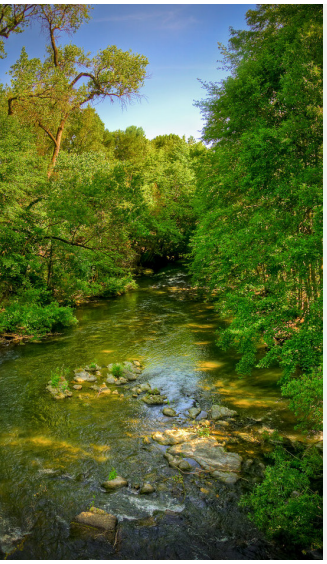
Brown AND Caldwell

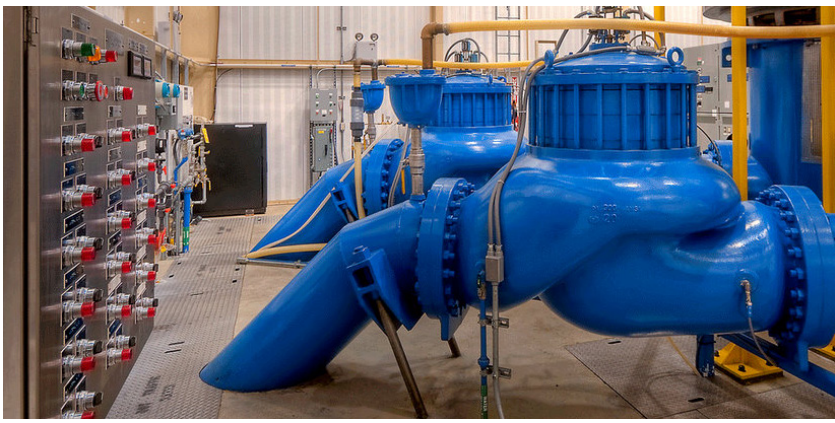
Prepared for
Sonoma County Water Agency

SONOMA COUNTY WATER AGENCY

2015 Urban Water Management Plan

June 2016





2015 Urban Water Management Plan

Prepared for
Sonoma County Water Agency
Santa Rosa, CA
June 2016

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List of Abbreviations

ABAG	Association of Bay Area Governments
Act	Urban Water Management Planning Act
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
ALWSZ	Airport-Larkfield-Wikiup Sanitation Zone
ASR	Aquifer Strorage Recovery
BAP	Basin Advisory Panel
BCM	Basin Characterization Model
BMP	best management practices
Board	Board of Directors
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
County	County of Sonoma
CUWCC	California Urban Water Concervation Council
DMM	demand management measure
DSS	Decision Support System
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ESA	Endangered Species Act
ETo	evapotranspiration
FERC	Federal Energy Regulatory Commission
FIRO	Forecast Informed Reservoir Operations
GCM	Global Circulation Model
GIS	Geographic Information System
GMP	Groundwater Management Plan
GSP	Groundwater Sustainability Plans
HEC	Hydrologic Engineering Center
kWh	kilowatt-hour
LRT2	Local Supply/Recycled Water/Tier 2 Conservation Fund
M&I	municipal and industrial
MCRRFCWCID	Mendocino County Russian River Flood Control and Water Conservation Improvement District
MCL	maximum contaminant level
MG	million gallons
mgd	million gallons per day
MMWD	Marin Municipal Water District
MOU	Memorandum of Understanding
NCEI	National Center for Environmental Information
NMFS	National Marine Fisheries Service
NMWD	North Marin Water District
PG&E	Pacific Gas and Electric
Plan	Urban Water Management Plan
PVID	Potter Valley Irrigation District
PVP	Potter Valley Project
Restructured Agreement	Restructured Agreement for Water Supply
RR ResSim	Russian River System Model
SGMA	Sustainable Groundwater Management Act
SVCSD	Sonoma Valley County Sanitation District
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
Water Agency	Sonoma County Water Agency
WUE	water use efficiency

Section 1

Introduction

This wholesale Urban Water Management Plan (Plan) addresses the Sonoma County Water Agency (Water Agency) water transmission system and includes a description of the water supply sources, historical and projected water use, and a comparison of water supply to water demands during normal, single-dry, and multiple-dry years. The Water Agency provides wholesale water, principally from the Russian River, to eight water contractors,[1] other water transmission system customers,[2] and the Marin Municipal Water District[3] (MMWD), collectively referred to as the Water Agency's Customers. The Water Agency also supplies small quantities of water (when available) from its transmission system to surplus water customers[4], and allows other entities known as Russian River customers[5] to divert water from the Russian River under the Water Agency's water rights using their own facilities. Each of the water contractors and MMWD has prepared its own 2015 urban water management plan. This section describes the Urban Water Management Planning Act (Act), the Plan organization, and key assumptions.

1.1 Urban Water Management Planning Act

The Water Agency's Plan has been prepared in accordance with the Act, which is in the California Water Code, Sections 10610 through 10656. The Act requires every urban water supplier that provides water for municipal purposes to more than 3,000 connections, or supplying more than 3,000 acre-feet (ac-ft) of water annually, to adopt and submit a plan every five years to the California Department of Water Resources (DWR). This plan serves as a long-range planning document for the Water Agency's wholesale water supply. Individual water contractors' plans should be consulted for details on their demands and supplies. The Act was most recently amended in 2014.

1.2 Plan Organization

This section provides a summary of the sections in the Plan. Section 2 presents the basis for preparing the Plan, linkage to regional planning, and coordination and outreach. Section 3 provides the system description including the Water Agency's organization, service area, climate, and demographics. Section 4 presents current and projected water uses. Water supply sources, water supply facilities, and the transmission system are described in Section 5. Section 6 describes the reliability of the water supplies. Section 7 presents the water shortage contingency planning and Section 8 addresses water demand management measures.

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[1] The water contractors include the Cities of Santa Rosa, Petaluma, Rohnert Park, Cotati, and Sonoma, the Town of Windsor, and the North Marin and Valley of the Moon Water Districts.

[2] The other water transmission system customers include the Forestville Water District, California-American Water Company (with respect to the Larkfield-Wikiup area), the Kenwood Village Water Company, Lawndale Mutual Water Company, and Penngrove Water Company, the County of Sonoma, the State of California, and Santa Rosa Junior College.

[3] The Agency's deliveries to Marin Municipal Water District are authorized by the Restructured Agreement for water supply (See Section 4.1.2) and are subject to the terms of a Supplemental Water Supply Agreement, dated July 1, 2015 between the Water Agency and the Marin Municipal Water District, which renewed two existing agreements (the "Offpeak Water Supply Agreement" and the "Agreement for the Sale of Water"). Deliveries to Marin Municipal Water District under the Supplemental Water Supply Agreement are subject to a number of limitations, including sufficient transmission system capacity. The maximum monthly delivery limit for Marin Municipal Water District is 12.8 mgd during the months of May through October, which is a combination of the limits under the Agreement for the Sale of Water (9 mgd) and the Offpeak Water Supply Agreement (360 ac-ft/month).

[4] Surplus Water is water that from time to time may be available for delivery from the Transmission System in excess of the amounts required to meet the Agency's contractual obligations and the requirements of all the Water Agency's Regular Customers. Surplus customers are subject to the Water Agency's Water Service Rules.

[5] These "Russian River Customers" include: City of Healdsburg, Camp Meeker Recreation and Park District, and Occidental Community Services District. Russian River customers divert at least a portion of their water supply under the Water Agency's water rights.

Section 9 presents the references used to help prepare this Plan. Appendices A through F provide relevant supporting documents.

DWR has provided a checklist of the items that must be addressed in each Plan based upon the Act. This checklist makes it simple to identify exactly where in the Plan each item has been addressed. The checklist is completed for this Plan and provided in Appendix F. It references the sections numbers where the specific items can be found. The tables that are recommended by DWR are identified in this Plan with their applicable DWR table number (DWR, 2016).

1.3 Assumptions

The evaluation and conclusions in this Plan are based in part upon assumptions (identified below and discussed in subsequent chapters) about the most likely outcome of decisions by regulatory agencies and other circumstances beyond the Water Agency's control over the 25-year planning period. The Water Agency recognizes that regulatory agencies may make different decisions or take different actions than those assumed by the Water Agency, which may affect the availability of water and the adequacy of the Water Agency's transmission system. Similarly, the Water Agency worked closely with its water contractors and MMWD as they developed their future water demand projections and their projections of the portion of their future demands to be supplied by the Water Agency (after considering conservation, recycled water, and local supplies). The Water Agency concludes, given the facts currently available, that the assumptions in this Plan are reasonable, but will monitor the assumptions and update subsequent Plans as warranted by new information.

Local planning agencies choosing to consider this document as a reference for analysis of water availability are encouraged to check with the Water Agency or the appropriate water retailer for updated information regarding the assumptions on which this Plan is based.

