amount of water applied, while maintaining or improving crop yield and agricultural productivity. Net water savings recognizes: 1) the uptake and transpiration of water for crop water use; 2) the role, benefits, and quantity of applied water that is recoverable and reusable in the agricultural setting; and 3) the quantity of irrecoverable applied water that flows to salt sinks--such as inaccessible or degraded saline aquifers--or that evaporates to the atmosphere and is unavailable for reuse.

Examples of measures that improve agricultural water use efficiency include:

- Hardware – improving irrigation and water delivery systems;
- Water management – reducing evapotranspiration and improving management of irrigation and water delivery systems; and
- Agricultural technology – breeding, genetically modified foods crops, fertilizers, technology, etc.

Currently, agricultural lands account for approximately 2.7 percent of the Plan area and are predominantly irrigated pasture rather than crops[1]. A reduction in agricultural water demand can minimize the impacts of existing vulnerabilities and help increase agricultural resiliency to possible decreases in water availability in the future. The Agricultural Lands Stewardship Workgroup identified 16 recommendations for promoting agricultural water use efficiency, including education, data sharing, and technical assistance to agricultural land managers, as well as the use of best management practices in agricultural operations (**Table 9.1**).

9.2.1.2. Urban Water Use Efficiency

Urban water use efficiency strategies focus on reducing demand, as most municipal water is not available for reuse without treatment. The *California Water Plan Update 2013* includes 14 Demand Management Measures (DMMs) aimed at reducing urban water demand in California. These DMMs include internal water system audits, leak detection and repair, metering all connections and applying conservation pricing, rebate programs for high-efficiency appliances, public outreach, and landscape surveys and water-efficient landscape guidelines.

Urban water use efficiency programs such as DMMs are targeted mainly at large urban water suppliers[2], and produce significant savings at large scales. Municipal water in the region is supplied by small districts serving fewer than 3,000 customers; however, increasing efficiency of municipal water use would provide important benefits in the region, especially through reducing demands on existing

[1] Alfalfa and grass hay production are considered crops, as it can be harvested for sale and transport out of the area.

[2] Urban water suppliers are defined in the California Water Code as entities that supply 3,000 or more customers or deliver 3,000-acre feet of water annually.

infrastructure and avoiding the need for costly expansion. The region's population increases significantly in summer months with an influx of seasonal residents and tourism. Infrastructure that increases urban water use efficiency throughout the year can help preserve a limited water supply, even during times of increased water demand and decreased water availability. The Municipal Services Workgroup identified seven recommendations for promoting urban water use efficiency, including implementing DMMs and funding incentive programs for disadvantaged communities (DACs) and small districts (**Table 9.1**).

9.2.2. Improve Flood Management

Flood management comprises policies and practices related to educating the public, preparing for, mitigating damages related to, responding to, and recovering from flooding, as well as protecting the natural and beneficial functions of floodplains. The Flood Management RMS is divided into four approaches:

- *Nonstructural* – land use planning, floodplain mapping, risk assessment, land acquisitions and easements, building codes and flood proofing, permanent relocation, flood insurance, flood risk awareness;
- *Structural* – levees and flood walls, channels and bypasses, retention and detention basins, culverts and pipes, streambank stabilization, reservoir and floodplain storage, inspection and vegetation management, sediment removal, repair of structures;
- *Restoration of natural floodplain functions* – promoting natural hydrologic, geomorphic, and ecological processes, protecting and restoring floodplain habitats, invasive species reduction; and
- *Flood emergency management* – flood preparedness, emergency response, post-flood recovery.

These approaches all address the impacts of flooding, the risk of which may increase with future changes in the regional climate. Increasing temperatures, reduced snowfall, and earlier snowmelt may increase the risk of wildfire, leading to avalanche chutes, debris chutes, and alluvial fans, which can worsen erosion and water quality in flood events after a wildfire. Increased probability of rain-on-snow events can create higher than anticipated runoff peaks. Protecting the floodplains through structural, nonstructural, and restorative approaches supports the watershed's ecological health and builds resiliency to flood events.

9.2.2.1. Flood Management

The non-structural and structural approaches to flood management have limited applicability to the region, given the rural setting, small population, expectation of limited growth, the large percentage of public land, and the location of most communities in upper watershed areas. The region does not face significant issues of new development in floodplains, or reliance on levees, channels, or bypasses. Sedimentation in streams, culverts, and reservoirs is a significant issue in the watershed, but is addressed in the Sediment Management RMS.

The most significant flood management issue in the region is the loss of natural floodplain functions due to declining capacity of meadows, erosion and headcutting of streams, and reduced ability of the watershed to hold and release floodwaters. Rain-on-snow events, the severity and frequency of which may increase with climate change, can accelerate the loss of these functions. The Floodplains, Meadows, and Waterbodies Workgroup identified one recommendation: restoration of natural

floodplain function to preserve and/or restore the natural ability of undeveloped floodplains to absorb, hold, and release floodwaters (**Table 9.1**).

9.2.3. Improve Operations Efficiency and Transfers

Improving operational efficiency of water management refers to exploring ways water infrastructure can be used to maximize regional and inter-regional beneficial uses of existing water supplies. Water infrastructure elements such as dams, canals, and pumping stations are often developed for single purposes by independent entities, but could be integrated into a more holistic water management network that uses all available water to maximize benefits. Improving operational efficiency may require changes to administration and facilities operations more so than new infrastructure, though minor modifications to facilities or construction of new conveyance interties may be necessary. Improving efficiency and connectivity of available water supplies also prepares the region to maintain water availability in anticipation of rising temperatures and decreased snowfall as a result of climate change.

9.2.3.1. Conveyance – Regional/Local

Regional conveyance is the conveyance or distribution of water from locally developed sources to end users located within the same watershed or river system. Conveyance systems are necessary to achieve benefits from virtually every other facet of local and regional water management such as recycling, water transfers, and both surface and groundwater storage. Improvements in system conveyance capacity can be achieved by locating and widening bottlenecks that constrict the movement of water. Conveyance capacity improvements can increase reliability without requiring increased supplies by increasing operational flexibility to move water between storage locations and points of use. Other potential benefits of improving regional conveyance capacity include improved water quality, reduced impacts to fisheries and streams, enhanced opportunities for conjunctive use, and increased surface and groundwater storage.

The most significant regional conveyance issues in the region are aging infrastructure and inadequate capacity. Continuing to study how anticipated climatic changes will place additional pressure on these systems can guide infrastructure and ecosystem upgrades that will respond to both current and future challenges. The Agricultural Lands Stewardship Workgroup identified six recommendations to improve regional conveyance, including repair and upgrade of aging infrastructure, replacement or improvement of canals, invasive weed control, and an improved description of the existing management system and capacity needs (**Table 9.1**).

9.2.3.2. System Reoperation

System reoperation describes the improvement of existing operations and management procedures of water facilities to meet needs more efficiently and reliably, rather than relying solely on infrastructure improvements. Minor physical changes to facilities may also be required. Examples of system reoperation include:

- Integration of flood protection and water supply systems to increase water supply reliability and flood protection, improve water quality, and provide for ecosystem protection and restoration;
- Reoperation of existing reservoirs, flood facilities, and other water facilities in conjunction with groundwater storage to improve water supply reliability, flood hazard reduction, and ecosystem protection and to reduce groundwater overdraft;

- Promotion of more effective groundwater management and protection and greater integration of groundwater and surface water resource uses, and;
- Improvement of existing water conveyance systems to increase water supply reliability, improve water quality, expand flood protection, and protect and restore ecosystems.

System reoperation focuses primarily on large-scale integration of State Water Project, Central Valley Project, and regional water project facilities. The Plan area includes several dams operated by the State Water Project, as well as hydroelectric facilities operated by Pacific Gas & Electric, and numerous facilities operated by the U.S. Forest Service and local water districts (see **Table 4.10** for a list of dams in the Plan area). Opportunities for system reoperation in support of water management outside the watershed are necessarily mediated through management and operation of Oroville Dam; however, local benefits such as improved fisheries habitat, water quality, groundwater recharge, and flood management could accrue from reoperation of dams and other water facilities in the watershed. System reoperation in response to climate change impacts, such as decreased streamflow and precipitation, can help the region's hydropower resources along the Stairway of Power prepare for unavoidable impacts to hydropower production and may also enable communities dependent on that energy be better equipped for a diminished supply of power. The Forest and Water Balances Study (**Appendix XX**) considers the effects of forest densification on groundwater recharge and streamflows with implications for downstream dams and facilities.

The Municipal Services Workgroup identified three recommendations for promoting system reoperation: collaborating with federal, state, and local agencies on system reoperation studies, performing system audits, and conjunctive management (**Table 9.1**).

9.2.3.3. Water Transfers

Water transfers are sometimes seen as merely moving water from one beneficial use to another; however, in practice many water transfers become a form of flexible system reoperation linked to many other water management strategies. These strategies include surface water and groundwater storage, conjunctive management, conveyance efficiency, water use efficiency, water quality improvements, and planned crop shifting or crop idling for the specific purpose of transferring water. These linkages often result in increased beneficial use and reuse of water overall and are among the most valuable aspects of water transfers. Transfers also provide a flexible approach to distributing available supplies for environmental purposes. This ability to conserve, increase reliability, or build additional water supply through transfers helps the region adapt to climate change in the face of possible decreases in typical year flows.

A water transfer is a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights. Transfers can be between water districts that are close by or across the state, provided there is a means to convey or store the water. A water transfer can be a temporary or permanent sale of water or a water right by the water right holder, a lease of the right to use water from the water right holder, or a sale or lease of a contractual right to water supply. Water transfers can also take the form of long-term contracts for the purpose of improving long-term supply reliability. Generally, water is made available for transfer by five major methods:

1. Transferring water from reservoir storage that would otherwise have been carried over to the following year. The expectation is that the reservoir will refill during subsequent wet seasons.
2. Pumping groundwater (groundwater substitution) instead of using delivered surface water.
3. Transferring previously banked groundwater either by directly pumping and transferring the banked groundwater or by pumping the banked groundwater for local use and transferring surface water that would have been used locally.[3]
4. Reducing the existing consumptive use of water through crop idling or crop shifting to make water available.
5. Reducing seepage to saline sinks by applying water-use efficiency measures. Water that seeps to saline groundwater is irrecoverable. Any deep percolation, whether from canal seepage or from irrigated fields that would otherwise seep to unusable groundwater, can be transferred if the seepage is prevented. Thus, deep seepage conserved from lining a canal or by switching from flood irrigation to drip can be transferred.

Opportunities for inter-regional water transfers in the region are limited at present; however, the large number of and diversity of water management entities within the watershed creates significant opportunities to increase regional efficiencies through water transfers. The Municipal Services Workgroup identified three recommendations for increasing benefits from water transfers, including expanded groundwater management and monitoring programs, and exploring opportunities for intra-, inter-, and interstate- basin transfers (**Table 9.1**).

9.2.4. Increase Water Supply

Strategies to increase water supply include not only precipitation enhancement and conservation, but also conjunctive management of surface and groundwater as a single integrated source, enhanced surface storage, and recycling.

9.2.4.1. Conjunctive Management

Conjunctive management is the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. Surface water and groundwater resources typically differ significantly in their availability, quality, management needs, and development and use costs. Managing both resources together, rather than in isolation, allows water managers to use the advantages of both resources for maximum benefit. Conjunctive management thus involves the efficient use of both resources through the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin that is planned to be used later by intentionally recharging the basin when excess

[3] Groundwater banks consist of water that is "banked" during wet or above-average years. The water to be banked is provided by the entity that will receive the water in times of need. Although transfers or exchanges may be needed to get the water to the bank and from the bank to the water user, groundwater banks are not transfers in the typical sense. The water user stores water for future use; this is not a sale or lease of water rights. It is typical for fees to apply to the use of groundwater banks.

water supply is available, for example, during years of above-average surface water supply or through the use of recycled water.

A sustainable conjunctive water management program consists of several components that include investigating the groundwater aquifer characteristics, estimating surface water and groundwater responses, and appropriate monitoring of groundwater level and quality. In addition, reliable institutional systems for ensuring environmental compliance, providing long-term system maintenance, and managing contractual and legal features of the program are critical to sustainability. Conjunctive management may become more important as precipitation variability increases throughout the region as a result of climate change.

Conjunctive management would potentially benefit the region through better management of stormwater and groundwater. Because of the complex regional geology, there are 14 groundwater basins in the Plan area (see **Chapter 4.5.1** for a description of the groundwater basins in the Plan area), only one of which has a basin plan. The Agricultural Lands Stewardship Workgroup identified nine recommendations for promoting conjunctive management in the region, including public education, data gathering, monitoring, management plans for all groundwater basins, and increased groundwater recharge (**Table 9.1**). The Floodplains, Meadows, and Waterbodies Workgroup identified five recommendations to promote conjunctive management in the Plan area, including public education, increased monitoring, improved coordination with tribes and other local agencies, and restoration of wet meadows (**Table 9.1**).

9.2.4.2. Precipitation Enhancement

Also called cloud seeding, precipitation enhancement is a form of weather modification that artificially stimulates clouds to produce more rainfall or snowfall than they would produce naturally, by injecting substances into the clouds that enable snowflakes and raindrops to form more easily. Precipitation enhancement projects typically use silver iodide, supplemented with dry ice for aerial application. Occasionally, liquid propane or hygroscopic materials are used instead of silver iodide. In 2011, there were a total of 15 precipitation enhancement programs active in California, including one in the Lake Almanor area that is managed by Pacific Gas & Electric (PG&E). Most of the agencies or districts doing precipitation enhancement projects suspend operations during very wet years once enough snow has accumulated to meet their water needs. Additional precipitation generated by cloud seeding could offset demand on other water sources that may face diminished supplies as a result of climate change.

Precipitation enhancement could potentially benefit the region by increasing snow pack, but may have limited potential for further application beyond present levels, particularly in view of current climate trends. Natural precipitation decreases from west to east and from north to south in the Plan area, and the potential to artificially enhance precipitation from storms may be low in most of the upper watershed of the Middle Fork. Enhancing precipitation over the western slope of the Sierra Crest where natural precipitation is highest could result in more flow into Lake Oroville, but would not benefit most of the watershed, since most of the inhabited area and impoundment facilities lay east of the Sierra Crest. In addition, precipitation enhancement is often viewed with skepticism by local stakeholders because of concerns over its effects on environmental and human health.

The Floodplains, Meadows, and Waterbodies Workgroup identified two recommendations to increase knowledge regarding the effectiveness and health consequences of existing precipitation enhancement projects in the region, and to increase involvement of academics and local citizens in research related to the effects of cloud seeding on local communities (**Table 9.1**).

9.2.4.3. Municipal Recycled Water

The California Water Code (CWC) provides the following definition for recycled water: "water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource" (CWC Section 13050(n)). Recycled water can be divided into two categories: potable reuse and non-potable reuse. Potable reuse involves introducing recycled water directly into the domestic water supply or indirectly through a reservoir or groundwater basin. Non-potable reuse involves using recycled water for irrigation, agriculture, or industry. Typically, treated wastewater is discharged into rivers and streams as part of permitted disposal practices. Discharged water then comingles with the stream or river that may be a water source for downstream communities or agricultural users. Treated wastewater discharged into streams or shallow groundwater in the region become part of the streamflow. Or, as a consequence of increasing direct municipal recycled water use, the volume of treated water discharged into streams may be reduced, potentially reducing instream flows, including beneficial uses. Recognizing this, the CWC requires that prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater, the State Water Resources Control Board (SWRCB) reviews proposed changes to ensure potential impacts on beneficial uses are considered.

Making municipal recycled water available for irrigation and other agricultural uses would be a substantial benefit in the watershed. In the face of reduced snowpack and precipitation as a result of climate change, recycled water can reduce pressure on other surface and groundwater resources to meet demand. The Municipal Services Workgroup identified five recommendations to promote the use of municipal recycled water in the region, including funding, public outreach, and feasibility studies (**Table 9.1**).