1.3.1 Potter Valley Project

This Plan assumes that Pacific Gas and Electric's (PG&E's) existing Federal Energy Regulatory Commission (FERC) license for the Potter Valley Project (PVP) will not be modified, and that a new license will be issued in 2022 or thereafter that will not appreciably change the amount of water discharged from the PVP into the Russian River system.

With respect to the PG&E FERC license for the PVP, the Water Agency acknowledges that the diversion of water by PG&E from the Eel River watershed into the Russian River watershed has been a source of controversy. The diversion has been ongoing for more than 100 years, during which time the State Water Resources Control Board (SWRCB) has issued numerous water rights licenses and permits along the Russian River in Mendocino and Sonoma Counties. Consequently, extensive agricultural, municipal, and commercial economies have developed during those 100 years in reliance upon the PVP diversions. Also, salmonid species within the Russian River watershed listed as threatened and endangered under the Endangered Species Act (ESA) depend on these continued diversions. For these reasons, it is reasonable to assume that the PVP diversions into the Russian River watershed will continue.

For example, in the license amendment proceeding at FERC involving PVP flows, FERC noted that "[b]oth [the National Environmental Policy Act] and section 10(a)(1) [of the Federal Power Act] require consideration of the effects of proposed [PVP flow] actions on, respectively, the environment and other public interest uses of the waterways." FERC explicitly recognized the importance of the PVP diversions to Mendocino and Sonoma Counties, both in its Environmental Impact Statement in the license amendment proceeding, and in its orders concluding the proceeding.[6]

[6] See Order on Rehearing (June 2, 2004) at 16 ("The Tribes and the Eel River Groups object to the fact that the EIS includes a detailed analysis of the potential economic impacts of the various alternatives on Russian River interests, but does not include a comparable analysis of economic impacts on Eel River Basin interests. As the January 28 Order explained, this is because the alternatives have direct and substantial effects on the Russian River Basin economy, which has strong agricultural and consumptive urban components.")

In addition, having a sufficient supply of water in Lake Mendocino in the fall is of critical importance to the salmonid species in the Russian River that are listed as threatened under the ESA. For example, the SWRCB has approved several requests by the Water Agency to temporarily reduce flows in the Russian River above Healdsburg to conserve water in Lake Mendocino for benefit of the listed Russian River salmonid species. In approving the Water Agency's requests, the SWRCB noted that "[t]he proposed change will help conserve cold water in Lake Mendocino so that it can be released for listed Russian River salmonid fisheries present in the Russian River during the late summer and fall months. It is in the public interest to preserve water supplies for these beneficial uses when hydrologic circumstances intervene to cause dangerous reductions in these water supplies." (SWRCB, 2004, 2007, 2009, May 2013, December 2013, 2014, and 2015).

Given the importance of the PVP diversions to the agricultural, commercial, and industrial economy in Mendocino and Sonoma Counties, as well as the importance of a sufficient water supply in Lake Mendocino to the threatened Chinook salmon and steelhead in the Russian River watershed, it is reasonable to assume that decisions about the extent of PVP diversions into the Russian River watershed made in any future proceedings by FERC (or by any other regulatory agencies potentially having jurisdiction over PVP flows) will recognize the importance of those diversions to Mendocino and Sonoma Counties and the Russian River fishery.

Operating under the assumption that PVP flows into the East Fork Russian River will continue to be maintained at the levels set forth in the existing FERC PVP license is an assumption that is supported by the evidence, given the history of proceedings regarding the PVP at FERC and the historical reliance of Mendocino and Sonoma counties on the diversions. In order to base the water supply analysis in this Plan on an alternate assumption, the Water Agency would have to select a specific alternate assumption out of a universe of potentially available assumptions. The Water Agency's reliance on existing conditions instead of some speculative future alternative is reasonable and appropriate.

1.3.2 Threatened and Endangered Species – Russian River Biological Opinion

Two salmonid species inhabiting the Russian River watershed (Chinook salmon and steelhead) have been listed as "threatened" under the federal ESA, and one species – Coho salmon – has been listed as "endangered" under the federal ESA and under the California ESA. Protective regulations promulgated under the ESA prohibit the "take" of these species. "Take" is broadly defined in the ESA and its implementing regulations; it includes not only intentionally killing a protected species, but also actions that unintentionally result in actual harm to a member of a protected species, including adverse modification of habitat. Civil and criminal penalties may be imposed under the ESA for the "take" of protected species.

Because the Water Agency's water supply facilities and operations have the potential to adversely affect the three listed species, the Water Agency entered into a Memorandum of Understanding in December 1997 to participate in a consultation under Section 7 of the ESA. The other signatories to the Memorandum of Understanding (MOU) included the U.S. Army Corps of Engineers (USACE), National Marine Fisheries Service (NMFS), and Mendocino County Russian River Flood Control and Water Conservation Improvement District (MCRRFCWCID). NMFS issued its Biological Opinion for Water Supply, Flood Control Operations, and Channel Maintenance conducted by the USACE, the Water Agency, and the MCRRFCWCID in the Russian River Watershed (Russian River Biological Opinion) on September 24, 2008. The California Department of Fish and Wildlife (CDFW) issued a consistency determination on November 9, 2009, finding that the NMFS' Russian River Biological Opinion was consistent with the requirements of the California ESA and adopting the measures identified in the Russian River Biological Opinion.

The Biological Opinion requires the Water Agency and the USACE to implement a series of actions to modify existing water supply and flood control activities that, in concert with habitat enhancement, are intended to minimize impacts to listed salmon species and enhance their habitats within the Russian River and its tributaries. In return, the Biological Opinion contains an "incidental take statement" that allows the Water Agency to "take" listed salmonid species (within limits specified in the Biological Opinion) while operating its

water transmission system and flood control activities, without violating the federal ESA. The CDFW consistency determination gives similar protection to the Water Agency under the California ESA. The Biological Opinion is in effect until September 2023.

The Water Agency must implement the following general categories to avoid jeopardy and maintain the Incidental Take Statement provided in the Biological Opinion:

- Modifying minimum instream flows in the Russian River and Dry Creek
- Enhancing salmon habitat in Dry Creek and its tributaries
- Developing a feasibility study of a bypass pipeline around Dry Creek that would be considered if habitat enhancement is unsuccessful
- Changing Russian River estuary management
- Improving water diversion infrastructure at the Water Agency's Wohler and Mirabel facilities
- Modifying flood control maintenance activities on the mainstem Russian River and its tributaries
- Continued participation in the Coho Broodstock program at the Warm Springs Dam Fish Hatchery

This Plan assumes that the Biological Opinion will remain in effect and that the Water Agency will carry out the actions required by (and be subject to the restrictions set forth in) the Biological Opinion. Although the Biological Opinion is only in effect until 2023, for purposes of this Plan the Water Agency assumes that it will engage in a new Section 7 consultation with NMFS and USACE and that a new Biological Opinion will be issued in the future. The Plan also assumes that the requirements, terms and conditions in the existing Biological Opinion will continue to be applicable through 2040. Although it is likely that any future consultation and new Biological Opinion will have provisions that differ from the existing Biological Opinion, it is impossible for the Water Agency to guess what new provisions might be added in future consultations. Moreover, given the long history of coordination and cooperation between the Water Agency, USACE, NMFS, and CDFW, the Water Agency reasonably assumes that any changes to the Biological Opinion will not affect the Water Agency's ability to deliver the quantities of water from its transmission system projected in this Plan.

The Water Agency has met the requirements of the Biological Opinion since its issuance, and has worked closely with NMFS and CDFW on the implementation of projects under the Biological Opinion. (The current status of Water Agency activities related to the Biological Opinion is available on-line at http://www.scwa.ca.gov/rrifr/). The long history of cooperation between the Water Agency and NMFS/CDFW and the successful implementation by the Water Agency of the Biological Opinion to date establish the reasonableness of the Water Agency's assumption.

Section 5.1.2 provides more detail about the terms and conditions of the Biological Opinion with respect to water supply.

1.3.3 Future Water Supply Projects

Section 5.7 and Table 5-10 describe the expected future water supply projects that will be necessary for the Water Agency to deliver the quantities of water from its transmission system projected in this Plan. This Plan assumes that those facilities will be approved and constructed within the times described in Table 5-10. The assumption that it maybe necessary for the Water Agency to make filings with the SWRCB (which may be an application for a new water right permit or petitions to amend the Water Agency's existing permits) so that the Water Agency will be authorized to divert and redivert more than 75,000 ac-ft annually by 2035 is reasonable. This date represents the professional opinion of Water Agency staff as to the date by which the Water Agency will receive approvals to increase diversions, given the various regulatory processes (including California Environmental Quality Act (CEQA) review and completion of the Section 7 consultation process). There is substantial evidence supporting this assumption. The physical water supply supporting the additional requested diversion already exists -- the Water Agency already has the right to divert and store the necessary water in Lake Sonoma and Lake Mendocino. The amount of the additional diversions to be

requested is relatively small. The need for the additional diversions is supported by the projections in this Plan, and as noted later in this Plan, the Water Agency and its Customers are maximizing conservation in order to reduce diversions to the extent practicable. Finally, the timing of the requests for additional diversions to the SWRCB will allow the Water Agency to incorporate the additional diversions into the new Section 7 consultation with NMFS described in Section 1.3.2. Given the long history of ongoing cooperation between the Water Agency and NMFS, it is the professional opinion of Water Agency staff that NMFS is likely to issue a new Biological Opinion that will provide "incidental take" coverage for the increased diversions. Again, while nothing in the future is certain, there is substantial evidence to support the Water Agency's assumption that it will receive approval to increase its Russian River diversions up to 76,000 ac-ft per year (ac-ft/yr).