9.2.4.4. Surface Storage – Local/Regional

Surface storage is the term for the use of human-made, aboveground reservoirs to collect water for later release when needed. Many California water agencies rely on surface storage as a part of their water distribution systems. Reservoirs also play an important role in flood control and hydroelectric power generation throughout California.

In addition, surface storage is often necessary to implement, or to maximize the benefits from, other water management strategies such as water transfers, conjunctive management of surface and groundwater, and conveyance improvements. There are two general categories of surface storage reservoirs: 1) those formed by damming an active, natural river; and 2) offstream reservoirs, which require a human-made diversion or pumping of water from a river into storage.

A significant amount of the larger local and regional surface storage in the region is by agencies managing water for uses downstream of Lake Oroville (Department of Water Resources/DWR) or for hydroelectric power generation (PG&E). Surface storage for local uses is generally in small impoundments (see **Table 4.10** for a list of dams in the Plan area); exceptions are DWRs' Antelope

Reservoir, which is managed for recreation, agricultural irrigation and instream flows, and Lake Davis, which contains Plumas County's State Water Project (Table A) water for domestic recreational and environmental uses. Increasing surface storage capacity in the region could benefit local users as well as increase flexibility to respond to climate-induced changes in timing of water availability and reduced watershed retention.

The Floodplains, Meadows, and Waterbodies Workgroup identified four recommendations to increase surface storage in the Plan area, including increasing capacity of existing facilities and timing water releases for agricultural and environmental uses, restoring meadows, wetlands, and riparian areas, and methods, studies, and tools for analyzing costs and benefits of future projects (**Table 9.1**).

9.2.5. Improve Water Quality

Protecting and improving water quality is a major priority of water management in California. Along with providing sufficient supply of water for all beneficial uses, water management agencies must ensure that the supplied water is of adequate quality to provide those beneficial uses. Drinking water and environmental uses require high-quality water, as do some industrial uses, while agriculture and other uses may be met by water that is not of sufficient quality for drinking. Preventing pollution and the accumulation of salts in the water supply, along with matching water quality to use are important tools for ensuring that the water supply meets the needs of all beneficial uses that rely on it. Addressing the following resource management strategies to improve water quality can help the Upper Feather River watershed adapt to anticipated impacts from climate change, including wildfires, increased temperatures, and changes in precipitation.

9.2.5.1. Drinking Water Treatment/Distribution

Drinking water regulations mandated by the California Safe Drinking Water and Toxic Enforcement Act apply to all public water systems, regardless of ownership. The U.S. Environmental Protection Agency (EPA) is responsible for ensuring implementation of the federal Safe Drinking Water Act and related regulations. The state has primacy for the public water system regulatory program in California and works closely with the EPA to implement the program. In addition, local agencies such as county environmental health departments are responsible for regulating small public water systems (typically those serving fewer than 200 homes) in most counties. The EPA directly provides regulatory oversight for tribal water systems.

Common surface water treatment facilities include basic chlorine disinfection; sedimentation basins; filtration; and more recent technical advances, such as membrane filtration, ultraviolet light, and ozonation to meet pathogen removal and/or inactivation as well as disinfection requirements while reducing the formation of disinfection byproducts. Common facilities for groundwater sources that require treatment are chemical removal and/or blending facilities.

Issues of water quality in the watershed include aging and inadequate storage and distribution systems that are prone to leakage and backflow, outmoded treatment facilities, and high levels of arsenic in some water sources, which may be made worse as the frequency and severity of catastrophic wildfires increase in the region due to climate change. The Municipal Services Workgroup identified five recommendations for improving drinking water quality in the region, including funding to improve and

repair aging infrastructure, upgrading and modernizing treatment facilities, and developing incentives to promote reduction of waste (**Table 9.1**).

9.2.5.2. Groundwater/Aquifer Remediation

Contaminants in groundwater can come from many sources, naturally occurring and anthropogenic. Examples of naturally occurring contaminants include heavy metals and radioactive constituents, as well as high concentrations of various salts from specific geologic formations or conditions. In addition, groundwater can be contaminated by anthropogenic sources with organic, inorganic, and radioactive constituents from point and nonpoint sources. These anthropogenic sources include industrial sites, mining operations, leaking fuel tanks and pipelines, landfills, impoundments, septic systems, and urban and agricultural activities. The contaminant having the most widespread and adverse impact on drinking water wells is arsenic, followed by nitrates, naturally occurring radioactivity, industrial and commercial solvents, and pesticides. Groundwater in some of the region is naturally high in arsenic.

Groundwater remediation removes contaminants that affect beneficial use of groundwater, by passive or active methods. Passive groundwater remediation allows contaminants to degrade biologically or chemically or disperse in the aquifer (in situ) over time. Active groundwater remediation involves either treating contaminated groundwater in situ or extracting contaminated groundwater from the aquifer and treating it outside of the aquifer (ex situ). Active in situ methods generally involve injecting chemicals into the contaminant plume. Ex situ methods for treating contaminated groundwater can involve physical, chemical, and/or biological processes. Remediating contaminated groundwater sources in the region may increase available water for human and environmental use, and create additional space for water transfers and storage. As climate change may reduce availability of existing water supply, additional supply from remediated groundwater could help buoy the water system to meet demand.

The Municipal Services Workgroup identified four recommendations to enhance groundwater remediation in the Plan area: protecting source waters, funding for monitoring and wellhead treatment, and in situ and ex situ treatment programs.

9.2.5.3. Matching Water Quality to Use

Matching water quality to use is a management strategy that recognizes that not all water uses require the same water quality. One common measure of water quality is its suitability for an intended use; a water quality constituent often is only considered a contaminant when that constituent adversely affects the intended use of the water. For example, high-quality water can be used for drinking and industrial purposes, and lower-quality water can be adequate for other uses. Some new water supplies, such as recycled water, can be treated for a wide range of purities that can be matched to different uses. The use of other water sources, such as recycled water, can serve as a new source of water that substitutes for uses not requiring potable water quality. Instream uses are directly influenced by discharge from wastewater treatment and stormwater flows; these source discharges can provide benefits and challenges to uses such as aquatic life and recreation and downstream users.

Human uses are categorized as consumptive (e.g., municipal, agricultural, and industrial supplies) and non-consumptive (e.g., navigation, hydropower generation, and recreation). Instream uses also include aquatic ecosystem uses, fish migration, spawning, and preservation of rare, threatened, and endangered

species. Matching water quality to most of these uses is important because water is generally used as is (i.e., without treatment) with the exception of domestic and industrial uses.

Strategies for matching water quality to use include blending of water from different sources, water exchanges among entities that need water of different quality, and tailoring treatment of recycled water to the intended use. Most of these strategies are of limited applicability in the region, as there is little potential for water exchanges or blending among sources of different quality because most water in the Plan area originates in the Plan area. Recycling municipal water for irrigation use, and sustaining instream environmental and other surface water needs through groundwater recharge, are two areas of potential benefit for water management in the region.

9.2.5.4. Pollution Prevention

Pollution prevention is defined as reducing or eliminating waste at the source by modifying production processes, promoting the use of non-toxic or less toxic substances, implementation of practices or conservation techniques that reduce the generation and/or discharge of pollutants, and the application of innovative and alternative technologies which prevent pollutants from entering the environment prior to treatment. Sources of water pollution are categorized into two types: point source and nonpoint source (NPS). In California, point-source pollution prevention is addressed through Water Code Section 13263.3(d)(1), which authorizes the SWRCB, a Regional Water Quality Control Board (RWQCB), or a publicly owned treatment works to require a discharger to prepare and implement a pollution prevention plan. A point-source discharger is defined per Water Code Section 13263.3(c) as any entity required to obtain a National Pollutant Discharge Elimination System (NPDES) permit or any entity subject to the federal pretreatment program. A nonpoint discharger is any discharger not covered by a NPDES permit. Pollution prevention can contribute to the protection of water quality for beneficial uses by protecting water at its source and therefore reducing the need and cost for other water management and treatment options. By preventing pollution, water supplies can be used and reused by a greater number and variety of water users. Sources of pollution in the watershed include abandoned mine sites; agricultural runoff; livestock; watercraft; aging or inadequate septic fields; runoff from roads; and residential pollution such as pesticide and fertilizer use, and oils from vehicle.

The impacts of climate change identified in the vulnerability assessment include decreased precipitation and stream flows, increased temperatures, and increased risk of wildfire. All of these impacts can stress the watershed by increasing in-stream temperatures, decreasing summertime flows, and worsening sedimentation as a result of increased wildfires. In the face of these additional challenges anticipated in future years, preventing pollution where possible is especially important. Doing so can reduce compounding stress on ecosystems and help build resilience across the watershed.

The Agricultural Lands Stewardship Workgroup identified eight recommendations to improve pollution prevention efforts in the region, including protection of source waters, livestock fencing of riparian areas, sealing of abandoned wells, sediment control, invasive species control, and management and monitoring of contaminants that lead to listing of streams as impaired under Section 303(d) of the Clean Water Act (**Table 9.1**). The Floodplains, Meadows, and Waterbodies Workgroup identified nine recommendations to improve pollution prevention in the Plan area, including reforming land and water management practices, restoring and protecting riparian areas, identifying and monitoring abandoned

mines, controlling invasive aquatic species, and monitoring marinas and recreational facilities for impacts to water quality (**Table 9.1**).

9.2.5.5. Salt and Salinity Management

Salt and salinity management is the control of salts (including dissolved minerals such as lime, gypsum, and other slowly dissolved soil minerals) and salinity. Human causes of salinity include use of home water softeners, concentration of salts from treated water processes, and the use of fertilizers or soil amendments. The most common ions found in water are calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, and nitrate. Salt is present to some degree in all natural water supplies because soluble salts in rocks and soil begin to dissolve as soon as water reaches them.

Salinity management not only reduces salt loads that affect a region, it is also a key component of securing, maintaining, and recovering usable water supplies. Salt is ubiquitous throughout the environment and it is a conservative constituent – meaning it is never destroyed, only concentrated or diluted and transported. Since salts are ubiquitous, any water use and reuse increases salinity as each use subjects the water to evaporation. If reused water passes through soil, additional dissolved salts will be picked up. The continued concentration of salt is a major element of any recycled water project. Salts may accumulate in water conveyance and treatment facilities and must be removed at substantial cost to the operator.

Salt management involves source control, treatment, and dilution. Source control means limiting the initial concentration of salts through minimizing artificial inputs such as agricultural chemicals or using naturally less saline source water. Treatment refers to mechanical removal of salts with membrane filters or distillation, and is expensive, energy-intensive, and produces highly concentrated end products that must be stored or transported. Dilution is mixing low-salinity water with saline water to reduce the total concentration of salts. Real-time salinity management employs a form of dilution, timing the release of saline waters into a river with periods of high natural flow in order to keep salinity levels below thresholds for beneficial uses downstream. Salinity management issues are more prominent in coastal or arid regions, and in agricultural areas such as the Central Valley, than in upper watershed regions such as the Upper Feather River watershed; however, soils in Sierra Valley are considered highly saline due to high electrical conductivity[4].

The local benefits of sustainable salinity management include restoring and maintaining beneficial uses of water within the basin, securing and improving the reliability of the water supply, and enhancing local economic stability by providing reliable drinking water sources and water quality that supports local industries. The Municipal Services Workgroup identified two recommendations for salinity management in the region, including treatment and real-time salinity management (**Table 9.1**).

9.2.5.6. Urban Stormwater Runoff Management

Urban stormwater runoff management describes a broad range of activities to manage both stormwater and dry-weather runoff. Dry-weather runoff occurs when water flows to the storm drain because of

[4] Department of Water Resources, 2013. *California Water Plan Update 2013, Table 19-3.* Available at: http://www.waterplan.water.ca.gov/docs/cwpu2013/Final/Vol3_Ch19_SaltSalinity-Mgmt.pdf.

activities such as excessive landscape irrigation, car washing, and other urban outdoor water uses. Urbanization alters flow pathways, water storage, pollutant levels, rates of evaporation, groundwater recharge, surface runoff, the timing and extent of flooding, the sediment yield of rivers, and the suitability and viability of aquatic habitats.

Urbanization creates impervious surfaces that collect pollutants that are washed off to surface waters during rain events. The impervious surfaces also increase runoff volumes and velocities, resulting in streambank erosion, and potential flooding downstream. Because of the emphasis on removing the water quickly, the opportunity to use storm-generated runoff for multiple benefits is reduced. Traditionally, urban stormwater runoff management was viewed as a response to flood control concerns resulting from the effects of urbanization; however, concerns about the water quality impacts of urban runoff have led water agencies to look at watershed approaches to control runoff and provide other benefits. As a result, urban stormwater runoff management is now linked to other resource management strategies.

A watershed approach for urban stormwater runoff management seeks to emulate and preserve the natural hydrologic cycle that is altered by urbanization. The watershed approach consists of best management practices (BMPs) designed to reduce the pollutant loading and reduce the volumes and velocities of urban runoff discharged to surface waters. Common BMPs include facilities to capture, treat, and recharge groundwater with urban runoff; public education campaigns to inform the public about stormwater pollution, including the proper use and disposal of household chemicals; and technical assistance and stormwater pollution prevention training. There are no stormwater management plans in the region.

The primary benefits of urban stormwater runoff management are to reduce surface water pollution and improve flood protection. Additional benefits include increasing water supply through groundwater recharge and reduced pollution. Groundwater recharge and stormwater retention sites can also be designed to provide additional benefits to wildlife habitat, parks, and open space. The general absence of urbanization in the Plan area reduces the potential for urban stormwater runoff issues; however, localized effects on water quality can still result from runoff. Although the scale of urban stormwater may be limited in the Plan area, low precipitation as a result of climate change may amplify pollutant buildup, creating an imperative to develop BMPs for pollutant load reduction.

The Municipal Services Workgroup identified five recommendations to improve urban stormwater runoff management in the region, including education and public outreach, coordination among stakeholders in stormwater management policies, and providing incentives for low-impact design features on new development and retrofitting of existing development (**Table 9.1**).

9.2.6. Practice Resource Stewardship

Integrated and sustainable water management must take into account the fact that water resources originate in upland areas. Uplands are the vast majority of the catchment area for precipitation, and nearly all surface water has passed over, under, or through upland soils before reaching a stream, wetland, or waterbody. The health of forested uplands, agricultural lands, meadows, floodplains, and groundwater recharge areas is essential to maintaining the quality and reliability of surface and groundwater supplies. In addition, all life depends on water, and a healthy natural environment

contributes to human well-being through the providing of ecosystem services such as crop pollination, waste decomposition, carbon sequestration, air and water purification, and recreation. Appropriate stewardship of all the lands and resources in a watershed is integral to the management of water resources.

9.2.6.1. Agricultural Land Stewardship

Agricultural land stewardship refers to private farm and ranch landowners producing public environmental benefits (conservation of natural resources and protection of the environment) in conjunction with the food and fiber they have historically provided. Land managers practice agricultural land stewardship by conserving and improving land for food, fiber, biofuel production, watershed functions, and soil, air, energy, plants, animals, and other conservation purposes. Agricultural land stewardship also protects open space and the traditional characteristics of rural communities. Agricultural land stewardship practices can protect the health of environmentally sensitive land, recharge groundwater, improve water quality, provide water for wetland protection and restoration, reduce costs of flood management, and aid riparian restoration and management projects. Land can also be managed to improve water management, stormwater runoff control, water storage, conveyance, and groundwater recharge. Such stewardship practices are particularly advantageous as they do not rely on construction of major facilities and provide a range of environmental co-benefits.

The Agricultural Lands Stewardship Workgroup identified 17 recommendations to promote agricultural land stewardship in the region, including improved funding, education, and outreach for promoting stewardship practices implementation, infrastructure development, program monitoring, information sharing, agency planning, conservation easements, stream restoration, water storage, vegetation management, carbon sequestration, and enhancing local appreciation for the importance of agricultural working landscapes (**Table 9.1**)

9.2.6.2. Ecosystem Restoration

Ecosystem restoration describes the improvement of modified natural landscapes and biological communities to provide for their sustainability and for their use and enjoyment by current and future generations. It is anticipated that increased temperatures and other climate change impacts will degrade ecosystem health. Restoration for past ailments and projected problems will strengthen the ecosystem and help species adapt to climate change impacts.

Few, if any, modified ecosystems can be fully restored to their pre-development condition. Instead, efforts focus on rehabilitation of important elements of ecosystem structure and function. Successful restoration increases the diversity of native species and biological communities and the abundance of habitats and connections between them. This can include reproducing natural flows in streams and rivers, curtailing the discharge of waste and toxic contaminants into water bodies, controlling non-native invasive plant and animal species, removing barriers to fish migration in rivers and streams, and recovering wetlands so that they can store floodwater, recharge aquifers, filter pollutants, and provide habitat.

Rivers and their associated floodplain ecosystems provide numerous benefits that can be thought of as goods and services. These include water purification, groundwater recharge, erosion control, storage of floodwaters, hydropower generation, soil-building, pollination, wood products, carbon sequestration,

fisheries, wildlife, and recreation. The most significant ecosystem restoration issues in the region are restoration of healthy forest stands and degraded meadows. Other issues include sedimentation in streams, invasive species, and loss of fisheries habitat and fish populations. The modification of the region's rivers by dams is a significant change to natural systems.

The Floodplains, Meadows, and Waterbodies Workgroup identified ten recommendations to promote ecosystem restoration in the watershed, including protecting streams and source waters from pollution; restoring natural stream flows and hydroperiods; restoring natural sediment transport regimes; removing barriers to the movement of fish and other aquatic organisms; establishing biological reserves and ensuring connectivity among habitat patches; and controlling invasive species (**Table 9.1**). The Uplands and Forests Workgroup identified 13 recommendations for promoting ecosystem restoration in the Plan area, including restoring and connecting habitats, protecting against catastrophic wildfire, restoring healthy forest stand densities, controlling invasive species, restoring and protecting source surface and groundwater (**Table 9.1**).

9.2.6.3. Forest Management

Forest management is the application of forestry principles, practices, and business techniques to the management of forested lands to achieve the owner's objectives. Different forest landowners have different goals and objectives and different strategies to accomplish them; however, the water produced by these forests has economic value that equals or exceeds that of any other forest resource. Forest management activities can affect water quantity and quality. For purposes of water management, this strategy focuses on forest management activities on both public- and privately-owned forest lands for the conservation of forest ecology and productivity, including favorable flows of water that originate from forestlands.

The vast majority of forested lands in the region are managed by the U.S. Forest Service, mostly in Plumas National Forest, but also including parts of Tahoe and Lassen National Forests. National Forests were established under the Organic Act of 1897, which specifically states that a primary purpose of these lands is to "secure favorable conditions of water flow." Direct management of these forested lands is the responsibility of the USFS, and implementation of resource management strategies under this Plan will depend on the management plans of that agency. Forest management issues in the watershed that affect water supply and quality include increased sedimentation caused by erosion from poorly maintained roads and areas burned by fires; reduced water retention caused by either loss of canopy from catastrophic fire or from unnaturally high stand densities due to fire suppression and lack of biomass utilization facilities ; conversion of forest to brush following fires; and pollution from abandoned mine sites and other past land uses on public lands now managed by the USFS. Private forest owners include W. M. Beaty and Associates, Soper-Wheeler Company, Collins Pine Company, and Sierra Pacific Industries.

Rising temperatures and longer dry seasons, both of which are expected in the Upper Feather River (UFR) watershed because of climate change, increase the risk of wildfire. Rising temperatures and earlier snowmelt are shown to increase the frequency, size, and severity of wildfires, trends that align with wildfire activity in the Sierra Nevada since the early 1980s. In addition to the increased risk of wildfires from higher temperatures and ongoing drought, increasing fuel supply exacerbates the risk. As rains replace winter snows due to rising temperatures, plant growth is expected to accelerate, increasing

moisture competition and stress in living trees and increasing dead and ladder fuel flammability for wildfires. Catastrophic wildfire removes vegetative cover and reduces the stability of soils, increasing erosion rates and runoff for months to decades. If a heavy rain event occurs after a fire, soil, ash, and sediment can flow into surface waters in the UFR watershed, degrading water quality. Climate projections estimate that when precipitation does occur, it will be in the form of heavy rains, increasing the volume of water to carry sediment over burned areas into streams and waterbodies. Managing forests through strategic fuel reduction and forest management can help protect the watershed's ecosystem and promote high water quality.

The Uplands and Forests Workgroup identified three recommendations for forest management in the Plan area: 1) integrated research and implementation projects to assess the effects of a wide range of forest management practices and watershed trends in the region, 2) monitoring, modeling, and studies to assess the effects of climate change, and 3) study the effect of increasing forest densification for forest health and surface water and groundwater conditions. (**Table 9.1**). The Tribal Advisory Committee (TAC) identified four recommendations for forest management in the region, including restoring natural fire regimes, and employing traditional ecological knowledge (TEK) in collaborative studies and projects to restore water quality and control the spread of invasive species (**Table 9.1**).

9.2.6.4. Land Use Planning Management

Land use planning is the orderly and planned use of land, resources, facilities and services with a view to securing the physical, economic and social sustainability, health, and well-being of urban and rural communities. Stronger collaboration between land use planners and water managers can promote more sustainable and efficient land-use patterns and integrated regional water management practices, which can produce safer and more resilient communities. Integrating land use and water management consists of planning for the housing and economic development needs of a growing population, while providing for the efficient use of water, water quality, energy, and other resources. Land use decisions can also help reduce greenhouse gas (GHG) emissions, which contribute to climate change, by encouraging alternative modes of transportation (such as walking and biking) and green building (which reduces a home or building's energy use). Land Use Planning and Management RMS emphasize strategies to promote compact and sustainable urban and rural development.

While the region is projected to experience a slight decline in population through 2030, the on-going shift in the regional economic base toward tourism, seasonal residents, services, and health care will still drive new development (see **Chapter 4.3** for a discussion of demographic and economic trends in the Plan area). All four workgroups identified recommendations for land use planning, including planning for compact and sustainable development; directing development away from wetlands, meadows, and recharge areas; improved communication among land use planners, water managers, and agencies; and agriculture-supportive goals and strategies in county land use plans (**Table 9.1**).

9.2.6.5. Recharge Area Protection

Recharge areas are those areas that provide the primary means of replenishing groundwater. Good natural recharge areas are those where high-quality surface water is able to percolate through the sediments and rocks to the saturated zone that contains groundwater. If recharge areas cease to function properly, there may not be sufficient groundwater for storage or use. Protection of recharge areas is necessary to maintain the quantity and quality of groundwater in the aquifer; however,

protecting recharge areas by itself does not provide a supply of water. Recharge areas are functioning properly when aquifer storage capacity is available, sufficient permeable surface is present, and an adequate supply of high-quality water to recharge the aquifer is available.

Because of its location in the upper watershed, adequate supply of high-quality surface water is generally not an issue in most of the region. Rather, the principal issues of groundwater recharge in the watershed are reduced infiltration and retention of surface water in forested uplands, loss of wetland functions in meadows, and the shift in precipitation from snow to rain. The Floodplains, Meadows, and Waterbodies Workgroup identified several recommendations for recharge area protection in the region, including identifying actual and potential recharge areas, protecting and restoring meadows (**Table 9.1**).

9.2.6.6. Sediment Management

Sediment management refers to the management of fine solid fragmented material such as silt, sand, and clay, which is suspended in or settled on the bottom of a water body. Like water, sediment is a valuable resource and is vital to the functioning of beaches, wetlands, spawning beds, and riparian habitat. Sediment deposited by floodwaters is also a source of fertile agricultural soils. However, excessive sediment can lead to clouded water, degraded wildlife habitat, barriers to navigation, and decreased storage capacity in reservoirs, among other things.

Source management is preventing soil loss and adverse sediment flows from land use activities that may, without proper management, cause erosion and excessive sediment movement. Routine source management activities prevent or mitigate excessive sediment introduced into waterways due to recreational use, roads and trails, grazing, farming, forestry, and construction. Erosion of uplands caused by roads and fires, along with erosion and incision of stream channels in meadows, causes excess sedimentation in streams and reservoirs in the watershed. The impacts of climate change may also create need for increased sediment management, as more intense, severe storms may lead to increased erosion and turbidity in surface waters.

The Agricultural Lands Stewardship Workgroup identified six recommendations to improve sediment management in the region, including education and outreach, evaluation and management of sediment sources such as roads and burned areas, evaluation of agricultural water delivery infrastructure for sediment management needs, and re-use of sediment removed during mitigation for beneficial uses such as wetland restoration and agriculture (**Table 9.1**). The Uplands and Forests Workgroup identified four recommendations to improve sediment management in the region, focused on coordination of state and federal agency regulations and practices and on post fire recovery. (**Table 9.1**).

9.2.6.7. Watershed Management

Watershed management is the process of creating and implementing plans, programs, projects, and activities to restore, sustain, and enhance watershed functions. These functions provide the goods, services, and values desired by the human community that are affected by conditions within a watershed. A primary objective of watershed management is to increase and sustain a watershed's ability to provide for the diverse needs of the communities that depend on it including local, regional, state, federal, and tribal stakeholders. Watershed management initiatives should work to blend community goals and interests with the broader goals of the state as a whole in a manner consistent with improving environmental, social, institutional, and economic conditions within the watershed. The

need to incorporate environmental justice and social equity should also be recognized and addressed, along with more traditional project management approaches.

The Floodplains, Meadows, and Waterbodies Workgroup identified 16 recommendations to promote watershed management in the region, including improving the scientific basis of projects and of monitoring programs that track changes and disseminate information to stakeholders, preserving and restoring habitats, species, and soils, and improving coordination and information sharing among stakeholders (**Table 9.1**). The Uplands and Forests Workgroup identified ten recommendations to promote watershed management in the region including integrating traditional ecological knowledge into monitoring and project assessment, improving interagency cooperation, involving federal agencies as partners in grant programs, allowing federal funds and in-kind services to be used as matching funds, and developing science-based projects to accomplish a wide range of ecosystem restoration (**Table 9.1**).

9.2.7. People and Water

Water management is a human activity, undertaken because people have an unbreakable relationship to, and dependence on, water. Essentially all water management infrastructure exists to provide water to people for out of stream uses. In-stream environmental water uses affect people through human cultural, spiritual, economic, and aesthetic relationships to water and the natural systems it supports. Encouraging conservation, efficient use, and protection of water resources among the public can have positive effects on all other aspects of water management. Recognizing the need to incorporate the relationships between people and water is important to effective and sustainable water management.

9.2.7.1. Economic Incentives

Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Economic incentives can influence the amount and timing of water use, the source of supply, and the volume of wastewater produced. State grant programs help fund planning and infrastructure projects designed to enhance water use efficiency, as well as subsidies for services to disadvantaged communities. Most urban water suppliers in California are moving toward tiered rate structures in which the unit water charge increases as water use increases. Policies that facilitate water transfers and water banking among agencies increase resiliency to drought and improve efficiency. Economic incentives to support sustainable water management can help protect water supplies that will become increasingly vulnerable because of climate change impacts. Additionally, reductions in water lead to reductions in energy use that would have previously been needed to process the water, thereby reducing greenhouse gas emissions.

The Municipal Services Workgroup identified three recommendations for utilizing economic incentives in the region: regular review and adjustment of water rates and using tiered rate structures, and adopting policies that promote long-term water use efficiency (**Table 9.1**). The Uplands and Forests Workgroup identified four recommendations for utilizing economic incentives in the region: reducing barriers and liabilities to managed burning, developing programs that support biomass utilization, groundwater recharge, and fire reduction, integrating traditional ecological knowledge into program implementation, and improving capacity of local stakeholders to carry out RMS implementation (**Table 9.1**).

9.2.7.2. Outreach and Engagement

Outreach and engagement describe the use of public communication tools and practices by water agencies to encourage public groups and individuals to contribute to positive water management outcomes. Public outreach and engagement produce two broad types of benefits: instrumental, outcome-oriented benefits (such as designing a program that satisfies multiple criteria) and intrinsic, process-oriented benefits (such as building trust between participants). Public involvement leads to instrumental outcomes in two ways. First, public involvement results in a citizenry that is more understanding and appreciative of the issue, and thus one that makes informed decisions. Second, public involvement assists agencies in making better decisions as a direct result of including public knowledge. In addition to instrumental outcomes, public involvement provides many intrinsic benefits, such as enhanced community capital. Outreach and engagement that incorporates lessons about the impacts of climate change can help create a more prepared community and encourage residents to engage and support activities that reduce GHG. Outreach and engagement efforts range from informing and educating to empowering, and the tools used mirror the goals of engagement.

The Agricultural Lands Stewardship Workgroup identified eight recommendations to improve public outreach and engagement for water management in the region that include using varied media for outreach and engagement; making data and agency contact information available to the public; using project-specific education and outreach as well as established programs; and training managers and board members of local agencies and organizations how to engage the public (**Table 9.1**). The Uplands and Forests Workgroup identified three recommendations to improve public outreach and engagement for water management in the region: incorporating outreach and education into project implementation, expanding existing education programs, and working with adjacent and downstream landowners to improve understanding of benefits that result from large scale and coordinated watershed projects (**Table 9.1**).

9.2.7.3. Water and Culture

Incorporating culture into water management increases awareness of how cultural values, uses, and practices are affected by water management, and how they affect water management. Water and water-dependent resources shape individual and collective experiences that contribute to individual and community well-being, sense of identity, and connection with the natural world. These experiences are inextricably linked to values, traditions, and lifestyles, which in turn inform perspectives and expectations regarding water resources and conditions. Understanding these connections, and how these relationships may change because of climate change, can help communities prepare for impacts and protect or adapt cultural values. Cultural considerations by their nature are inherently linked to every resource management strategy. Expression of cultural connections to water and water-dependent resources can involve a wide range of activities and material objects.

The Tribal Advisory Committee identified two recommendations for incorporating cultural considerations into water management in the region: recognizing as beneficial uses those that support the cultural, spiritual and traditional lifeways of California Indian Tribes, Tribal communities and families, and integrating and applying TEK in collaboration with Tribes, Tribal organizations, and cultural traditional ecological practitioners (**Table 9.1**).

9.2.7.4. Water-dependent Recreation

Water-dependent recreation describes recreation activities in or on water, including fishing, swimming, skiing and snowboarding, waterfowl hunting, motor boating, wind surfing, kayaking, and passive recreation activities that can be enhanced by water, such as wildlife viewing (including birding), picnicking, biking, relaxing on the beach, camping, and hiking. The right of public access to navigable waterways, lakes, and beaches is protected by a variety of federal, state, and regional laws. Agencies such as the Federal Energy Regulatory Commission and the State Water Project are required by law to consider recreation in their decisions and projects. As resource extraction industries decline, the economy of the region is trending more heavily toward tourism and recreation, most of which is water-oriented. As winter snows and summer runoff are expected to diminish as climate change worsens, recreation that depends on healthy streams (such as birding and fishing) or high water levels (such as boating and swimming) is increasingly at risk. This has potential for impacts in the tourism and recreation sectors of the regional economy.

The Floodplains, Meadows and Waterbodies Workgroup identified 11 recommendations for water-based recreation in the watershed, including identifying recreational and educational opportunities in the region; reducing impacts from water recreation; restoring water quality, fish populations, and riparian systems in the region; and educating residents and businesses in the watershed about their role in protecting water quality and recreational opportunities (**Table 9.1**).

9.2.8. Other Strategies

Other strategies are management strategies that can potentially generate benefits that meet one or more water management objective(s), but have limited capacity to strategically address long-term regional water planning needs. These are unique or uncertain strategies that do not fit into the framework of the RMSs discussed previously. Some have only local or specific application, and others rely on unpredictable conditions.