1.3.4 Climate Change

The Water Agency has investigated whether existing climate models can be used or modified to provide reliable estimates of the effects of increased concentrations of carbon dioxide and other greenhouse gases on temperatures and precipitation patterns within the Water Agency's service area and within the watersheds from which the Water Agency obtains its water supply during the 25-year planning horizon. As of this time, no detailed analysis exists of potential climate change impacts that takes into consideration regional climate factors such as the influence of marine layers, whose effects on the region are difficult to model. For these reasons, this Plan assumes that the climatic patterns and associated hydrology experienced over the past 104 years of record (1910 – 2013) provide a reasonable basis for the 25-year planning horizon that would impact the water supply and water demand analysis set forth in the Plan. As discussed in Section 5.9, however, the United States Geological Survey (USGS) conducted a study for the Water Agency on the potential effects of climate change on the Water Agency's water supply, which has provided additional information on the potential impacts of climate change on the Water Agency's service area. Furthermore, the Water Agency has embarked on a Climate Adaptation Planning process which will study the potential impacts of climate change in regards to both water supply reliability and the Water Agency's transmission system facilities. This process will analyze the results of multiple climate models to determine a range of potential climate related impacts. A risk based analysis of the potential impacts to the watershed and Water Agency facilities will be used to identify courses of action that can be pursued to mitigate the effects of climate change. A work plan was developed in 2015 and a robust planning process will begin in 2016.

If one or more of these assumptions about the Potter Valley Project, Russian River Biological Opinion or Climate Change, discussed above, do not come to pass, there are other potential alternative projects that could be evaluated and potentially implemented to mitigate the effect of any reduction in water supply caused thereby. Although the assumptions set forth above are reasonable and supported by substantial evidence at the present, certainty of outcomes over the 25 year planning horizon of this Plan is not possible. For this reason, this Plan will be updated in 2020 and every five years thereafter, so that new information can be considered, and the Water Agency will make interim modifications to the Plan as warranted. Customers of the Water Agency, local planning agencies, and other persons relying on this Plan as a reference for analysis of water supply availability are encouraged to check with the Water Agency for updated information regarding these assumptions.

Section 2

Plan Preparation

This section presents the basis for preparing the Plan, Plan identification, coordination and outreach, and Plan adoption and submittal.

2.1 Basis for Preparing the Plan

The Water Agency is a wholesale urban water supplier. Table 2-1 presents the Public Water System name and number. While the Water Agency is extensively involved in regional planning, individual reporting is selected for this Plan as identified in Table 2-2. Each of the retail water agencies has developed their own Plan. The Water Agency has selected to report on a calendar year basis using ac-ft as the unit of measure as noted in Table 2-3.

Table 2-1. Wholesale: Public Water Systems (DWR Table 2-1)

Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA4910020	Sonoma County Water Agency	14	43,112
TOTAL		14	43,112

Table 2-2. Plan Identification (DWR Table 2-2)

✓	Individual UWMP
	Regional UWMP (RUWMP)

Table 2-3. Agency Identification (DWR Table 2-3)	
Type of Agency (select one or both)	
✓	Agency is a wholesaler
	Agency is a retailer
Fiscal or Calendar Year (select one)	
✓	UWMP Tables Are in Calendar Years
	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Day that the Fiscal Year Begins	
Day	*Month*
Units of Measure Used in UWMP (select one)	
✓	Acre Feet (AF)
	Million Gallons (MG)
	Hundred Cubic Feet (CCF)

2.2 Coordination and Outreach

The Act requires the Water Agency to coordinate with its retail water agency customers as well as with other pertinent agencies and the community.

2.2.1 Wholesaler and Retailer Coordination

The Water Agency coordinated the preparation of its Plan with its retail water agency customers listed in Table 2-4 by identifying and quantifying water supplies available to each retailer from the Water Agency. The retailers provided their projected use of wholesale water as well as their population projections. The Water Agency and its customers coordinated the preparation of their respective Plans at the monthly meetings of the Water Advisory Committee and the Technical Advisory Committee (TAC). Appendix A includes documentation of water supplier coordination.

Table 2-4. Wholesale: Water Supplier Information Exchange (DWR Table 2-4)	
✓	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with CWC 10631. Completion of the table below is optional. If not completed include a list of the water suppliers that were informed.
	Provide page number for location of the list. Table 2-5 lists transmission system customers under 'Water Contractors' and 'Other Transmission System Customers and MMWD' categories and non-transmission system customers under 'Russian River Customers (Direct Diverters)' category.
	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631.Complete the table below.
Water Supplier Name	

2.2.2 Coordination with Other Agencies and the Community

The Water Agency coordinated the preparation of this Plan with its Customers, as well as many other relevant agencies. Table 2-5 provides a summary of the Water Agency's coordination efforts with the appropriate agencies.

The Water Agency encouraged community and public interest involvement in the Plan update through public notifications, internet and social media postings, and inspection of the draft document. Postcards and communications were distributed to organizations informing the recipients that the Water Agency was starting the Plan update process, and inviting the recipients to provide input into the Plan. The coordination post card, outreach list, and coordination emails with other agencies are provided in Appendix A.

The Water Agency also included articles about the Plan update process in its monthly electronic newsletter (SCWA ENews) in March and May 2016. The Water Agency utilized social media as a part of its Plan update outreach strategy. A special Plan preparation e-mail account (uwmp@scwa.ca.gov) was established at the Water Agency to help coordinate public input. The Water Agency's external public web site (www.sonomacountywater.org) featured a special Plan preparation web page that included public notices, Plan preparation schedule, and staff contact information.

Table 2-5. Coordination of Plan Preparation							
	Was notified that Plan development was initiated	Participated in developing the Plan	Commented on the draft Plan	Attended Water Agency public meetings	Was contacted for assistance	Was sent a copy of the draft Plan	Was sent a notice of public meeting and intention to adopt
Water Contractors							
City of Cotati	✓	✓			✓	✓	✓
North Marin Water District	✓	✓	✓	✓	✓	✓	✓
City of Petaluma	✓	✓			✓	✓	✓
City of Rohnert Park	✓	✓			✓	✓	✓
City of Santa Rosa	✓	✓			✓	✓	✓
City of Sonoma	✓	✓			✓	✓	✓
Valley of the Moon Water District	✓	✓	✓		✓	✓	✓
Town of Windsor	✓	✓			✓	✓	✓
Other Transmission System Customers and MMWD							
Forestville Water District	✓				✓	✓	✓
Marin Municipal Water District	✓	✓			✓	✓	✓
California American Water Company (Larkfield)	✓				✓	✓	✓
Penngrove Water Company	✓				✓	✓	✓
Lawndale Mutual Water Company	✓				✓	✓	✓
Kenwood Water Company	✓				✓	✓	✓
Russian River Customers (Direct Diverters)							
Camp Meeker Recreation and Park District	✓				✓	✓	✓
Occidental Community Services District	✓				✓	✓	✓
City of Healdsburg	✓				✓	✓	✓
Counties							
County of Marin	✓					✓	✓
County of Sonoma	✓					✓	✓
County of Mendocino	✓					✓	✓

Table 2-5. Coordination of Plan Preparation							
	Was notified that Plan development was initiated	Participated in developing the Plan	Commented on the draft Plan	Attended Water Agency public meetings	Was contacted for assistance	Was sent a copy of the draft Plan	Was sent a notice of public meeting and intention to adopt
Regional Agencies							
Mendocino County Russian River Flood Control and Water Conservation Improvement District (MCRRFCWCID)	✓					✓	✓
State Agencies							
North Coast Regional Water Quality Control Board	✓					✓	✓
San Francisco Bay Regional Water Quality Control Board	✓					✓	✓
State Water Resources Control Board	✓					✓	✓
California Department of Fish and Wildlife (CDFW)	✓					✓	✓
Federal Agencies							
U.S. Army Corps of Engineers (USACE)	✓					✓	✓
Federal Energy Regulatory Commission (FERC)	✓					✓	✓
National Marine Fisheries Service (NMFS)	✓					✓	✓
Other							
City of Cloverdale	✓					✓	✓
City of Ukiah	✓					✓	✓
City of Sebastopol						✓	✓
Potter Valley Irrigation District	✓					✓	✓
Redwood Valley County Water District	✓					✓	✓
Sweetwater Springs Water District	✓					✓	✓
Pacific Gas & Electric (PG&E)	✓					✓	✓
General public	✓		✓	✓		✓	✓

2.2.3 Adoption and Submittal

Cities and counties within the service area were notified that the Plan was being prepared more than 60 days prior to the public hearing, as noted in Table 2-6 and documented in Appendix B with some example notifications. Public hearing notifications were published in the Santa Rosa Press Democrat, in the May 2016 issue of the Water Agency monthly public electronic newsletter (SCWA ENews), on the Water Agency's website, and included in its social media sites. Copies of the draft Plan were made available for public inspection at the Water Agency's Administration building, the Clerk of the Water Agency's Board of Directors, and the Water Agency's web site.