9.2.8.1. Miscellaneous

The Agricultural Lands Stewardship Workgroup identified three strategies not included in other RMSs that would further the goals and objectives of the IRWM Plan:

1. Windbreaks and snow fences: Snow fences slow the velocity of wind, which cause the deposition of snow downwind of the fence. Snow fences do not increase the total amount of snow that falls, but they concentrate snowfall in small local areas (1.25 acres or less), creating deeper snow pack in some places and shallower or no snow pack in others. Deeper snow pack melts more slowly, which extends the release of winter precipitation farther into the summer dry season.
2. Reestablish historic wetlands: Where possible, wetlands that have been converted to other uses or lost to stream erosion could be restored to increase water retention, improve water quality, and enhance wildlife habitat.
3. Rainfed agriculture: Rainfall in real time provides all crop consumptive water use directly. Owing to the unpredictability of rainfall frequency, duration, and amount, there is significant uncertainty and risk in relying solely on rainfed agriculture. This is especially true in California, where there is little or no precipitation during most of the spring and summer growing season. Rainfed agriculture is successful in parts of California where winter wheat is cultivated without

irrigation, producing extra crop yield that can replace a portion of summer yield lost to reduced irrigation. The cold winters and low precipitation of agricultural areas in the region make rainfed agriculture an uncertain strategy, but one that still merits study.

The Uplands and Forests Workgroup identified nine strategies for forest and fuels management not included in other RMSs:

1. Reduce risk of wildfire through strategically located fire breaks for ridgeline lightning, roadway, and railroad ignitions,
2. Forest and fuels management for protection of critical habitats.
3. Snow zone fuels and fire management.
4. Wildfire liability reduction.
5. Wildland-Urban Interface (WUI) fuels management.
6. Traditional Ecological Knowledge (TEK) to reintroduce historic fire regimes.
7. Community recharge area management to protect domestic and agricultural wells from catastrophic wildfire and from reduced groundwater infiltration or excessive siltation.
8. All-scale biomass utilization including community and tribal biomass projects.
9. Landscape-scale forest and fuels management that includes multiple (#1-#8) fire and fuels management strategies.

9.2.8.2. Wastewater/NPDES

The Municipal Services Workgroup added the wastewater and NPDES permitting management strategy and identified five recommendations to improve wastewater management facilities and administrative/operator capacity in the region:

1. Water and wastewater treatment as a resource management strategy potentially includes integration of agricultural and domestic wastewater into the water supply equation. Water/wastewater treatment has been a significant issue for several decades.
    - Regional facilities to treat wastewater to a level necessary for recycled or potable use.
    - Water/wastewater treatment as a supply option through groundwater recharge and/or other means.
2. Aging wastewater infrastructure and the need for upgrades to meet new and revised state standards. This strategy will also be important when considering water-recycling opportunities. Actions might include:
    - Facility upgrades.
    - Assessment of private sewage treatment for safety next to wells in areas of semi-dense development (one-acre plots).
    - Development of strategies for wastewater treatment to ensure the maintenance of receiving water quality.
3. Infrastructure reliability: recognizes the importance of maintaining and upgrading infrastructure for water supply, treatment, and distribution; wastewater collection, treatment, and disposal; and recycled water treatment and distribution. Infrastructure improvements are continually needed as facilities age, demands on their use increase (due to population growth, degraded water quality, or increased water quality standards), and new technologies are introduced.
4. Provide training in wastewater collection, treatment, and disposal that will increase the certified operational pool in the region (succession planning).
5. Increase public outreach activities to promote the water and wastewater fields as career paths.

9.3. Strategies Considered but not Applicable to the Upper Feather River Region

The following RMSs from the *California Water Plan Update 2013* were considered but not included in the UFR IRWM Plan because they are not applicable to the Upper Feather River region.

9.3.1.1. Conveyance – Delta

The State of California is developing a large-scale plan for conveyance of water through the Sacramento-San Joaquin Delta, which is the confluence point of the Sacramento and San Joaquin Rivers that drains to the Pacific Ocean. The purpose of the state plan is to promote coequal goals of protecting the Delta ecosystem and maintaining a stable supply of water for California. While the Upper Feather River region is a major contributor of water to the State Water Project, water from the Plan area reaches the Delta through the Lower Feather River and Sacramento River, which are outside the IRWM region.

9.3.1.2. Desalination

Desalination involves removal of salts from brackish and saline water through various technologies. The UFR region does not include any coastal or other saline waters.

9.3.1.3. Surface Storage – CALFED/State

CALFED is a joint federal-state effort created to coordinate activities in the Sacramento-San Joaquin Delta. The state and federal governments have funded investigations into five sites for surface storage that would meet the goals of water supply reliability, water quality, and ecosystem restoration. None of these five sites is in the UFR region.

9.4. Strategy Recommendations

9.4.1. Process

In April 2015, the RWMG reviewed and discussed the RMS, removing those not relevant to the region and requesting that workgroups select RMSs for which they would be responsible. In May, the RWMG assigned the remaining applicable RMSs to workgroups to ensure each applicable RMS was addressed. Additionally, in May 2015, Tribal representatives volunteered to develop recommendations for several of the RMSs, primarily those related to water and culture.

Each of the workgroups used a collaborative process to develop recommendations for their assigned RMS, considering the strategy recommendations identified in the *California Water Plan 2013 Update* and those identified by other IRWM regions. The RMS recommendations were thoroughly reviewed and vetted by workgroup participants and presented to the RWMG at public meetings in November 2015 and January 2016.

9.4.2. Matrix of Recommendations

Table 9.1 provides a matrix of the recommendations each Workgroup identified for the 27 Standard RMSs applicable to the UFR region. These strategy recommendations are tailored to the specific goals and objectives of the IRWM Plan (see Appendix XX for identified linkages between RMS

recommendations and Plan objectives). A blue dot indicates that the Workgroup strategy recommendation is supportive of climate change adaptation or GHG efforts.

Table 9-1. Summary of Workgroup Recommendations for Resource Management Strategies

#	RMS	Workgroup of Origin	Workgroup Strategy Recommendations
Objective: Reduce Water Demand			
1	Agricultural Water Use Efficiency	Agricultural Land Stewardship	Education, Data and other Technical Assistance: 1. Explore and identify techniques to improve overall agricultural water use efficiency. *2.* Expand water efficiency information, evaluation programs and on-site technical assistance reaching water suppliers, farmers and ranchers, through academic institutions, including agricultural extension services, Resource Conservation Districts (RCD), independent crop advisors, and other agricultural outreach efforts. 3. Agricultural, water and environmental stakeholders develop community educational and motivational strategies for conservation activities to foster water use efficiency. 4. RCDs and groundwater districts in agricultural areas collect--and UC Cooperative Extension and Plumas-Sierra Agriculture Departments document--promising practices and plans for droughts and other water shortages. 5. Develop sources of real-time data to provide irrigators and water managers with better information with which to make water management/irrigation decisions, such as: a. Local meteorological/weather data b. Soil moisture data (meters) c. Water application/use monitoring d. Surface water depth and flow data e. Surface to groundwater depth f. Groundwater modeling 6. Develop methods to quantify and communicate water savings and costs associated with hardware upgrades, water management, and evapotranspiration reduction projects. 7. Develop consistent, watershed-wide methodology for collecting and reporting water use information by users and suppliers (groundwater and surface) that is consistent with state requirements. 8. Develop comprehensive educational, informational, and awareness efforts regarding sustainability of consumption of local products in the water-use efficiency programs for growers, water suppliers, post-harvesting processors, consumers, and others. Encourage reducing long-distance commodities transporting and importing commodities and thus, reduce energy use and greenhouse gas emissions. Use of Promising Practices: 9. Steward soil and wetland areas for increased groundwater holding and recharge, as well as sediment management.

			10. Employ flood management capacities of agricultural land to support groundwater recharge, reduce infrastructure damage, control erosion and sedimentation of waterways and improve downstream water quality: a. Explore diversion of flood/high season water to aboveground storage areas b. Employ flood easements to compensate farmers/ranchers who allow fields to be flooded during extreme events 11. Utilize conservation easements and proven (or promising) practices to protect water supplies and water quality. 12. Adjust irrigation schedules and methods to decrease the amount of water used or applied, including possible use of low energy precision application (LEPA) for center pivots. 13. Provide help to convert to more drought-resistant or less-water-consumptive cropping. 14. Identify appropriate water efficiency methods, encourage pilot/demonstration projects, track water efficiency measures and resulting savings–publicly available, consolidated at regional level, e.g., by Valley (Indian Valley, American Valley, Sierra Valley, Mountain Meadows)–to preserve privacy. 15. Facilitate use of available recycled water that otherwise would not be used beneficially, e.g., use of treated wastewater from mills, treatment plants, etc. for irrigated pasture; widespread use of graywater. 16. Implement source water protection measures.
2	Urban Water Use Efficiency	Municipal Services	1. Implement programs such as best management practices. 2. Provide information to homeowners regarding water efficient landscapes. 3. Increase public outreach and encourage community involvement. 4. Fund incentive programs for small districts and disadvantaged communities (DAC). 5. Conduct large landscape surveys and develop water efficient landscape guidelines. 6. Conduct audits of internal water distribution systems. 7. Identify excessive water users and offer water audits.
Objective: Improve Flood Management			
3	Flood Management	Floodplains, Meadows, Waterbodies	1. Restore floodplain function to preserve and/or restore the natural ability of undeveloped floodplains to absorb, hold, and release floodwaters.
Objective: Improve Operational Efficiency and Transfers			
5	Conveyance - Regional/Local	Agricultural Land Stewardship	1. Improve aging infrastructure, increase existing capacities, and/or add new conveyance facilities. 2. Add fish ladders and state-of-the-art fish screens to conveyance structures. 3. Establish a baseline hydrology and enhanced description of present water management system components. 4. Replace or improve canal structures to improve the ability of irrigation districts, water companies and other entities to manage and control water in the region and reduce spillage. 5. Control invasive weeds to improve flow, reduce spread of weeds, and reduce sedimentation and bank erosion/degradation.

			6. Evaluate conveyance infrastructure for risk from earthquake and flood, and the role it could play in flood control. Plan for needed improvements.
6	System Reoperation	Municipal Services	1. Collaborate with federal, state, and local agencies on system reoperation studies. 2. Perform system audits to identify operational improvements that can be made. 3. Encourage conjunctive management.
7	Water Transfers	Municipal Services	1. Develop and implement groundwater management plans, monitoring programs. 2. Assemble data from existing monitoring programs and analyze them in an effort to identify additional areas to monitor. 3. Consider inter-, intra-, and interstate basin transfers to maximize water use.
Objective: Increase Water Supply			
8	Conjunctive Management	Agricultural Land Stewardship	1. Assess the connection between groundwater, spring and surface water sources and recharge areas to better understand their interactions. 2. Identify tools and data sharing needed to improve surface, groundwater and conjunctive water management: a. Develop and make available to the public a consolidated map of groundwater basins, recharge areas, California Statewide Groundwater Elevation Monitoring (CASGEM) wells, state websites (e.g., Groundwater Ambient Monitoring and Assessment Program [GAMA]) and data for all groundwater basins in the UFR watershed b. Regular monitoring of surface and groundwater levels and quality throughout watershed with publicly accessible data: ○ Hydrogeologic characterization of the aquifers ○ Changes in groundwater levels ○ Groundwater flow (inter-basin + to/from streams) ○ Groundwater quality ○ Land subsidence, if any ○ Surface water flow ○ Surface water quality ○ Interaction of surface and groundwater 3. Implement a program to promote public education about groundwater and its relation to surface water, including: a. Interconnection of surface water and groundwater b. Benefits of recharging groundwater with surface water and recycled water c. Importance of protecting groundwater quality and recharge areas d. Seasonal versus long-term changes in groundwater levels e. Potential impacts of climate change on groundwater resources f. Organizations with management responsibility: obtain contact info, responsibilities, etc. g. Data sources

			4. Coordinate surface and groundwater management where local agencies overlap geography. 5. Preparation and execution of sustainable groundwater management plans for all groundwater basins (not just Sierra Valley), that protect groundwater elevation and quality, surface water-groundwater interaction and groundwater ecosystem services. 6. Increase local and regional groundwater recharge and storage to reduce groundwater depletion. 7. Monitor and possibly execute on developments if/when SWRCB creates "measures whereby agencies proposing to use peak surface water flow for groundwater recharge are not subject to potential protest of their existing water right, in order to stipulate groundwater recharge as a reasonable beneficial use of their surface water right." 8. Improve and repair infrastructure that supports the conjunctive use of surface and groundwater. 9. Explore, map, and conduct overall evaluation of potential for groundwater banking.
		Floodplains, Meadows, Waterbodies	1. Implement monitoring, assessment, and maintenance of baseline groundwater levels. 2. Encourage local water management agencies to coordinate with tribes and other agencies involved in activities that might affect long term sustainability of water supply and water quality. 3. Local groundwater monitoring and management activities and feasibility studies to increase the coordinated use of groundwater and surface water. 4. Restore wet meadows to full biological function to enhance storage and more continuous release of shallow groundwater. 5. Implement a program to promote public education about groundwater and surface water connectivity.
10	Precipitation Enhancement	Floodplains, Meadows, Waterbodies	1. Collect data and evaluate existing California precipitation enhancement projects within the UFR region on their effectiveness and impact on water quality and human health. 2. Collaborate with academic institutions, agencies, and local citizen groups on research.
11	Municipal Recycled Water	Municipal Services	1. Increase funding availability for water reuse/recycling facilities and infrastructure. 2. Create education curriculum for public schools and institutions of higher learning to educate the public about recycled water. 3. Engage the public in an active dialogue and encourage participation in the planning process of water recycling projects including non-potable and potable applications. 4. Provide resources (i.e. funding) to agencies that will perform comprehensive analyses of existing water recycling projects to estimate costs, benefits, and water deliveries. 5. Assess water recycling technology to determine least costly and environmentally appropriate technology based on location and need.
13	Surface Storage - Regional/Local	Floodplains, Meadows, Waterbodies	1. Increase surface storage and timed releases for agricultural and natural resource purposes. 2. Increase water-holding capacity of riparian vegetation and wetlands. 3. Develop a comprehensive methodology for analyzing project benefits and costs by local agencies. 4. Continue studies, research, and dialogue to identify a common set of tools for determining costs and benefits of local surface storage projects, and assess need for determining need for future projects.

Objective: Improve Water Quality			
14	Drinking Water Treatment and Distribution	Municipal Services	1. Develop incentives to allow water systems to reduce waste of limited water resources. 2. Provide additional funding for water supply, water treatment, and infrastructure projects to ensure safe and reliable supply of drinking water for individuals and communities. 3. Improve treatment facilities to include more sophisticated methods of treatment such as membrane filtration, ultraviolet light, and ozonation. 4. Upgrade aging water storage and distribution systems, which may have an impact on water quality that pose public health risks. 5. Improve water system to prevent cross connections and backflow in distribution systems.
15	Groundwater Remediation/ Aquifer Remediation	Municipal Services	1. Implement source water protection measures. 2. Establish and supporting funding for detecting emerging contaminants by commercial laboratories and installation of wellhead treatment systems. 3. Treat contaminated groundwater while it is still in the aquifer (in situ). 4. Extract contaminated groundwater from the aquifer and treating it outside of the aquifer (ex situ).
16	Matching Water Quality to Use		1. It may be possible in the region to allocate effluent for in-stream use. 2. It may be appropriate that water used in industrial processes, such as in timber mills, could be of non-potable quality in order to preserve potable water for human consumption. 3. Manage water supplies to optimize and match water quality to the highest possible use and to the appropriate technology. 4. Encourage upstream users to minimize the impacts of nonpoint urban and agricultural runoff and treated wastewater discharges. 5. Review projects to determine the potential impacts from wastewater elimination into local streams. 6. Support research into solutions to the potential conflicts between ecosystem restoration projects and the quality of water for drinking water purposes.
17	Pollution Prevention	Agricultural Land Stewardship	1. Regional, tribal, and local governments and agencies should establish drinking water source and wellhead protection programs to shield drinking water sources and groundwater recharge areas from contamination. 2. Encourage the use of riparian-area livestock fencing to reduce or prevent water-borne pathogens. 3. Control sediment from dirt roads, fires/burned areas and agricultural operations. 4. Encourage community composting; make available to increase carbon sequestration in soil. 5. Reduce invasive species. 6. Resource Conservation Districts provide technical support for agricultural practices and crop systems that result in lower greenhouse gas (GHG) emissions. 7. Address improperly destroyed, sealed, and abandoned wells that can serve as potential pathways for groundwater contamination.

			8. Manage/monitor and control Clean Water Act Section 303(d) listing constituents (sediment, temperature, DO, pH, nutrients) through: a. Improve systems for irrigation return water b. Irrigated Lands Regulatory Program (ILRP) implementation of cattle exclusion c. Point source exclusions d. Best management practices for timber harvest and catastrophic wildland fire rehabilitation e. Restore wet meadows f. Roads decommissioning and restoration g. Reduce sedimentation into watersheds h. Control pesticide and herbicide contamination
		Floodplains, Meadows, Waterbodies	1. Develop proper land management practices that prevent sediment and pollutants from entering source waters and waterbodies. 2. Restore degraded riparian habitats where elevated sediment or turbidity cause nuisance or adversely affect beneficial uses per the Basin Plan. 3. Assess the costs and impacts of current water quality management activities, and use this assessment to guide future implementation programs. 4. Identify abandoned mines throughout the region and assess the level to which these sites contaminate regional waters. 5. Construct and maintain livestock exclusions around sensitive meadow and riparian habitats, particularly in areas that are important for groundwater recharge or source water protection. 6. Assess and Identify source(s) of pollutants to waterbodies. 7. Establish monitoring protocol for marinas and recreational boating facilities. 8. Establish criteria for preventing/monitoring invasive aquatic species introduction to waterbodies 9. Identify where recreational development has harmed water quality in the region and take action to remediate it
18	Salt & Salinity Management	Municipal Services	1. Utilize treatment options such as membrane or distillation technologies 2. Real-time salinity management that improves the coordination of salt loading from upstream point and nonpoint sources to manage a maximum load of salts that does not exceed water quality objectives
19	Urban Stormwater Runoff Management	Municipal Services	1. Coordinate efforts with agencies, stakeholders, and the public to decide how urban runoff management should be integrated into work plans. 2. Work with community to identify opportunities to address urban runoff management. 3. Provide incentives for the installation of low impact development features on new and existing developments. 4. Emphasize source control measures and strong public education/outreach efforts as being the most effective way to manage urban runoff in this highly arid region.

			5. Increase community education efforts in coordination with organizations currently doing this work to include "drains to river" notification on storm drains and awareness programs for proper chemical disposal.
Objective: Practice Resource Stewardship			
20	Agricultural Land Stewardship	Agricultural Land Stewardship	1. Cultivate state payments for ecosystem services programs that compensate landowners for their stewardship while reducing the cost of regulatory compliance and delivering measurable conservation benefits. 2. Maintain working lands employing conservation easement programs for wildlife, agricultural land, grasslands, forestlands, floodplains, and scenic and recreational open space, with preference for those that protect the highest priority resource lands and that protect lands conserving multiple values simultaneously. a. Educate landowners about the tax relief, estate planning, and other benefits of agricultural conservation easements. 3. Develop on-farm irrigation ponds and practices that provide off-stream capture of winter stormwater for summer use. Evaluate benefits for economic viability, local water supply, watershed management, flood control, groundwater recharge, mitigation of climate change, wildlife habitat, etc. 4. Implement promising agricultural practices and strategies that reduce net GHG emissions and increase carbon sequestration. 5. Create an inventory of soil organic carbon content. 6. Explore opportunities for farmer-to-farmer education, demonstration, and outreach on successful conservation programs. 7. For grant-funded projects, document project success and share lessons learned and successes with other growers. 8. Protect wildlife habitat on working lands to benefit pollinators and migration routes. 9. Stabilize stream banks and improve riparian forestation to slow bank erosion and filter drainage water from the fields. 10. Utilize proven or promising grazing, forest and brush management practices to reduce catastrophic wildfire risk, where appropriate. 11. Employ recreational opportunities that benefit preservation and sustainability of working/agriculture lands. 12. RCDs, Natural Resources Conservation Service (NRCS), Sierra Nevada Conservancy, Upper Feather River Watershed Group, UC Cooperative Extension and other public and private agencies should educate and support agricultural producers around grants and other incentives available to support agricultural strategies outlined in this plan. 13. Support development or continuance of agriculture-supportive and preservation language in county general plans, such as: a. Preservation of agriculture lands b. Encouraging new producers

			c. Right-to-farm ordinances d. Healthy locally produced food supply e. Support for farmers markets f. Public awareness of the value of agriculture, including educational curriculum g. Efficient agricultural permit procedures h. Supports for economic viability of agricultural producers i. Market supports for local agriculture products 14. Leverage local, state and federal agricultural conservation entity support for agricultural infrastructure investments, marketing assistance and land stewardship practices and strategies. 15. Develop alternative and/or flexible cropping systems/patterns for repeat dry-year scenarios and predicted decrease in overall snowpack and changes in precipitation patterns. 16. Develop channels for gathering and sharing ag-related climate change mitigation practices. 17. Manage working agricultural land to build or maintain carbon sequestration capacity, while maintaining productivity for food/fiber production.
21	Ecosystem Restoration	Floodplains, Meadows, Waterbodies	1. Create programs that support and fund the identification of stream flow needs. 2. Establish biological reserve areas that connect or reconnect habitat patches. 3. Expand riparian habitat. 4. Devise climate change adaptation plans that benefit ecosystems, water, and flood management. 5. Reproduce natural flows in streams and rivers. 6. Control non-native invasive plant and animal species. 7. Filtering of pollutants and recharging aquifers. 8. The protection and preservation of springs as water supply sources as well as valuable ecological and spiritual resources in the region. 9. Encourage a natural sediment transport regime through minimizing areas of excessive erosion and sedimentation and encouraging the transport of substrate through habitat restoration and changes in reservoir and hydrologic system management. 10. Remove barriers to fish migration in rivers and streams; assess culverts for adequate passage of aquatic organisms as appropriate.
		Uplands and Forest	Support work programs that: 1. Maintain and restore a diversity of historic habitats. 2. Connect and expand important habitat areas. 3. Protect habitats and habitat connectivity from catastrophic wildfire. 4. Protect riparian habitats and habitat connectivity from catastrophic wildfire. 5. Protect habitats and habitat connectivity from catastrophic wildfire to maintain natural filtering of pollutants and for the recharging of aquifers. 6. Implement climate resiliency plans. 7. Benefit ecosystems, water, and flood management by protecting habitats and habitat connectivity from catastrophic wildfire.

			8. Reintroduce managed fire where and when appropriate. 9. Restore the forest hydrograph. This can be accomplished by reducing unnatural, fire suppression-caused conifer densification and species imbalance, and thereby restoring natural base flows and pulse flows in streams and rivers. 10. Control non-native invasive plant and animal species. 11. Conserve springs as water supply sources. Springs are valuable ecological and spiritual resources in the region. Protect spring and wetland habitats from catastrophic wildfire. 12. Minimize areas of excessive erosion and sedimentation through implementation of Best Management Practices, watershed management, and through reduction of catastrophic wildfire. 13. Reduce road culvert barriers to fish and amphibian migration in rivers and streams by assessing culverts for adequate passage of aquatic organisms. Prioritize passage improvement work as appropriate.
22	Forest Management	Uplands and Forest	1. Support work programs that foster connections between forest management and restoring the surface and groundwater hydrograph in forested landscapes. Include integrated research and implementation projects for assessing: a. The effects of landscape-scale fuels reduction for enhancing beneficial uses of water b. The effects of vegetation and fuels management on soil moisture, groundwater recharge, and streamflows c. The quantification of both the short and long-term effects of prescribed fire water cycling and the cycling of soil nutrients d. The determination of the impacts of burn frequency and intensity on infiltration, percolation, surface runoff, and groundwater discharge e. The effects of different severity wildfires on water quantity, water quality, and aquatic organisms f. The role and magnitude of groundwater storage in mountain meadows and surrounding forests including effects on streamflows and flood flows g. The quantification of sediment sources and erosion processes in unmanaged, managed, and high-severity burned forests h. The effects of riparian forests in maintaining stream and groundwater hydrology, water quality and nutrient cycling. i. The habitat effects of different forest and meadow conservation strategies j. The effects of urban trees in reducing nonpoint source pollution k. The effects of managed forestland fuels in reducing GHG emissions from catastrophic wildfire l. The effects of high severity fire conversion of mature forests to brushfields, and the resulting effects on carbon sequestration, groundwater storage, and the volume and timing of streamflows m. The effects of brushfield reburn cycles on carbon sequestration, groundwater storage, and the volume and timing of streamflows n. The regionally specific and pre-fire suppression extent of brushfields and mature forest

			habitats for specific forest species o. The effects of increasing conifer densities on the surface and groundwater forest hydrograph p. The short- and long-term effects of timely post-fire rehabilitation and restoration strategies. Evaluate effects on forest health, GHG emissions, water quality, and public safety 2. Support a program of work that includes monitoring and research on watershed trends. 3. Support the long-term monitoring needed to understand hydrologic changes resulting from climate change and management actions. Support more data collection stations in order to accurately determine how changes in hydrology and water quality are related to climate change and forest management activities: a. Additional stream gauges are needed throughout the forested regions of California to adequately represent the existing range of hydroclimatic and geologic conditions. In particular, gauges would be helpful in both managed and "pristine" watersheds b. Additional precipitation stations and snow courses are needed to increase the accuracy of determinations of climatic trends and evaluations of effects of management activities c. Additional water quality and sediment monitoring stations are needed to quantify the effects of climate change and forest management activities on surface water quality d. Additional long-term monitoring wells and aquifer infiltration, isotope, and recharge studies would be useful for understanding groundwater resources in forested watersheds e. Additional projects and studies to characterize regional surface water, groundwater and aquifer interactions on public, private, and tribal lands
		Tribal Advisory Committee	1. Increase landscape productivity by increasing ecosystem diversity and resilience through low and moderate intensity fire. 2. Increase landscape and climate change resilience through low and moderate intensity fire to increase fire succession mosaics. 3. Collaboratively develop projects and studies utilizing TEK as a monitoring tool of water quantity and quality over time. 4. Assess effects of fire succession in reducing invasive species and re-establishing fire adapted native species through collaborative projects and studies using TEK.
23	Land Use Planning and Management	Agricultural Land Stewardship	1. Develop or continue agriculture-supportive and preservation goals and strategies in county general plans, such as: a. Preservation of agricultural lands b. Encouraging new producers c. Right-to-farm ordinances d. Healthy locally produced food supply e. Support for farmers' markets f. Public awareness of the value of agriculture, including educational curriculum g. Efficient agricultural permit procedures

			h. Supports for economic viability of agricultural producers i. Market supports for local agriculture products 2. When conducting general plan updates, address relevant water management issues including water supply, water quality, water affordability, flood risk reduction, sedimentation and adequacy of services for residents. 3. Identify and assess groundwater recharge areas for groundwater supplies and limit development in those locations. 4. Plan for urban green zones, community gardens, school gardens, rainwater catchment, graywater and similar water conservation and management strategies. 5. Encourage compact and sustainable development patterns; discourage urban sprawl. 6. Collaborate with agencies and local governments to identify opportunities to maximize water conservation, groundwater recharge, storm water capture, and other water management strategies that rely on local land use planning for effective implementation. 7. Coordinate plan development among water management districts, flood control districts, RCDs, county and city governmental bodies, regional water masters, watershed managers, and others around water and related resource management strategies. 8. Continue use of the CEQA process to mitigate the significant impacts of new development on resources including agricultural land, wildlife habitat, open space, floodplains, recharge areas, wetlands, and water supply, among others.
		Floodplains, Meadows, Waterbodies	1. Increase communication between land use planners and water managers. 2. Plan for growth in a way that considers water resource features such as streams, wetlands, and groundwater recharge areas, water quality, and flooding. 3. Direct development away from undeveloped mountain meadows.
		Municipal Services	1. Plan for more compact and sustainable communities that will assist in reducing reliance on the state's water supply. 2. Plan for growth in a way that considers the availability of water supplies, water resource features, wetlands, groundwater recharge areas, and policies and regulations about water quality, drainage, and flooding. 3. Increase and enhance communication between land use planners and water managers.
		Uplands and Forest	1. Increase communication between land use planners and water managers. 2. Plan for growth in a way that conserves water resources such as streams, wetlands, springs, groundwater recharge areas, natural floodways, and water quality. 3. Direct development away from undeveloped mountain meadows, floodplains, and alluvial fans 4. Develop watershed information and strategies to update local land use decision makers on opportunities for maintaining and improving watershed functions
24	Recharge Area Protection	Floodplains, Meadows, Waterbodies	1. Restore and, where possible, protect meadows as recharge areas.

			2. Encourage the preparation of and implement groundwater basin management objective plans to monitor and/or minimize water transfers to protect groundwater supplies and recharge zones. 3. Encourage science-based ecological restoration on public and private lands to maximize watershed function and recharge. 4. Identify and inventory actual and potential recharge areas throughout UFR region.
25	Sediment Management	Agricultural Land Stewardship	1. Foster outreach and education on erosion and sediment management, new state requirements for irrigated land sediment management, and promising practices. 2. Evaluate strategies that manage fine solid fragmented material such as silt, sand, and clay, which is suspended in or settled on the bottom of waterbodies, for use in agricultural applications, wetland establishment and other beneficial re-uses. 3. Evaluate and coordinate management of agricultural water delivery systems for sediment build-up and mitigation needs. 4. Evaluate and manage areas such as dirt roads, burned areas, insufficient-capacity culverts and bare channels in the UFR that are susceptible to creating excessive sedimentation. 5. Remediate sedimentation of the Feather River and other Upper Feather River drainage dams. 6. Evaluate and plan for potential remediation of contaminated sediments.
		Uplands and Forest	1. The Natural Resources Agency and California Environmental Protection Agency should support an integrated approach to achieve the maintenance of stable watersheds where sediment yield mimics the natural sediment production that would occur in the absence of anthropogenic conditions. 2. Federal and state governments should support development of guidelines to identify when geomorphic assessments of streams for watershed stability are appropriate, to prevent undue delays in processing permits and ensure that studies are scaled to project size. 3. Where required, responsible agencies should utilize a common GIS mapping framework, and support sediment and flow monitoring programs. They should determine the sediment yields from a watershed and sediment budgets for downstream areas that include consistent monitoring protocols for scientifically defensible data of comparable quality throughout the state. 4. Post burn assessments and actions should include sediment and erosion remediation.
26	Watershed Management	Floodplains, Meadows, Waterbodies	1. Create a scientifically valid tracking and reporting method to document changes in the watershed. 2. Establish a scientifically valid means of tracking and reporting changes in the UFR region's major sub-watersheds that provide reliable, current information to local communities, state and federal agencies, and others, regarding the net effects of management against the background of external change. 3. Restore and preserve stream channel morphology to provide floodwaters access to the floodplain and to encourage stable banks and channel form. 4. Assess the performance of projects and programs. 5. Provide watershed information to better inform local land use decision makers on how to maintain and improve watershed functions. 6. Use watershed approaches in which all RMS strategies are coordinated.