Table 2-6. Wholesale: Notification to Cities and Counties (DWR Table 10-1)

✓	Supplier has notified more than 10 cities or counties in accordance with CWC 10621 (b) and 10642. Include a separate list of the cities and counties that were notified. Location of this list in the UWMP: Table 2-6	
	Supplier has notified 10 or fewer cities or counties. Complete the table below.	
City Name	60 Day Notice	Notice of Public Hearing
City of Santa Rosa	✓	✓
City of Sonoma	✓	✓
City of Cotati	✓	✓
Town of Windsor	✓	✓
City of Rohnert Park	✓	✓
City of Petaluma	✓	✓
City of Novato	✓	✓
City of Sebastopol	✓	✓
City of Healdsburg	✓	✓
City of Cloverdale	✓	✓
City of Ukiah	✓	✓
County Name	60 Day Notice	Notice of Public Hearing
Marin County	✓	✓
Sonoma County	✓	✓
Mendocino County	✓	✓

The public hearing was held on June 21, 2016 as agenda item 42 to provide an opportunity for all residents and those employed in the service area to learn and ask questions about their water supply and the Water Agency's plans for providing a reliable, safe, high-quality water supply. One written and three verbal comments were received. A video of the public hearing and Plan adoption can be viewed at the County of Sonoma's web page for Board of Supervisors meetings (http://sonomacounty.ca.gov/Board-of-Supervisors/Calendar/). This Plan was adopted by the Water Agency's Board of Directors on June 21, 2016 after the public hearing was closed. A copy of the adoption resolution is provided in Appendix B.

The 2015 Plan was submitted to DWR, the California State Library, and Sonoma, Mendocino, and Marin Counties and pertinent cities within 30 days after adoption. The Plan was made available for public review on the Water Agency's web site within 30 days after filing a copy of the Plan with DWR.

Section 3

System Description

This section describes the Water Agency's service area, climate, and population.

3.1 General Description

The Water Agency's water service area covers a large part of Sonoma County (County), as well as the eastern portion of Marin County. The service areas of the Water Agency's Customers are shown on Figure 3-1, as well as some of the Water Agency's water supply, storage, and transmission facilities.

The Water Agency was created as a special district in 1949 by the California Legislature to provide flood protection and water supply services. Legislation enacted in 1995 added the treatment and disposal of wastewater to the Water Agency's responsibilities.

The Sonoma County Board of Supervisors acts as the Water Agency's Board of Directors. The Water Agency is a separate legal entity created by State law, having specific limited purposes and powers, and separate sources of funding. The Water Agency is thus different from County departments, which are created by the Board of Supervisors for administrative purposes, but are not separate legal entities.

Land use within the Water Agency's service area is characterized as urbanized. Residential development is more densely concentrated in the cities of Santa Rosa, Rohnert Park, Petaluma, Windsor, Cotati, and Sonoma, with Forestville, Valley of the Moon, and Larkfield-Wikiup having less concentrated development. In Marin County, residential development is concentrated along Highway 101 and adjacent to San Pablo Bay.

Sonoma County, by policy, concentrates urban growth within incorporated cities, not in the unincorporated area. Sonoma County has a voter-approved County-wide urban growth boundary and each city has an urban growth boundary. There are voter-approved taxes supporting open space acquisition in Sonoma and Marin Counties. Most of the Water Agency's water contractors have locally approved growth management ordinances.

Within the Water Agency's service area, employment is primarily in the public sector and in the service and manufacturing industries. Regionally, employment in the agricultural industry is associated with vineyards, livestock, orchards, silage crops, and timber. The primary industrial activities in the region include: telecommunications, wine production, recreation, tourism, timber and other agricultural product processing, energy production, and miscellaneous manufacturing. The urban water management plans developed by the Water Agency's Customers should be consulted for descriptions of their retail service areas.

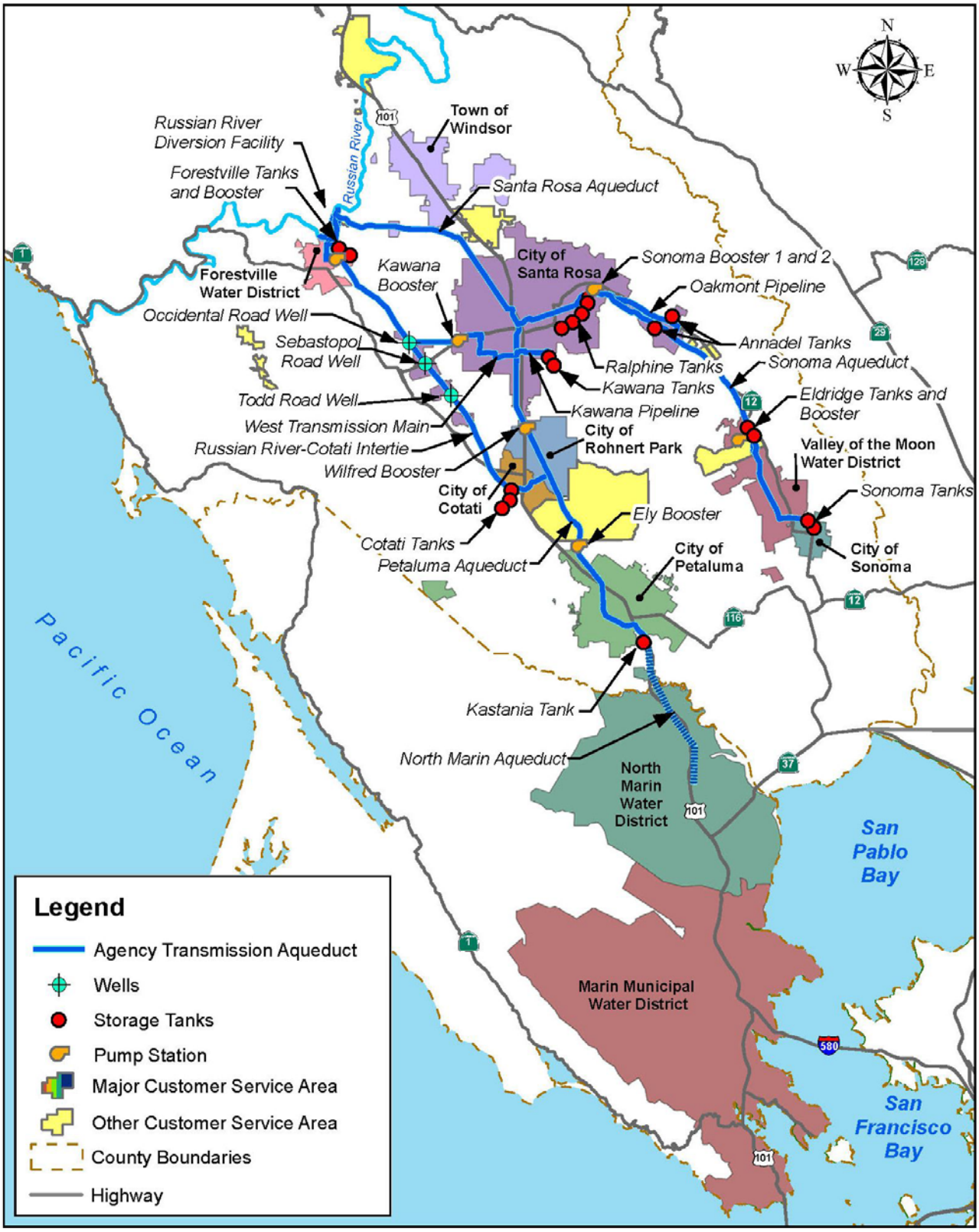

Figure 3-1. Water Agency Service Areas and Water Transmission System Facilities

3.2 Service Area Climate

The climate in the service area influences water demands, primarily outdoor water use, and the amount of surface water supplies. The climate of the Russian River watershed, the source of the majority of the Water Agency's water supply, influences the magnitude and timing of Russian River flows. The Russian River watershed is also influenced by its proximity to the Pacific Ocean. In common with much of the California coastal area, the year is divided into wet and dry seasons. Approximately 93 percent of the annual precipitation normally falls during the wet season, October to May, with a large percentage of the rainfall typically occurring during three or four major winter storms. These major storms often come in the form of an Atmospheric River, which is the horizontal transport of large amounts of water vapor through the atmosphere along a narrow corridor. Although brief, Atmospheric Rivers can produce 30-50% of the regions annual precipitation in a matter of a few days (http://www.esrl.noaa.gov/psd/atmrivers/). Winters are cool, and below-freezing temperatures seldom occur. Summers are warm and the frost-free season is fairly long. A significant part of the region is subject to marine influence and fog intrusion. Prevailing winds are from the west and southwest.