			7. Preserve habitats and ecosystems that provide functions essential to water management, including: a. Erosion prevention, healthy sedimentation levels, water temperature preservation, and the provision of a cold-water pool in the summertime b. Promote conservation of terrestrial and aquatic habitat connectivity c. Protect, preserve, and restore, where appropriate, the riparian zone 8. Identify where noxious weeds may become a serious problem for recreational use, water quality, ecosystem integrity, or other reasons, and manage those infestations accordingly. 9. Improve data collection and sharing among/between watershed stakeholders and outside entities. 10. Increase levels of community knowledge regarding their watershed and encourage responsible stewardship and protection. 11. Coordinate with and between stakeholders where appropriate. 12. Build regional capacity through stakeholder partnerships and collaboration. 13. Assess the connection between groundwater and spring and surface water sources to better understand their interactions. 14. Proactively address the recovery of special-status species, at both watershed and population scales, and incorporate measures to avoid future listing of other at-risk species. 15. Protect soil resources; restore the functions of drastically disturbed soils, to slow runoff and increase rainfall infiltration. 16. Retain intact floodplain and other wetlands, to the extent possible, to maintain or increase residence time of water in the watershed.
		Uplands and Forest	1. Support a work program for implementing projects that: a. Develop TEK tracking and reporting methods b. Create and maintain scientifically valid tracking and reporting methods to document hydrograph and precipitation changes in the watershed c. Establish scientifically valid means of tracking and reporting baselines and trends in watershed condition. Employ LIDAR and archival photo records to display and differentiate the net effects of management against the background of a more variable precipitation regime d. Restore and preserve stream channel morphology to provide access by floods to the historic floodplains e. Restore and preserve stream channel morphology to encourage stable banks and channel form for the regeneration of riparian vegetation f. Assess the performance of watershed projects and programs by integrating TEK and tribal restoration approaches with other metrics g. Develop landscape scale projects that coordinate multiple RMS strategies h. Maintain and enhance ecosystem functions in a changing precipitation regime i. Integrate peak flood attenuation with protecting habitats and migration corridors from catastrophic wildfire

			j. Advance the use of managed fire to enhance watershed function and resilience k. Assist property owners in implementing watershed management activities 2. Involve forest managers in integrated water and land management. 3. Develop science for informing the determination of objectives and strategies for forested meadows. 4. Use expanded interagency agreements to allow federal, state, tribal, and non-governmental agencies and entities to share expertise, staff time, and funding across jurisdictional boundaries for the purposes of landscape-scale watershed and water quality protection and improvement. 5. Use expanded interagency agreements where federal, state, and non-governmental agencies and entities share expertise, staff time, and funding across jurisdictional boundaries at landscape scales for the reintroduction of controlled fire and for the incorporation of tribal TEK. 6. Develop a science-based public education campaign directed at water users and communities in the Central Valley, Bay Area, and Southern California to increase support for forest management. 7. Develop integrated state and federal watershed resource enhancement and conservation climate adaptation plans for the forested headwaters areas and for urban forestry. 8. Involve federal agencies as partners with tribal, state, and local entities for grant programs, and allow federal funds and in-kind services to be used as grant matches. 9. Streamline vegetation and fuels management projects that reduce the risks of catastrophic wildfires with net beneficial effects on groundwater storage, surface water flows, and on water quality. 10. Work to reduce liabilities and other barriers to managed burning.
Objective: People and Water			
27	Economic Incentives	Municipal Services	1. Encourage regular examination and adjustment, where necessary, of water rates. 2. Encourage use of tiered rate structures. 3. Adopt policies that promote long-term water use efficiency.
		Uplands and Forest	1. Develop programs for supporting biomass utilization, enhancing groundwater recharge, reducing catastrophic fire, and reducing GHG emissions as integrated as essential elements of restoring forest ecosystem health across California's forestlands. 2. Develop TEK and other scientific evaluations for implementing such programs at the landscape scale in key watersheds of statewide importance. 3. Assist with developing the capacity of landowners and local organizations and programs to carry out RMS implementation. 4. Work with federal, state, and local legislators, agencies and entities, to reduce liabilities and other barriers to managed burning.
28	Outreach and Engagement	Agricultural Land Stewardship	1. Utilize both electronic and conventional media for outreach and engagement. 2. Engage public in creation of water and resource management plans. 3. Conduct outreach and education around available water management data sources; local agencies, their functions and contact information; and priorities from the UFR IRWMP.

			4. Explore and coordinate common project goals and areas of need across organizations and agencies for more robust and integrated funding proposals. 5. Conduct outreach and engagement with stakeholders to advocate for policy change supportive of UFR IRWMP. 6. Conduct field trips, tours, and education projects and promising management practices for youth and adults. 7. Encourage use of the Ranch Water Quality Planning Short Course, which promotes the California Rangeland Water Quality Management Plan, to generate common understanding, discourse and action. 8. Develop opportunities for board leadership and management training for agencies and organizations in the UFR.
		Uplands and Forest	1. Support projects that incorporate outreach and education into project implementation. 2. Support and expand existing educational programs such as: tribal education programs; the Forest Institute Training for teachers "FIT" program; the "Learning Landscapes" program; the Butte County Fire Safe Council's 6th grade "fire aware" Charter School field training program; the Feather River Watercourse, "Plumas to the Pacific;" exemplary outdoor education programs offered to students (pre-school through junior college); and other entities in the UFR Region. 3. Support work with adjacent and downstream landowners to improve understanding of benefits that result from large scale and coordinated watershed projects.
29	Water and Culture	Tribal Advisory Committee	1. General Beneficial Use Goal: Beneficial uses of water include those that support fish consumption, aquatic and wildlife habitat for plant and animal species, recreation, and water quality and quantity to support such systems and activities. This includes those uses that support the cultural, spiritual and traditional lifeways of California Indian Tribes, Tribal communities and families. 2. TEK Goal: Integrate and apply Traditional Ecological Knowledge in collaboration with Tribes, Tribal organizations, and cultural traditional ecological practitioners. The UFR RWMG recognizes the ethical responsibility of project proponents to collaborate for the inclusiveness of the whole community and therefore to reach the Maidu family(s) with traditional responsibility to the project location.
30	Water-Dependent Recreation	Floodplains, Meadows, Waterbodies	1. Develop invasive species prevention measures. 2. Enhance the educational qualities of recreational activities throughout the region. 3. Work with a variety of stakeholders (USFS, power providers, educational institutions, non-profits) to identify recreational and educational opportunities. 4. Ensure that current and future recreational developments do not endanger water quality and/or environmental characteristics. 5. Develop a plan to resolve legacy pollution impacts on recreational waters. 6. Develop BMP guidance to reduce recreation-based water quality impacts, including impacts from recreational vehicles such as reduced pollution of marine engines and parking lot runoff. 7. Test surface water quality more often and make real-time water quality information for surface waters more accessible online and at recreation sites.

			8. Educate residents and businesses in the watershed about their role in protecting water quality and recreational opportunities. Explain water quality issues to the public in more understandable and compelling ways. 9. Restore sustainable populations of native and/or game fish. 10. Maintain and restore vegetation along rivers and streams that support and enhance outdoor recreation. 11. Participate in the National Water Trails System.
31	Other Strategies	Agricultural Land Stewardship	1. Promote snow fences and/or windbreaks along roadways. 2. Reestablish historic wetlands where appropriate. 3. Explore rain-fed agricultural opportunities for UFR region.
		Uplands and Forest	1. Manage fire and fuels and strategically locate fire breaks for ridgeline lightning, roadway, and railroad ignitions. 2. Manage fire and fuels for the protection of critical habitats. 3. Manage snow zone fuels and fire. 4. Reduce wildfire liability. 5. Manage Wildland-Urban Interface (WUI). 6. Use Traditional Ecological Knowledge to reintroduce historic fire regimes. 7. Community recharge area management to protect domestic and agricultural wells from catastrophic wildfire and from reduced groundwater infiltration or excessive siltation. 8. All-scale biomass utilization, including community and tribal biomass projects. 9. Manage landscape-scale forest and fuels that include multiple fire and fuels management strategies.
	Wastewater/ NPDES	Municipal Services	1. Water/wastewater treatment: This resource management strategy potentially includes integration of agricultural and domestic wastewater into the water supply equation. Water/wastewater treatment has been a significant issue for the region's special district for several decades. a. Consider regional facilities b. Consider water/wastewater treatment as a supply option, through groundwater recharge and/or other means 2. Aging wastewater infrastructure and the need for upgrades to meet new and revised state standards. This strategy will also be important when considering water-recycling opportunities. Actions might include: a. Facility upgrades b. Assessment of private sewage treatment for safety next to wells in areas of semi-dense development (one-acre plots) c. Development of strategies for wastewater treatment to ensure the maintenance of receiving water quality 3. Infrastructure reliability: This strategy recognizes the importance of maintaining and upgrading infrastructure for water supply, treatment, and distribution; wastewater collection, treatment, and

			disposal; and recycled water treatment and distribution. Infrastructure improvements are continually needed as facilities age, demands on their use increase (due to population growth, degraded water quality, or increased water quality standards), and new technologies are introduced. 4. Provide regional operator training to enhance knowledge of wastewater collection, treatment, and disposal that will increase the certified operational pool in the area (succession planning). 5. Increase public outreach activities to promote the water and wastewater fields as career paths.

ITEM NO. 6

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Draft Plan Performance, Implementation, Monitoring, Data Management Chapter

Date: June 15, 2016

INTRODUCTION

The Draft Plan Performance, Implementation, Monitoring, and Data Management chapter addresses standards for each of the topics listed. The following describes the intent of the standards and what is required to be addressed in the Plan.

The intent of the Plan Performance and Monitoring Standard is to ensure:

- The RWMG is efficiently making progress towards meeting the objectives in the IRWM Plan.
- The RWMG is implementing projects listed in the IRWM Plan.
- Each project in the IRWM Plan is monitored to comply with all applicable rules, laws, and permit requirements.

To guide the RWMG in implementing IRWM projects, the IRWM Plan must:

- Contain an explanation of whom or what group within the RWMG will be responsible for IRWM implementation evaluation.
- List the frequency of evaluating the RWMG's performance at implementing projects in the IRWM Plan (monthly, semi-annual, yearly, etc).
- Explain how IRWM implementation will be tracked with a Data Management System (DMS), and who will be responsible for maintaining the DMS.
- Discuss how findings or “lessons learned” from project-specific monitoring efforts will be used to improve the RWMG’s ability to implement future projects in the IRWM Plan.
- Identify who has the primary responsibility for development of the project-specific monitoring plans and who is responsible for project-specific monitoring activities.
- Specify the stage of project development that a project-specific monitoring plan will be prepared.
- Provide an explanation of typically required contents of a project-specific monitoring plan including, but not limited to, the following:

1) Clearly and concisely (in a table format) describe what is being monitored for each project. Examples include monitoring for water quality, water depth, flood frequency, and effects the project may have on habitat or particular species (before and after construction).
2) Measures to remedy or react to problems encountered during monitoring. An example would be to coordinate with the Department of Fish and Game if a species or its habitat is adversely impacted during construction or after implementation of a project.
3) Location of monitoring.
4) Monitoring frequency.
5) Monitoring protocols/methodologies, including who will perform the monitoring.
6) DMS or procedures to keep track of what is monitored. Each project's monitoring plan will also need to address how the data collected will be or can be incorporated into statewide databases. Note that standards and guidance related to the integration of data into statewide databases is included in the Data Management Standard.
7) Procedures to ensure the monitoring schedule is maintained and that adequate resources (including funding) are available to maintain monitoring of the project throughout the scheduled monitoring timeframe.

This chapter also includes the data management strategy. The intent of the Data Management Standard is to ensure efficient use of available data, stakeholder access to data, and to ensure the data generated by IRWM implementation activities can be integrated into existing State databases.

IRWM Plans should contain common protocols that gather data in a consistent manner, and processes for data and information sharing that assist all IRWM stakeholders in their local efforts, as well as regional efforts. Data integration is best achieved through the use of common and compatible methods for data gathering, analysis, monitoring, and reporting systems used by members of the RWMG. The data management description in the IRWM Plan should be of sufficient detail so that it is clear to stakeholders how data are collected, validated, and shared in the region. At a minimum, the data management description in the IRWM Plan should include the following:

- A brief overview of the data needs within the IRWM region
- A description of typical data collection techniques
- A description of how stakeholders contribute data to a DMS
- The entity responsible for maintaining data in the DMS
- A description of the validation or quality assurance/quality control measures that will be implemented by the RWMG for data generated and submitted for inclusion into the DMS
- An explanation of how data collected for IRWM project implementation will be transferred or shared between members of the RWMG and other interested parties throughout the IRWM region, including local, State, and federal agencies
- An explanation of how the DMS supports the RWMG's efforts to share collected data
- An outline of how the data saved in the DMS will be distributed and remain compatible with State databases including CEDEN, Water Data Library (WDL), CASGEM, California Environmental Information Catalog (CEIC), and the California Environmental Resources Evaluation System (CERES).

PROCESS AND NEXT STEPS

The Draft Plan Performance, Implementation, Monitoring, and Data Management chapter was drafted by staff with input from Workgroup Coordinators. The chapter was based on discussions held during RWMG meetings. The draft chapter was released to the workgroups, stakeholders, and posted on the website on April 28, 2016 for a 30 day review and comment period. The deadline for comments was May 30, 2016. Staff received one set of comments in total. The comments were reviewed internally and with Randy Wilson, Project Manager, and revisions made accordingly. A complete set of all comments received on the chapter were emailed to the RWMG on June 10, 2016. The version included in this agenda item is the revised chapter.

The next step in the process will be to address any comments received by the RWMG at the June 24, 2016 meeting. Upon completing this process with the other draft chapters, the chapters will be incorporated into a comprehensive Public Review Draft Plan, which will be the next opportunity for public input and comment. Once the Public Review Draft Plan is ready and made available, there will be two public meetings scheduled within the public review period to present the Draft Plan and to receive comments.

REQUEST

Discussion and direction to staff.

Attachment: Draft Plan Performance, Implementation, Monitoring, and Data Management Chapter

Table of Contents

11. Plan Implementation, Performance, Monitoring and Data Management

11.1. Introduction

The Department of Water Resources (DWR) Guidelines for Integrated Regional Water Management (IRWM) Plans include the standard that IRWM Plans "shall include performance measures and monitoring to document progress toward meeting Plan objectives." The intent of the Plan Performance and Monitoring Standard is to ensure:

- The Regional Water Management Group (RWMG) is efficiently making progress toward meeting the objectives in the IRWM Plan;
- The RWMG is implementing projects listed in the IRWM Plan; and
- Each project approved under the Plan is monitored to comply with all applicable rules, laws, and permit requirements.

Performance measures allow the RWMG and regional stakeholders to understand and measure the success of ongoing Plan implementation, following adoption by the RWMG and individual entities and organizations. The two primary categories are 1) *Plan Performance*, evaluated and measured by the RWMG (i.e., progress toward accomplishing goals and objectives); and 2) *Project Performance*, the monitoring and evaluation of individual projects against their respective performance measures and outcomes, conducted by project sponsors and reported to the RWMG. The objectives of the Plan (**Chapter 8 – *Goals and Objectives***) generally represent the intended benefits of Plan implementation, and include both Plan-level and project-level benefits (**Chapter 13 – *Impacts and Benefits***). Evaluation of Plan Performance will include an assessment of the extent to which Plan-level benefits have been realized through Plan implementation. Assessment of Project-level benefits will be incorporated into individual project monitoring plans.

The Upper Feather River (UFR) RWMG is committed to an IRWM Program with a planning horizon that goes well beyond the recommended 20 years. The Memorandum of Understanding (MOU) brings together entities that intend to collaboratively address the long-term water resources management needs of the UFR region. The Plan will undergo periodic updates and revisions to reflect changing conditions in the Upper Feather River region and any updated IRWM Guidelines. In addition, the RWMG membership and governance processes may evolve in response to changing conditions.

In addition to this IRWM's extended implementation horizon and the possibility of changing governance processes in the RWMG, the list of implementation projects will require updating as the IRWM planning effort proceeds and projects are both completed and new ones identified. For these reasons, monitoring Plan performance will be closely tied to the implementation of individual projects, and the IRWM Plan focuses on establishing a framework for evaluation that will link project completion to IRWM Plan implementation.

11.2. Plan Performance and Monitoring

Plan Performance describes the overall performance of the Plan in meeting its goals and objectives, both through implementation of individual projects and through the governance and operation of the Plan itself. Evaluating Plan Performance will focus on summarizing and integrating project-level assessments but will also involve the effectiveness of the Plan itself, as not all of the intended benefits of the Plan accrue through the implementation of individual projects.