Tables 3-1 summarizes the monthly average climatic data at the Santa Rosa climate station operated under DWR's California Irrigation Management Information System (CIMIS) for January 1991 through December 2015 (CIMIS, 2015). Located within the inland valleys, six CIMIS weather stations in the service area typically report an annual average of 45 inches of water being transferred to the atmosphere through evapotranspiration (ETo). Warm seasons produce the highest levels of ETo, with some areas within the service area recording maximum ETo values near 55 inches annually (Table 3-2). According to the National Center for Environmental Information (NCEI), from 1981 - 2010 daily minimum and maximum temperatures averaged monthly ranged from 35ºF to 90ºF within the service area (NCEI cooperative stations: Petaluma 46826, San Rafael 47880, Santa Rosa 47965, Sonoma 48351, and Sonoma County Airport 23213). Average annual precipitation varied from 27 to 36 inches for the five NCEI weather stations. Figure 3-2 displays the distribution of CIMIS and NCEI weather stations throughout the service area.

The climatic conditions are different in areas other than the locations of the CIMIS and NCEI weather stations. For example, as shown in Figure 3-3, average annual precipitation is as high as 80 inches in the mountainous coastal region of Sonoma County. The quantity of rainfall over Sonoma and Marin counties increases with elevation, with the greatest precipitation occurring over the highest ridges. The valleys, where the majority of the water users are located, receive considerably less rainfall with some areas averaging just over 20 inches of precipitation annually.

Figure 3-2. Climate Stations Distribution

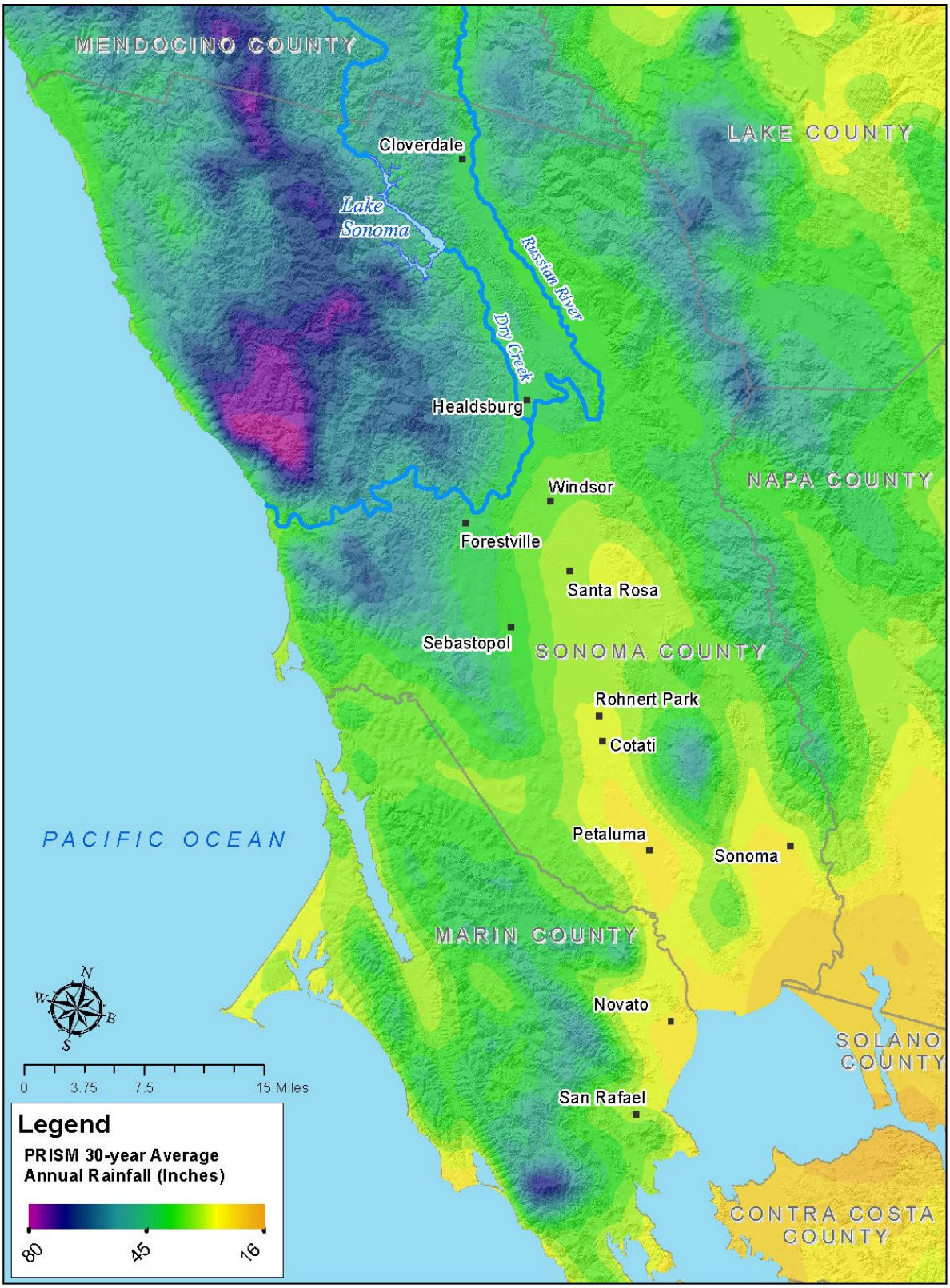

Figure 3-3. Precipitation Map

Table 3-1. Climate			
	Standard average monthly ET_o, in.	Average monthly rainfall, in.	Average monthly temperature , °F
January	1.16	5.63	45
February	1.72	6.24	48
March	3.12	4.03	50
April	4.39	1.98	53
May	5.61	1.28	57
June	6.22	0.91	61
July	6.32	0.26	62
August	5.74	0.28	62
September	4.48	0.24	61
October	3.15	1.53	57
November	1.55	3.17	50
December	0.97	6.91	45
Annual	44.43	32.47	54

Note: Data represent the monthly average from January 1991 to December 2015 and was recorded from Santa Rosa CIMIS Station 83. Data obtained from CIMIS website (http://www.cimis.water.ca.gov) on December 9, 2015.
ET_o, or reference evapotranspiration, is the loss of water from evaporation and transpiration from plants and is specifically related to turf.

Table 3-2. Annual Evapotranspiration Throughout Service Area (Inches)						
	Santa Rosa #83	Bennett Valley #158	Windsor #103	Petaluma East #144	Point San Pedro #157	Black Point #187
	1990 - 2015	2001-2015	1991-2012	2000-2015	2003-2015	2004-2015
Min	38.99	39.95	42.51	32.38	40.03	39.77
Max	49.5	47.7	49.74	47.67	48.56	54.92
Average	44.55	44.53	45.79	43.32	45.27	47.98

Note: Data represent annual evapotranspiration during the specified time period for each CIMIS station. Data obtained from CIMIS website (http://www.cimis.water.ca.gov) on April 4, 2016.

3.2.1 Climate Change

In 2012 the USGS, in collaboration with the Water Agency, completed a study of the effects of climate change in the Russian River Valley and the Santa Cruz Mountains (USGS, 2012). The study was based on analyzing Global Circulation Model (GCM) projections that had been downscaled to a 270-meter spatial grid cell resolution and a daily temporal scale resolution from 2000 to 2099. The future climate projections were then used as the climatic input into a hydrologic model developed by the USGS of the Russian River Basin (Basin Characterization Model) to analyze how projected changes in climate, potential evapotranspiration, recharge, runoff and climatic water deficit may affect basin hydrology. Findings of this work showed significant variability to changes in precipitation and hydrologic response in the Russian River due to climate change. Some future climate projections predicted drier conditions, while others predicted wetter conditions. Hydrologic models predicted reduced early and late wet season runoff for the end of the century for both wetter and drier climate projections, which could result in an extended dry season.

This study further found that all of the GCM projections analyzed predicted continual warming for the region. Summers are projected to be longer and drier in the future than in the past regardless of precipitation trends. Furthermore, water supply could be subject to reduced reliability due to greater variability in precipitation, increased evapotranspiration rates, and climatic water deficit during the extended summers. The Water Agency continues to work with the USGS and other partners in the region including the Sonoma County Regional Climate Protection Authority and the North Bay Climate Adaptation Initiative to expand climate change modeling to include updated GCM projections and other model refinements.

3.3 Service Area Population and Demographics

Table 3-3 provides the total current and projected populations through the year 2040 for the Water Agency's Customers. Table 3-4 presents the population of each individual retail water agency. The water contractors and MMWD provided the population estimates to the Water Agency that are contained in Table 3-3, developed during the preparation of their own urban water management plans. The Water Agency developed the population projections for the other Water Agency customers based on census tracts and Association of Bay Area Governments (ABAG) data, as described in Section 4.1.2.