11.2.1. Process for Plan Evaluation

11.2.1.1. Responsibility for IRWM Plan Implementation Evaluation

The RWMG will appoint a representative who will be responsible for evaluating and reporting on Plan Performance, including Plan implementation, progress toward meeting Plan objectives, Plan-level benefits, and implementation and outcomes of individual projects approved under the Plan. This representative may be a member of a participating agency or an outside party.

11.2.1.2. Evaluation Frequency

Plan Performance will be evaluated annually in a report to the RWMG by the appointed representative (**Section 11.2.1)**. Evaluation of Plan Performance will also accompany each successive IRWM implementation grant solicitation; release of updated IRWM Guidelines by DWR; update to regulations; or emergence of new data, science, or awareness of changed regional conditions that affect the issues and priorities within the Region. In response to any or all of the above, the RWMG will review the Plan's content and, as needed, will update the water management issues, goals, objectives, and strategies in the Plan area. Such updates to the Plan will be through an amendment process (**Chapter 3 – *Governance, Stakeholder Involvement, and Coordination***). Major changes to the Plan, including formal update and re-adoption requiring the approval of the RWMG, will occur only as required by the State of California or as deemed necessary by the RWMG. It is the intent of the RWMG that if adequate funding is available, the Plan will be formally reviewed, revised, and re-adopted no less frequently than every five years.

11.2.1.3. Feedback Protocol

After acceptance by the RWMG, the annual report on Plan Performance will be made available to the public on the RWMG website (http://www.featherriver.org), in print at appropriate locations in the Plan area (e.g., offices of participating agencies, libraries, community centers, etc.), or upon request. The annual report will provide the basis for discussion of how findings or "lessons learned" from Plan-level evaluation and project-specific monitoring efforts will be used to improve the RWMG's ability to implement future projects in the IRWM Plan. In addition, data from individual project monitoring and data collected for Plan-level assessment will be publicly available (**Section 11.4**).

If the annual report identifies a significant deficiency in Plan Performance, the RWMG may elect to hold public meetings or seek public comment on how implementation of the Plan, or the Plan itself, should be amended to better address regional issues. Amendments may include administrative changes, changes to the resource management strategies (RMS) (**Chapter 9 – *Resource Management Strategies)***, or changes to the goals and objectives of the Plan itself. For example, after a review of the RWMG performance measures, the RWMG may need to amend the RMS or the actual IRWM objectives to account for new scientific data or regional changes in conditions that could alter baseline assumptions or understanding of water management issues discussed in the IRWM Plan. Deficiencies in the performance of an individual project will be addressed by the required remedial and/or adaptive management components of the project-specific monitoring plan; however, the RWMG will take into account "lessons learned" from individual projects when considering future project proposals.

11.2.1.4. Project Updates, Additions, and Funding

With each IRWM grant solicitation, the RWMG will review the implementation project list and will invite project proponents to participate in the grant opportunity. Project proponents will be responsible for developing individual applications in response to solicitations. Updating the implementation project list within the Plan will be necessary as projects are funded and implemented, regardless of the source of funding. The RWMG's appointee or representative will update the project implementation list for review at the quarterly RWMG meeting.

The RWMG will issue a "call for projects" annually, or as warranted by upcoming grant solicitations, providing opportunity for the consideration of new projects to add to the implementation project list. The RWMG will review projects in accordance with the process presented in **Chapter XX *Project Development***, and the list will be updated annually.

11.2.1.5. Comparison to the 2005 IRWM Plan

The 2005 Upper Feather River IRWM Plan placed adaptive management at the core of its Technical Analysis and Plan Performance (**Section 7.3**). Adaptive management methods were included in the 2005 Plan as Objective 12 (**Section 2.3**), and were divided into passive and active strategies. Passive adaptive management was described as model-based predictions of how ecosystems would respond to certain management actions, and was conducted without experimental design elements such as replication, randomization, or controls.

The 2005 Plan described active adaptive management as a process of applying management strategies as treatments in a controlled, replicated experiment that would allow managers to isolate the effects of

management treatments. Furthermore, active adaptive management would allow direct comparison of different management strategies to better inform future management actions.

The 2005 Plan focused on implementation of projects funded by existing sources such as Monterey Settlement Agreement funds and CALFED, and administered through existing programs such as the Feather River Coordinated Resource Management, Plumas Watershed Forum, and the Quincy Library Group. Additionally, the region successfully obtained $7 million in Proposition 50 grant funds for implementation projects identified in the 2005 IRWM Plan. However, the 2005 Plan did not include a process for evaluating the performance of the Plan itself, and project performance evaluation was expected to consist of active adaptive management strategies.

11.2.2. Plan Performance Measures

Plan Performance will be evaluated in terms of the Plan-level benefits (**Chapter 13 – *Impacts and Benefits)***, the Plan objectives (**Chapter 8 – *Goals and Objectives***), and additional measures described in this section. Each project approved under the Plan will address at least one of the Plan objectives. Plan Performance in terms of those objectives will depend largely on the success of individual projects. **Table 11-1** presents the five Plan-level benefits, 18 Plan objectives, and five additional measures by which Plan Performance will be assessed along with suggested metrics to quantify success.

Table 11-1. Plan Performance Measures and Metrics

Performance Measure	Metrics
Plan-level Benefits	
Fostering understanding and information sharing within the Region	Conduct RWMG public meetings Update Featherriver.org website Data Management Standard Determine qualitative perceptions of participating stakeholders
Opportunities to collaborate on project development and solving regional issues	Coordinate with stakeholder agencies (including staff) Involve the public in project selection Involve DACs and Tribal representatives
Identification of diverse funding sources	Track the number and diversity of successful grant applications Assemble and disseminate lists of grant opportunities targeted to various stakeholder groups
Capacity building	Coordinate with stakeholder agencies, including staff (organizational capacity-building trainings) Contact UC Davis Extension – Agriculture, NRCS, and other programs to provide funding and assistance to private land owners

Performance Measure	Metrics
	Improve efficiency and reduce redundancy
Venue to address policy-related and regulatory processes	Conduct RWMG public meetings Update Featherriver.org website Evaluate Plan Performance annually
Plan Objectives[1]	
Restore natural hydrologic functions	Implement 3 Plan projects that restore natural hydrologic functions Update the project list and technical and scientific studies at the annual RWMG meeting
Reduce potential for catastrophic wildland fires in the Region	Implement 3 Plan projects that reduce catastrophic wildfire potential Update the project list and technical/scientific studies at the annual RWMG meeting
Balance the needs of forest health, habitat preservation, fuels reduction, forest fire prevention, and economic activity in the Region	Continue to support the integration of biomass electrical generation biofuels development with 1) forest and habitat conservation in US Forest Service (USFS) plan updates, 2) in the carbon sequestration and conservation plan for forests (CA Air Resources Board [ARB]), and 3) by implementing projects UF-12 and TAC-6
Build communication and collaboration among water resources stakeholders in the Region	Continue MOU development with water and land management entities in the Region Develop a process for supporting and endorsing collaborative projects, studies, and actions sponsored by MOU signatories Develop a review process for monitoring information and needs Develop a process for updates on conflicts identified in the Plan during public meetings, on the featherriver.org website, and

[1] The Plan objectives were approved on March 27, 2015 at a regular RWMG meeting. The objectives listed in this table are verbatim.

Performance Measure	Metrics
	through Inter-agency coordination/consultation
Work with DWR to develop strategies and actions for the management, operation, and control of State Water Project (SWP) facilities in the watershed in order to increase water supply and recreational and environmental benefits to the Region	Review proposals and management planning for lands, habitat, and cultural/historical resources within and downstream from SWP facilities in the watershed May develop an informational item that updates inter-agency and inter-regional planning efforts at a specific RWMG meeting every year
Encourage municipal service providers to participate in regional water management actions that improve water supply and water quality	Get involved in inter-agency, intra-regional planning efforts Participate in project selection Develop project-specific criteria
Continue to actively engage in Federal Energy Regulatory Commission (FERC) relicensing of hydroelectric facilities in the Region	Obtain an annual progress report from FERC regarding its implementation of hydroelectric license conditions as scheduled for FERC No. 2100, 2107, 699, 2105 Obtain a 'letter of intent' from FERC on fish and amphibian passage improvements, wildfire recovery projects, the James Lee and Indian Jim visitors and outdoor recreation and education and events center, the Rock Creek Bench river access project, and the accidental spill response plans. These are implementation priorities for water stakeholders in the North Fork Feather River Canyon
Address economic challenges of municipal service providers to serve customers	Determine Plan-level efforts of participating entities Obtain outside funding Review efforts by regional and local planning agencies
Protect, restore, and enhance the quality of surface and groundwater resources for all beneficial uses, consistent with the Basin Plan	Implement 2-3 Plan projects that address surface and groundwater resource conservation and quality
Address water resources and wastewater needs of Disadvantaged Communities (DACs) and Native Americans	Implement 4 Tribal benefit and 17 DAC benefit Plan projects

Performance Measure	Metrics
	Update the DAC water needs inventory every five years, or as needed by the RWMG
Coordinate management of recharge areas and protect groundwater resources	Implement 3 Plan projects that include recharge area and groundwater conservation efforts Assess whether inter-agency, intra-regional planning efforts include implementation of the region-wide LIDAR project (UF-13)
Improve coordination of land use and water resources planning	Incorporate the UFR IRWM Plan into updates of land, water, and natural resource planning for the three national forests in the Region Submit the UFR IRWM Plan as a planning reference for the Plumas, Lassen, and Tahoe National Forest Land and Resource Management Plan updates Support efforts by regional and local entities to participate in ARB's carbon sequestration and conservation plan for forest and agricultural landscapes Integrate TEK into USFS, ARB, and State Water Resources Control Board (SWRCB) plans Provide resource management strategy recommendations developed by the IRWM Plan workgroups for the next update of the California Water Plan
Maximize agricultural, environmental and municipal water use efficiency	Implement 2-3 Plan projects that address water use efficiencies
Effectively address climate change adaptation and/or mitigation in water resources management	Implement 3-4 Plan projects that address GHG reductions, and climate adaptation and mitigation in water and watershed management Update the project list and technical and scientific studies at the annual RWMG meeting
Improve efficiency and reliability of water supply and other water-related infrastructure	Implement 2-3 Plan projects that address water use efficiencies

Performance Measure	Metrics
Enhance public awareness and understanding of water management issues and needs	Implement 4 Plan projects that enhance public awareness and public education about water issues and needs Update the project list and technical and scientific studies at the annual RWMG meeting Support MOU signatory proposals for public outreach/education, public workshops and meetings, and water and watershed education in school programs
Address economic challenges of agricultural producers	Encourage agricultural producers to participate in potential funding opportunities through IRWM and other sources Obtain outside funding
Work with counties/communities/groups to make sure staff capacity exists for actual administration and implementation of grant funding	Implement 2 to 3 Plan projects that include capacity building for project development, implementation, and evaluation Update the project list and technical/scientific studies at the annual RWMG meeting
Additional Measures	
How robust the IRWM Plan process has been after Plan development	List the number of RWMG meetings held vs. identified benchmarks • Quarterly RWMG meetings • RWMG meetings will be cohosted with member organizations when appropriate
Public outreach and engagement	List the number and variety of attendees compared to what was targeted by the RWMG
Economic benefits	Develop a process for quantifying and assessing the amount of funding and local job creation associated with the implementation of projects identified in the Plan Retain and grow water management and watershed stewardship job opportunities Develop volunteer water management positions on regional boards and

Performance Measure	Metrics
	commissions for community health, education, and improvement activities, including school programs
Reduction of conflicts identified in the Plan	Develop a process for evaluating improved collaboration that includes responding to stakeholder participants and their qualitative perceptions
Overall effectiveness of the planning process	List the number of funded and implemented Plan projects List the number of DAC needs and projects that have advanced to implementation readiness List the number of tribal partnership projects funded and implemented Develop administrative capacity for the RWMG and for MOU signatories and project partners List the number of RMS recommendations that are incorporated into the next California Water Plan update
Up-to-date understanding of climate change vulnerability	Review the most current climate change projections, every five years Review actions to address priority climate change vulnerabilities, annually Re-prioritize climate change vulnerabilities, every three years

Many Plan performance measures will be assessed using metrics defined for individual projects (project-specific criteria) that cannot be defined at the Plan level; **Section 11.3** includes a general framework for project-level monitoring. Other measures can be assessed in terms of the number and variety of projects approved under the Plan (project selection). Finally, some measures can be quantified directly, such as local and regional planning agency efforts, number of public outreach programs, tracking attendance and participation in public meetings, public opinion surveys, cooperation and workload sharing among agencies, and the amount of grant funding obtained. The annual report to the RWMG on Plan Performance will summarize progress made in the preceding year in terms of each of the 28 measures in **Table 11-1**. See **Appendix XX** for a sample agenda/report.

11.3. Project Performance and Monitoring

The UFR RWMG or its appointee will be the primary contact for project proponents in the Plan area. Each project approved under the Plan will contribute to the accomplishment of at least one Plan objective, and it is through the implementation of approved projects that the Plan will provide many of

its intended benefits. Therefore, evaluation of Project Performance is essential to assessing the overall success of Plan implementation. Project Performance will be quantified and assessed through the implementation of a Project-specific Monitoring Plan (PSMP).

11.3.1. Project-Specific Monitoring Plans

During the development of actual grant applications, PSMPs will be prepared and implemented for most of the projects in this IRWM Plan. This section provides a framework for formulating PSMPs; however, individual PSMPs will vary depending on the nature of the project, the amount of stakeholder involvement, and the type(s) of affected resources. The minimum PSMP requirements set forth in this chapter are intended only to satisfy the monitoring and reporting requirements of this IRWM Plan, and although they may suffice for other monitoring and reporting requirements (e.g., regulatory agencies, NEPA/CEQA, etc.), other similar monitoring plans may be required concurrently with the PSMP. Each grant solicitation will have its own PSMP content requirements. The minimum content, discussed in the following sections, is consistent with content in the Proposition 84 guidelines. Under no circumstances will the PSMP supersede or void a condition required by any other plan as part of project approval.

11.3.1.1. Projects Requiring a PSMP

Projects selected for grant solicitations under the IRWM Plan will require a PSMP as part of the application submittal. Proposed implementation projects promote one or more Plan objectives. Such projects include, but are not limited to, infrastructure construction/improvement, restoration, surface or groundwater monitoring, and forest fuels reduction. The RWMG may require PSMPs for projects such as utility rate tiering, metering, land use changes, and system reoperation in order to track the success of such projects at promoting Plan objectives.

Projects such as education and outreach programs that secure outside funding, capacity-building activities, administrative actions by the RWMG and its appointed representatives, data-gathering, RWMG outreach activities, meetings, and inter-agency coordination are not considered projects and will not require a PSMP; these activities will be tracked as part of the annual Plan Performance assessment.

11.3.1.2. Party with Primary Responsibility for the PSMP

The project proponent is responsible for development of a PSMP for each project, according to the procedures described in this chapter. The project proponent is responsible for ensuring that the PSMP meets the minimum requirements specified in this chapter and any additional requirements specified by the RWMG or other agencies.

The project proponent is also responsible for guaranteeing the implementation of the PSMP for the life of the project or the term of the monitoring program, as specified in the PSMP. The exact mechanism for implementation of the PSMP will vary by project; however, the following position regarding monitoring of projects is the adopted policy of the UFR RWMG:

> *RWMG Policy (6/15/2015): Although project monitoring requirements will vary by grant solicitation, it is the position of the Upper Feather River Regional Water Management Group that project monitoring for IRWM-sanctioned projects should be objective, transparent, available to the public, required to be conducted by a third party, and science-based.*

To implement this policy, each PSMP will include a statement that monitoring will be conducted by a third party, subject to approval of the RWMG.

11.3.1.3. Review of the PSMP

The RWMG or its appointed representative will review and accept a PSMP before the project itself is submitted for IRWM funding. Funding agencies and other entities with regulatory authority over the project may also review the PSMP and require revisions to it as a condition of a grant or permit. This Plan does not require public review of PSMPs; however, it is advisable for most projects.

When Plan projects are submitted to other funding sources, they are not subject to the requirements of this Plan. However, project proponents are encouraged to submit their final PSMPs to be included on the Plan website to assist in building a regional data repository.