Table 3-3. Wholesale: Population - Current and Projected (DWR Table 3-1)

Population Served	2015	2020	2025	2030	2035	2040
	614,196	642,460	670,524	698,824	728,008	742,040

Table 3-4. Population by Retail Agency – Current and Projected

Water Contractors[a]	2015	2020	2025	2030	2035	2040
City of Cotati	7,560	7,867	8,187	8,520	8,866	9,226
North Marin Water District	61,150	62,656	63,929	65,099	66,139	67,482
City of Petaluma	61,201	63,631	66,061	68,490	70,920	73,350
City of Rohnert Park	45,465	47,232	49,054	51,016	53,232	55,524
City of Santa Rosa	173,071	189,053	205,036	221,018	237,000	237,000
City of Sonoma	11,147	11,375	11,642	11,865	12,130	12,430
Valley of the Moon Water District	24,174	24,873	25,229	25,586	25,943	26,300
Town of Windsor	27,486	29,000	30,150	31,400	32,650	34,000
Other Water Transmission System Customers[b]						
Larkfield (California American Water Company)	8,270	8,339	8,413	8,475	8,547	8,619
Forestville Water District	3,500	3,606	3,744	3,824	3,892	3,960
Kenwood	1,003	1,012	1,021	1,031	1,041	1,052
Lawndale	312	315	318	321	324	327
Penngrove	1,657	1,702	1,739	1,779	1,824	1,869
Marin Municipal Water District[a]	188,200	191,800	196,000	200,400	205,500	210,900
Total	614,196	642,460	670,524	698,824	728,008	742,040

[a] *As provided by the water contractors and MMWD.*

[b] *Estimated by the Water Agency using the 2009 ABAG population projections.*

3.3.1 Other Demographic Factors

Other demographic factors that affect water management planning include the uncertainty in estimating future population growth and per capita water use. The actual population growth that has occurred since the preparation of the 2010 Plan has been generally less than anticipated. The recession that started in 2008 and the accompanying slowdown in the construction of dwelling units resulted in slower population growth than previously estimated. The adoption of 2020 per capita demand targets in 2010 along with conservation programs enacted during the drought in 2014 and 2015 have resulted in a significant decline in per capita water use. While it is not known to what extent per capita water use will rebound, it is unlikely that pre-drought levels will return. The uncertainties with both future population and per capita water use are considered in the Water Agency's water management planning.

Section 4

System Water Use

This section presents the current and projected wholesale water demands of the Water Agency's wholesale water Customers and direct diverters, transmission system losses, and climate change impacts on water use.

4.1 Evaluation of Portion of Projected Total Water Demand to be met by Water Agency Supplies

This section describes: (1) the general process that the Water Agency's retail water contractors and MMWD employed to develop population and water demand projections; and (2) the Water Agency's analysis of population and water demands for other Water Agency transmission system customers[7] and Russian River customers.

4.1.1 Evaluation of Water Demand Projections by Water Agency's Water Contractors and MMWD

The Water Agency coordinated with its water contractors and MMWD as they developed population and water demand projections through 2040 as part of their urban water management plans.[8] The projections of water demands presented in this Plan include the combined results of these individual evaluations. Details regarding demand projections, water conservation savings, recycled water use, and local supplies are provided in each of the water contractor's and MMWD's urban water management plans. Their urban water management plans also contain their analysis of low income water demand projections and per capita demand baselines and targets as defined by SBX7-7. To identify the portion of future water demand that the Water Agency, as a wholesaler, is projected to supply to the water contractors and MMWD, the following process was followed:

1. The total projected population and water demand was estimated by each water contractor and MMWD utilizing its respective land use planning information (e.g., general plans, ABAG projections) and Decision Support System (DSS) modeling, or equivalent methods of analysis.
2. The amount of conservation savings was estimated by each water contractor and MMWD utilizing the DSS model or other methods of analysis in compliance with SBx7-7 requirements.
3. The water contractors and MMWD evaluated the amount of the remaining water demand that could be offset by their respective projected recycled water and local supplies.
4. The remaining net demand represents the portion of water supply projected to be provided by the Water Agency. The projected portion of MMWD's water demands to be met by the Water Agency was based on MMWD's analysis presented in its urban water management plan.

The Water Agency, water contractors, and MMWD coordinated with each other throughout this evaluation process.

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[7] The Water Agency only developed population and water demand projections for Customers that are not required to prepare urban water management plans because they are small and are exempt from the Act. Water Agency Customers that do not prepare urban water management plans due to exemptions based on their size include the Forestville Water District, California-American Water Company (with respect to the Larkfield District), the Kenwood Water Company, Lawndale Mutual Water Company, Penngrove Water Company, the County of Sonoma, the State of California, and Santa Rosa Junior College.

[8] Water contractors that provided population and water demand projections to the Water Agency include the Cities of Santa Rosa, Petaluma, Rohnert Park, Cotati, and Sonoma, the Town of Windsor, and the North Marin and Valley of the Moon Water Districts.

4.1.2 Evaluation of Water Demand Projections for Other Water Transmission System Customers and Russian River Customers

The Water Agency developed population and water demand projections for other water transmission system customers and Russian River customers that are not required to prepare an urban water management plan given their small number of connections and/or annual deliveries. With the exception of the City of Healdsburg, the projected demands for these customers were evaluated by considering the historical total demands and Water Agency deliveries to each customer and developing projected deliveries through 2040 based on changes in projected service population. Using the 'ABAG Projections 2009 by Census Tract' dataset, the population growth rates for the customer service areas were estimated based on analyses of the overlapping census tracts The estimated future annual diversions by the City of Healdsburg under the Water Agency's water rights were based on discussions with the City of Healdsburg and the water supply contract's primary purpose as a backup water supply.

4.2 Water Uses

The Water Agency provides wholesale water to its Customers, which then retail water directly to different water user categories, including single-family, multi-family, commercial, industrial, institutional/governmental, and landscape. The information on the water demands of each user type is contained in the individual urban water management plans prepared by the Water Agency's Customers.

Table 4-1 presents the 2015 water demands by user type that are supplied by the Water Agency. Table 4-2 presents the projected demands in five year intervals through 2040. Table 4-3 breaks down the current and projected wholesale water sales to other agencies for each of the Water Agency's water contractors, other transmission system customers and Russian River customers. Customers' demand projections are based on information provided by the Water Agency's Customers as described in Section 4.1. Tables 4-1, 4-2, and 4-3 do not include demands that are met by water conservation or are supplied by the Customers' recycled water or local supplies (consisting of groundwater, and, in the case of North Marin Water District (NMWD) and MMWD, surface water). The total amount of water projected to be provided by the Water Agency is presented in Table 4-4. The Water Agency does not purchase water from other agencies.

Table 4-1. Wholesale: Demands for Potable and Raw Water – Actual (DWR Table 4-1)

Use Type	2015 Actual		
	Additional Description (as needed)	Level of Treatment When Delivered	Volume, ac-ft
Sales to other agencies	Includes sales under water rights that are not delivered via transmission system	Drinking Water	43,081
Transfers to other agencies			0
Exchanges to other agencies			0
Groundwater recharge			0
Saline water intrusion barrier			0
Agricultural irrigation		Drinking Water	40
Wetlands or wildlife habitat			0
Retail demand for use by agencies that are primarily wholesalers with a small volume of retail sales		Drinking Water	23
Losses	Only includes Water Agency transmission system losses		1,589
Other			0
Total			44,733

Table 4-2. Wholesale: Demands for Potable and Raw Water – Projected (DWR Table 4-2)

Use Type	Additional Description (as needed)	Projected Water Use, ac-ft				
		2020	2025	2030	2035	2040
Sales to other agencies	See Table 4-3 for breakdown by agency. Includes sales under water rights that are not delivered via transmission system	64,283	68,213	70,836	72,880	73,726
Transfers to other agencies		0	0	0	0	0
Exchanges to other agencies		0	0	0	0	0
Groundwater recharge		0	0	0	0	0
Saline water intrusion barrier		0	0	0	0	0
Agricultural irrigation		61	61	61	61	61
Wetlands or wildlife habitat		0	0	0	0	0
Retail demand for use by agencies that are primarily wholesalers with a small volume of retail sales	Small non-surplus customers include the County of Sonoma, the State of California, and Santa Rosa Junior College	95	98	101	104	107
Losses	Only includes Water Agency transmission system losses	1,821	1,937	2,013	2,072	2,093
Other		0	0	0	0	0
Total		66,260	70,309	73,011	75,117	75,987