11.3.1.4. Timing of the PSMP

The project proponent will prepare a complete draft PSMP and submit it to the RWMG, or an appointed representative, for approval. The project proponent will complete a final PSMP and will submit it to the RWMG before the final project is approved for grant consideration. The PSMP will be included in all funding or permit applications (if submitted) to outside agencies, and may be subject to revision in response to requirements of outside agencies with jurisdiction over the proposed project.

11.3.1.5. Minimum Required Contents of the PSMP

Project-specific monitoring must include not only the physical elements of the project (*outputs* such as tank replaced, restored wetland, etc.) but also what the project accomplished in terms of Plan goals and objectives (*outcomes* such as a water supply improved for a DAC for the life of the project, improved watershed retention or sediment control). In other words, monitoring must address not only what the project achieved but also what it contributed toward the achievement of Plan goals and objectives.

Monitoring plans will be prepared according to the specifications required by a funding source. The DWR provides guidance for the contents of a PSMP; this guidance forms the minimum standard for PSMPs in the UFR IRWM Plan. At a minimum, a PSMP must include the following:

- Describe clearly and concisely (in a table format) what is being monitored for each project. Examples include monitoring for water quality, water depth, flood frequency, and effects the project may have on habitat or particular species (before and after construction). Express monitoring in quantitative metrics to the greatest degree possible.
- Measures to remedy or react to problems encountered during monitoring. An example would be to coordinate with the Department of Fish and Wildlife if a species or its habitat is adversely impacted during construction or after implementation of a project.
- Location of monitoring.
- Monitoring frequency.
- Monitoring protocols/methods, including who will perform the monitoring.
- A statement that monitoring will be conducted by a third party, subject to approval of the RWMG.
- A data management system or procedures to keep track of the results of monitoring. Each PSMP must address how the collected data will be or can be incorporated into statewide databases.

Note that standards and guidance relating to the integration of data into statewide databases is included in **Section 11-4**.

- Procedures to ensure the monitoring schedule is maintained, and that adequate resources (funding) are available to maintain project monitoring throughout the scheduled monitoring timeframe.
- Reporting procedures that include a written report provided to the RWMG annually. Any exception to annual reporting must be thoroughly justified in the PSMP.

As stated previously, it is the position of the UFR RWMG that all monitoring should be conducted by a third party, all monitoring should be science-based, and all monitoring results should be available to the public.

11.3.1.6. Oversight of the PSMP

The project proponent will be responsible for ensuring that the PSMP is implemented entirely, and that funding is available for adequate implementation for the life of the monitoring program. The RWMG or its appointed representative will conduct oversight of each Plan-approved project to confirm that the PSMP has been implemented. Oversight will include confirming adherence to all reporting and data submission requirements. Funding for this oversight may be required from the project proponent as part of the proposed project.

11.4. Data Management Standard

The intent of the Data Management Standard (DMS) is to ensure efficient use and access to available water resources, land management, and environmental monitoring data for the UFR Region, and to ensure that data generated by IRWM implementation activities can be integrated into existing state databases. During the development of the UFR IRWM Plan update, a website (http://featherriver.org) has functioned as the region's DMS and it will continue in perpetuity. The website will be maintained by an entity appointed by the RWMG, which will initially be Plumas County.

No data utilized in the preparation of a project proposal or collected for any project approved under this Plan will be considered the private property or possession of the project proponent or other private entity except data subject to assertions of Tribal sovereignty. No data collected as part of project implementation may be withheld as proprietary except data that are the possession of a sovereign Tribal entity. Free, open-access to data, along with data collection and submission standards outlined in this section, will promote the IRWM Plan objective of making regional data available to all stakeholders in the Plan area and will support the RWMG's goal of transparency.

11.4.1. Data Needs and Typical Data Collection Techniques

Implementation projects included in the Plan range from school watershed educational programs to groundwater monitoring programs, to construction projects, to incorporation of Traditional Ecological Knowledge (TEK) in regional projects. The data developed for each project and produced during the operations phase of each project will be very different. For construction projects, typical data include geotechnical studies and topographic surveys. Groundwater monitoring programs usually generate well boring logs during construction and generate groundwater level and water quality data during the monitoring or operations phases. In its PSMP, each project will be required to identify the data that will

be required and generated by the project; the data will be uploaded to the Plan website and state databases.

The Uplands and Forests Workgroup identified a lack of transparent, publicly available, and science-based monitoring data as a general issue in the Region (**Chapter 5 – *Regional Water Issues***). That data need is contained in the RWMG policy on monitoring (**Section 11.3.1.2)**.

Other regional data needs identified by Workgroups during IRWM Plan development are expressed as resource management strategy recommendations, and include:

- Sources of real-time data such as:
    - Local meteorological/weather
    - Soil moisture
    - Water application/use monitoring
    - Surface water depth and flow
    - Surface to groundwater depth
    - Groundwater modeling (Agricultural Lands Stewardship Workgroup, **Item #1 Table 9-1**);
- Improved data on baseline hydrology and capacity of existing water management components (Agricultural Lands Stewardship Workgroup, **Item #5 Table 9-1**);
- Data regarding the environmental and health effects of precipitation enhancement projects (Floodplains, Meadows and Waterbodies Workgroup, **Item #10 Table 9-1**);
- Publicly accessible groundwater monitoring data including:
    - Hydrogeologic characterization of the aquifers
    - Changes in groundwater levels
    - Groundwater flow (interbasin + to/from streams)
    - Groundwater quality
    - Land subsidence, if any
    - Surface water flow
    - Surface water quality
    - Interaction of surface and groundwater (Agricultural Lands Stewardship Workgroup, **Item #8 Table 9-1**);
- Improved data on sources of pollution including marinas and abandoned mine sites (Floodplains, Meadows and Waterbodies Workgroup, **Item #17 Table 9-1**);
- Inventory of the organic content of soil (Agricultural Lands Stewardship Workgroup, **Item #20 Table 9-1**);
- Additional stream gages, precipitation stations, water quality monitoring stations, and groundwater monitoring wells (Uplands and Forests Workgroup, **Issue #22 Table 9-1**);
- Groundwater basin management plans for all 14 groundwater basins in the Plan area (Floodplains, Meadows and Waterbodies Workgroup, **Item #24 Table 9-1**);
- Improved tracking and reporting method to document changes in the watershed (Floodplains, Meadows and Waterbodies Workgroup, **Item #26 Table 9-1**);
- Improved data and tracking on hydrograph and precipitation in the watershed (Uplands and Forests Workgroup, **Issue #26 Table 9-1**);
- Improved tracking and reporting methods using Traditional Ecological Knowledge (Uplands and Forests Workgroup/Tribal Advisory Committee, **Issue #26 Table 9-1**), and;
- Improved understanding of climate change and associated impacts including:
    - Climatic effects on catastrophic wildfire
    - Climatic effects on flooding

- Increased understanding of snowpack
- Regional greenhouse gas (GHG) emissions inventory and forecasts
- Updated, downscaled, and best available climate change projections.

Monitoring data, collected for individual projects, will vary depending on the nature and purpose of the project, and each PSMP will specify the type of data collected. In general, Project Performance is expected to be quantifiable; PSMPs will minimize qualitative or descriptive data collection. Photo-documentation will be the preferred method for qualitative monitoring, and data submissions to the website may include photographs. While the UFR website is configured to allow users to attach photos or other digital files when they submit data, other websites such as Flickr or Google+ provide free, geolocated photo galleries. Monitoring photos submitted to these public sites are likely to reach a broader audience and be easier to access, update, or manage than a custom photo gallery tool built especially for the UFR website. Photos posted to online photo websites may share links to their project photos in relevant pages on the UFR website.

Data submitted to the UFR website will be in a format compatible with import into standard analytical platforms (Excel, .xlsx, or comma-separated value, .csv). Scanned or digitized field data forms will not satisfy the requirements for data submission to most project funders. Wherever applicable, geospatial information should accompany any submitted data. Preferred formats for point locations are latitude/longitude using the WGS 1984 datum. GIS layers should be in the UTM Zone 10 NAD 83 projection, or include a projection file (.prj).

11.4.2. Data Submission to the Website

Monitoring entities and Plan participants may post data directly onto the UFR website. Registration to use the site is free and open to all who request an account. RWMG designees may administer the website to remedy errors, delete fake accounts, or request clarification if questions arise about any submitted data.

Data may be submitted to the website using forms that request basic metadata such as author, title, contact information, date, and keywords. These forms were developed using national standards for spatial metadata developed by the Federal Geographic Data Committee. Contributors should also provide a list of outside databases to which the data have also been submitted, as well as digital copies of any forms or reports generated by statewide databases confirming their receipt of data submissions.

11.4.3. Stakeholder Access to Data

It is the intent of the RWMG to ensure that all public data generated by the projects are available to the stakeholders and project proponents. However, it is not the intent of the RWMG to duplicate efforts and data that are available elsewhere. To accomplish these two goals, the RWMG will ensure that all stakeholders will have access to the data generated by the other projects through the proposed projects page (http://featherriver.org/proposed-projects). The proposed-projects page contains links to the project-specific webpages, if applicable, and will contain links to state database webpages.

The UFR website (www.featherriver.org) is free and accessible to the public. When users share data to the site they may designate it as “sensitive” or “not for public distribution.” Examples of sensitive data may include the location of cultural resources or sensitive species. The UFR website has no special

security features; it is recommended that users concerned with unauthorized use of their data *not* submit it to the UFR website. Rather, they should submit an entry that describes their data, and provide contact information so interested parties may follow up.

11.4.4. Data Quality Control

Monitoring entities, participating agencies, and all parties submitting data to the website are expected to take primary responsibility for the integrity of the data they submit and to ensure that those data are consistent with the standards of the project funder. Parties submitting data to the website are exclusively responsible for the accuracy and truthfulness of the data they submit. The RWMG makes no warrantee regarding accuracy or integrity of data on the website.

Funding for a detailed review of data submitted to the website is currently not available. However, should administrative funding become available, the website managing entity will perform an annual audit of data that will include quality control of all data submitted to the website.

The website has a public comment system that allows people to email the website managing entity regarding concerns about the data. The website managing entity will consult with data submitters and stakeholders to address stakeholder concerns regarding data posted to the website/DMS.

11.4.5. Integrating Data into State Databases

Project design will include an evaluation of the data protocols for statewide databases to which project data will be submitted (**Section 11.4.2**). The legislation supporting a given grant program may specify a state database for data submittal. These protocols will inform the design of the project-specific data collection protocol. If project data will not fit into a particular state database, project designers will use the best principles approach, along with discussions with the project technical advisory committee, to ensure that effective, efficient, and defensible methods are employed.

A brief overview of public databases follows, categorized by data type. This list is not exhaustive but includes all databases described in DWR's IRWM Guidelines (both Proposition 84 and Proposition 1). The last category (**Section 11.4.5.5**) includes searchable databases that do not accept direct data entry; however, they represent significant data sources that can be useful when designing the data component of a project or assessment.

11.4.5.1. General Databases

Sacramento River Watershed Information Module – SWIM is a data tool developed by the Sacramento River Watershed Program to catalog technical information about the Sacramento River watershed. This site is a clearinghouse and is not intended to provide a protocol for data collection. The Upper Pit IRWM Region used SWIM as its data management system. The UFR website includes imported data from SWIM relating to the UFR Region. Information on SWIM is available at www.sacriver.org.

California Environmental Data Exchange Network – CEDEN is a system designed to facilitate integration and sharing of data collected by many different participants and is organized into regional data centers. The UFR IRWM Plan area is covered by the Central Valley Regional Data Center. CEDEN data templates, prepared by the regional data centers, are available on the CEDEN website, http://www.ceden.org.

11.4.5.2. Water Quality Databases

Surface Water Ambient Monitoring Program – Any group collecting or monitoring surface water quality data using funds from Propositions 13, 40, 50, and 84 must provide such data to SWAMP. The SWRCB has developed required standards for all data submissions. The SWAMP data checker produces a summary report for each data submission. Information on SWAMP is available at http://www.swrcb.ca.gov/water_issues/programs/swamp/index.shtml.

11.4.5.3. Groundwater Databases

Groundwater Ambient Monitoring and Assessment program – GAMA provides a comprehensive assessment of water quality in water wells throughout California. Projects that include a groundwater component should contact the GAMA program manager before designing a field or lab data output format. GAMA requires electronic submittal of information and prefers GeoTracker (http://www.waterboards.ca.gov/ust/electronic_submittal/); Excel files can be problematic. Additional information on the GAMA program is available at http://www.waterboards.ca.gov/gama/.

California Statewide Groundwater Elevation Monitoring Program – The intent of the CASGEM program is to establish a permanent, locally managed program of regular and systematic monitoring in all of California's alluvial groundwater basins. CASGEM anticipates that the monitoring of groundwater elevations required by the enacted legislation will be done by local entities. The purpose of the CASGEM database is to maintain the collected elevation data in a readily and widely available public database. Local entities such as counties or agencies implementing an IRWM Plan that do not agree to conduct groundwater monitoring are ineligible to receive water grants and loans from the state. Information on the CASGEM Program is available at http://www.water.ca.gov/groundwater/casgem/

11.4.5.4. Climate Change Database

Cal-Adapt – The California Energy Commission (CEC), the California Natural Resources Agency (CNRA), and the Public Interest Energy Research Program (PIER) maintain Cal-Adapt, an online database that synthesizes and shares the most up-to-date understanding of how climate change might impact the State of California. Projected impacts of precipitation changes, temperature increases, and wildfire in the UFR IRWM Plan are available through the year 2100. Cal-Adapt is available at http://cal-adapt.org/

11.4.5.5. Reference-only Databases

Water Data Library – DWR maintains the state's WDL which stores data from various monitoring stations, including groundwater monitoring wells, water quality stations, surface water stage and flow sites, rainfall/climate observers, and well logs. Information regarding the WDL is available at http://wdl.water.ca.gov/.

Integrated Water Resources Information System – DWR maintains IWRIS, a data management tool for water resources data that is not a database. IWRIS is a web-based GIS application that allows entities to

access, integrate, query, and visualize multiple sets of data simultaneously. Information on IWRIS is available at http://www.water.ca.gov/iwris/.

California Irrigation Management Information System – CIMIS is a program in the Office of Water Use Efficiency Branch (DWR) that manages a network of automated weather stations in California. The purpose of CIMIS is to make real-time weather data publicly available for irrigation scheduling. CIMIS information is available at http://www.cimis.water.ca.gov/cimis/.

California Natural Diversity Database – CNDDB is maintained by the Biogeographic Data Branch of the California Department of Fish and Wildlife. The purpose of CNDDB is to inventory the status and location of rare plants and animals in California. CNDDB staff work with partners to maintain current lists of rare species and to maintain a database of GIS-mapped locations for these species. Plan projects involving surveys for wildlife, such as habitat restoration projects, should report records of sensitive species to CNDDB. Information on accessing and submitting data to CNDDB is available at http://www.dfg.ca.gov/biogeodata/cnddb/.

ITEM NO. 7

Upper Feather River
Integrated Regional Water Management

RWMG Meeting No. 12
June 24, 2016

To: Upper Feather River Regional Water Management Group

From: Uma Hinman, Uma Hinman Consulting

Subject: Next Meeting Date and Topics

Date: June 16, 2016

INTRODUCTION

The Grant Agreement Work Plan included 12 regular RWMG meetings. To date, we've held 12 regular RWMG meetings and one special meeting.

Remaining topics for consideration:

1. Update on Proposition 1 DAC Involvement Request for Proposals
2. Presentation of Forest-Water Balances Study
3. Draft Goals and Objectives Chapter
4. Draft Project Development and Review Process
5. Draft Plan Development Chapter
6. Draft Finances Chapter

Future topics:

- Draft IRWM Plan
- Public meetings for Draft IRWM Plan

REQUEST

Discussion and possible schedule for the next meeting date, time and tentative content.

Calendar for year 2016 (United States)

January

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Holidays are listed on the following page.