Table 4-3. Water Agency Sales to Water Agency Contractors and Customers, ac-ft/yr						
	Actual[a]	Projected [e]				
Water Contractors[b]	2015	2020	2025	2030	2035	2040
City of Cotati	479	927	938	936	960	989
North Marin Water District	5,002	8,699	8,835	8,913	9,028	9,178
City of Petaluma	7,020	8,737	8,898	9,137	9,478	9,757
City of Rohnert Park	2,774	4,403	4,763	5,043	5,320	5,489
City of Santa Rosa	15,341	22,849	24,289	25,955	26,803	26,840
City of Sonoma	1,588	1,924	2,015	2,078	2,217	2,212
Valley of the Moon Water District	1,837	2,671	2,798	2,879	3,010	3,018
Town of Windsor[f]	3,048	4,156	4,256	4,358	4,493	4,637
Other Water Transmission System Customers[c]						
Larkfield (California American Water Company)	219	568	576	583	591	600
Forestville Water District	377	458	476	486	495	504
Kenwood	4	6	7	8	9	10
Lawndale	62	80	82	84	86	88
Penngrove	169	215	230	245	260	275
Marin Municipal Water District[d]	5,131	8,460	9,920	10,000	10,000	10,000
Other Customers[g]	63	156	159	162	165	168
Russian River Customers	31	130	130	130	130	130
Total	43,145	64,439	68,372	70,997	73,045	73,895

[a] *Sales figures (2015).*

[b] *Projections of future demand in this table represent the water demand figures provided by the water contractors as developed for their individual urban water management plans less savings due to an individual water contractor's water conservation and local water supply development (groundwater, recycled water, or surface water). Pursuant to the Restructured Agreement for Water Supply, the water contractors have also agreed to use their best efforts to secure the implementation of recycled water or local supply projects to reduce the water contractors' collective deliveries from the Transmission System.*

[c] *Projections based on historical deliveries and 2009 ABAG census tract data.*

[d] *Projections provided by MMWD.*

[e] *Because the figures in this table from 2020 to 2040 are projections, actual local water supply development amounts may vary over time from those estimated for purposes of the figures set forth in the table, as may the manner in which contractors achieve those local water supply amounts (i.e., projected savings and local supply/recycled water may vary).*

[f] *Includes Windsor transmission system and direct diversion demands.*

[g] *2015 actual sales include surplus sales and small non-surplus customers (the County of Sonoma, the State of California, and Santa Rosa Junior College).*

Table 4-4. Wholesale: Total Water Demands, ac-ft (DWR Table 4-3)						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water From Tables 4-1 and 4-2	44,733	66,260	70,309	73,011	75,117	75,987
Recycled Water Demand	0	0	0	0	0	0
Total Water Demand	44,733	66,260	70,309	73,011	75,117	75,987

As noted above, the future water demand estimates in Table 4-4 are based upon information provided by the Water Agency's Customers, and are based upon future population estimates derived from their respective planning departments' General Plan projections. The future demand estimates are also based on projected water conservation savings. If the actual future population in the Water Agency's Customers' service areas is less than that estimated by the Customers or additional water conservation programs are implemented reducing projected demand, then the actual future water demands may be less than those shown in Table 4-4. During the 2013 through 2015 drought, the Governor's state of emergency declaration and regulatory constraints resulted in significantly reduced water demands and thus reduced deliveries by the Water Agency to its Customers. There is evidence that such multiple-year suppression of water use (caused by drought, economic conditions, or otherwise) may result in permanent longer-term reductions in water consumption by water users. As a response to the recent drought, the Water Agency and its Customers have expanded water use efficiency programs which have resulted in permanent changes that will affect long term water use. For these reasons, actual future demands on the Water Agency's transmission system are uncertain.

4.3 Transmission System Losses

Water losses in the Water Agency's transmission system for 2015 are presented in Table 4-5. These are the water losses from the diversion location on the Russian River to the points of connection with the Water Agency's Customers. The water loss is calculated using the AWWA water audit methodology. The water loss of 2015 and the projected water losses are included in Tables 4-1 and 4-2. The water loss workbook is included in Appendix C.

Table 4-5. Wholesale: 12 Month Water Loss Audit Reporting (DWR Table 4-4)

Reporting Period Start Date (Month/Year)	Loss, ac-ft[a]
7/2014	1,327

[a] Losses consist of real and apparent losses for the Water Agency's transmission system. Projections assume a water loss of 3% of transmission system deliveries.

4.4 Climate Change

Climate change will impact landscape water use due to projected temperature increases that will likely require more water to maintain a healthy landscape. The Water Agency and its Water Customers continue to promote locally appropriate plant material through its Water Use Efficiency Programs, while offering incentives to replace high water use plants that will require more water as the impacts of climate change develop.

Section 5

System Supplies

This section describes the water supply sources and quantities of the Water Agency's water supplies. The urban water management plans of the Water Agency's Customers should be consulted for details on their individual local water supplies.

The Russian River provides most of the Water Agency's water supply with groundwater supply from the Santa Rosa Plain as a secondary source. Almost all of the Water Agency's Customers have other water supplies, in addition to those provided by the Water Agency, which includes local surface water, local groundwater, and recycled water. These local supplies are accounted for in these entities' retail urban water management plans. With the exception of limited quantities of water sold by the Water Agency to government entities, "surplus water" irrigation customers and the provision of fire protection service, the water supplied by the Water Agency through the water transmission system is sold wholesale to retail water suppliers.

5.1 Surface Water

The Water Agency's Russian River water supply is controlled and influenced by a variety of agreements and decisions. This section describes the water rights held by the Water Agency, the surface water supply facilities, and the various agreements and issues that may influence the availability of the surface water supply.

5.1.1 Water Rights

Currently, four water rights permits[9] issued by the SWRCB authorize the Water Agency to store up to 122,500 ac-ft/yr of water in Lake Mendocino and up to 245,000 ac-ft/yr of water in Lake Sonoma, and to divert or redivert up to 180 cubic feet per second (cfs) of water from the Russian River with a limit of 75,000 ac-ft/yr. The permits also establish minimum instream flow requirements for fish and wildlife protection and recreation. These minimum instream flow requirements vary based on the hydrologic classifications of *Normal*, *Dry*, and *Critical* water supply conditions as defined by the Water Agency's water rights permits and SWRCB Decision 1610, adopted in 1986. The Water Agency meets the various instream flow requirements by making releases from Coyote Valley Dam and Warm Springs Dam. As described in Section 1.3.2 above, the Russian River Biological Opinion requires modification of minimum instream flow requirements on the Russian River and Dry Creek to maintain the Incidental Take Statement provided by the Biological Opinion. The evaluation of future Russian River supply availability is based upon the assumption that that proposed changes to the minimum instream flow requirements under Decision 1610 set forth in the Biological Opinion are implemented, and that the Water Agency will obtain water rights approvals necessary to increase its total Russian River diversions above 75,000 ac-ft/yr by 2035. .As described in Sections 1.3.3 and 5.7, it is anticipated that the Water Agency would request at that time an additional 1,000 ac-ft/yr to increase the overall supply from the Russian River to 76,000 ac-ft/yr.

5.1.2 Surface Water Supply Facilities

The Russian River watershed drains an area of 1,485 square miles that includes much of Sonoma and Mendocino counties. The headwaters of the Russian River are located in central Mendocino County, approximately 15 miles north of Ukiah. The Russian River is approximately 110 miles in length and flows

[9] The four permits from the SWRCB are Permits 12947A, 12949, 12950, and 16596.

generally southward to Mirabel Park, where it changes course and flows westward to the discharge point at the Pacific Ocean near Jenner, approximately 20 miles west of Santa Rosa. Figure 5-1 depicts the Russian River watershed and the Water Agency's water supply system.

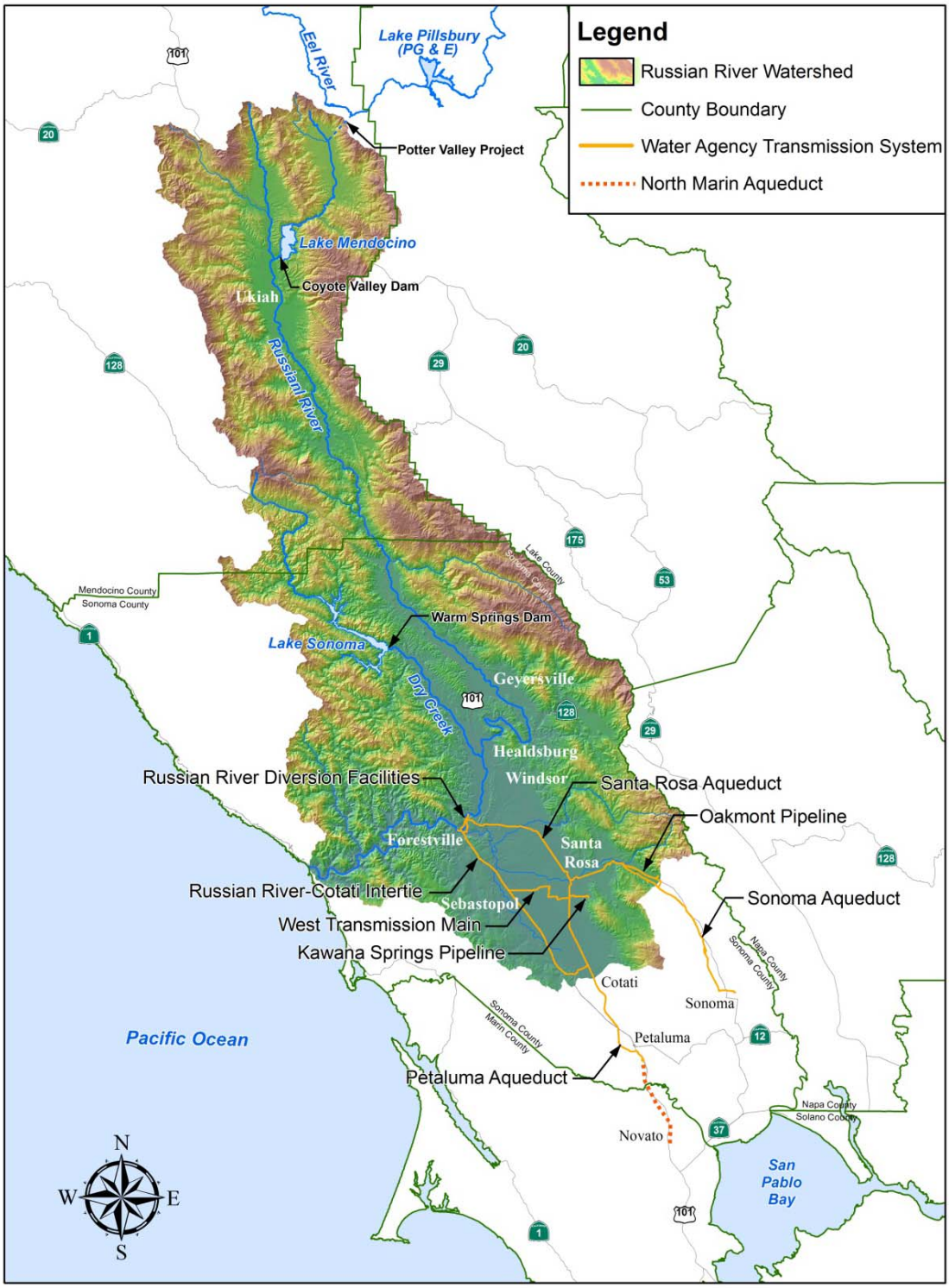

Figure 5-1. Russian River Watershed

Two federal projects impound water in the Russian River watershed: the Coyote Valley Dam on the Russian River east of the city of Ukiah in Mendocino County (forming Lake Mendocino), and the Warm Springs Dam on Dry Creek (a tributary of the Russian River) northwest of the City of Healdsburg in Sonoma County (forming Lake Sonoma). Because the Water Agency was the local sponsor for the dams and partially financed their construction, the Water Agency has the right to control releases from the water supply pools of both reservoirs. PG&E's PVP, discussed below, diverts water from the Eel River into the Russian River watershed. Lake Sonoma and Lake Mendocino and their associated facilities, collectively referred to as the Russian River Project, are operated in accordance with criteria established by the Water Agency's water rights permits and SWRCB's Decision 1610, which establish minimum instream flow requirements for Dry Creek and the Russian River. The Water Agency makes no diversions from the Russian River between Lake Mendocino and the Russian River's confluence with Dry Creek, but does authorize diversions by others (see Section 5.1.3) under its water rights permits. Flood management releases from both reservoirs are controlled by the USACE. The Water Agency diverts water from the Russian River near Forestville and conveys the water via its transmission system (including diversion facilities, treatment facilities, aqueducts, pipelines, water storage tanks, and booster pump stations) to its Customers.

5.1.2.1 Lake Pillsbury and the Potter Valley Project (PVP)

PG&E's PVP, originally constructed in 1908, results in a diversion of water from the Eel River into the Russian River watershed. Water is stored in Lake Pillsbury on the Eel River (constructed for the PVP in 1922), then released and re-diverted 12 miles downstream at Cape Horn Dam through a diversion tunnel and penstock to the Potter Valley powerhouse in the Russian River watershed. The water is discharged from the powerhouse into a tailrace from which the Potter Valley Irrigation District (PVID) diverts water. Water not diverted by PVID flows into the East Fork of the Russian River to Lake Mendocino. PVP diversions are regulated by a license issued to PG&E by FERC and serve multiple purposes, including power generation, Potter Valley agricultural irrigation, and minimum instream flow requirements in the East Fork of the Russian River and Eel River below Cape Horn Dam.

5.1.2.2 Lake Mendocino and Coyote Valley Dam

Coyote Valley Dam impounds water, forming Lake Mendocino on the East Fork of the Russian River. Lake Mendocino has been an operating reservoir since 1959 and captures water from two sources: (1) runoff from a drainage area of approximately 105 square miles and (2) Eel River water diverted by PG&E's PVP. Natural drainage and stream flow (as opposed to reservoir releases) contribute the majority of the Russian River flow downstream of Coyote Valley Dam and above Dry Creek during the rainy season (November through April). In contrast, during the drier months of May through October, water released from Lake Mendocino accounts for most of the water in the Russian River upstream of Dry Creek.

The Water Agency and the MCRRFCWCID have water right permits authorizing storage up to the design capacity of 122,500 ac-ft/yr in the reservoir. The Water Agency controls releases from the water supply pool in Lake Mendocino to meet minimum instream flow requirements and municipal, industrial and agricultural demands downstream of the reservoir. The water supply pool capacity of Lake Mendocino between November 1 and February 28 is 68,400 ac-ft. The USACE allows the Water Agency to encroach into the flood pool in the spring such that the summer water supply pool can increases to 111,000 ac-ft. The USACE manages flood control releases when the water level exceeds the top of the water supply pool elevation.

5.1.2.3 Lake Sonoma and Warm Springs Dam

Water stored behind Warm Springs Dam, completed in 1983, forms Lake Sonoma, which is located approximately 10 miles northwest of the City of Healdsburg on Dry Creek. Runoff from a drainage area of approximately 130 square miles contributes water to Lake Sonoma. Lake Sonoma has a design capacity of 381,000 ac-ft at the spillway crest and a design water supply pool capacity of 245,000 ac-ft. The Water Agency controls water supply releases from Lake Sonoma and the USACE manages flood control releases.

Natural drainage and stream flow (as opposed to reservoir releases) contribute the majority of the Dry Creek flow downstream of Warm Springs Dam during the rainy season (November through April). During the dry season (May through October), reservoir releases contribute the majority of the flow in Dry Creek. Such reservoir discharges supply flow to meet minimum instream flow requirements and municipal, domestic, and industrial demands in the lower Russian River area. Water released from Lake Sonoma and runoff from other tributaries contribute to meeting these demands.

5.1.2.4 Water Transmission System

The Water Agency diverts surface water from the Russian River and delivers it to the Water Agency's Customers through a transmission system. The transmission system is also supplied by groundwater as described in Section 5.2.1. The Water Agency's diversion facilities extract Russian River underflow, which is reported under the Water Agency's surface water rights. The Water Agency operates six radial collector wells at the Wohler and Mirabel production facilities adjacent to the Russian River. The first two collector wells (Collectors 1 and 2) were constructed in the late 1950s in the vicinity of Wohler Bridge. Between 1975 and 1983, Collectors 3, 4, and 5 were constructed near Mirabel Park. Collector 6, located in the Wohler area, was completed in 2006. Each collector well consists of a 13 to 18 foot diameter concrete caisson extending vertically approximately 60 to 110 feet into the alluvial aquifer. Horizontal perforated intake laterals extend radially from the bottom of each caisson into the aquifer. Each collector well houses two vertical turbine pumps driven by electrical motors. An important method used to increase production capacity during peak demand months involves raising an inflatable dam on the Russian River near Mirabel that allows for operation of five infiltration ponds at Mirabel that increase the area of infiltration along the Russian River. Water pools behind the inflatable dam and is diverted into the infiltration ponds to recharge the aquifer in the vicinity of Collectors 3, 4, and 5. Backwater conditions along the river also result in increased infiltration in the Wohler area, thereby enhancing the production capacity of Collectors 1, 2 and 6.

In addition to Collectors 3, 4 and 5, there are also seven vertical wells located at the Mirabel area. These wells are not operated as primary production facilities, but are maintained for standby emergency production.

The Water Agency's transmission system extends from the Water Agency's Russian River diversion facilities located near Forestville to the Santa Rosa, Petaluma, and Sonoma valleys. The transmission system consists of over 85 miles of pipelines that range in diameter from 16 to 54 inches, six booster pump stations, and 18 storage tanks with a combined storage capacity of 129 million gallons. The major pipelines that comprise the system are known as the Santa Rosa Aqueduct (built in 1959), the Sonoma Aqueduct (built in 1963), the Petaluma Aqueduct (built in 1962), and the Russian River - Cotati Intertie (built in 1977). The Water Agency owns the northern portion of the North Marin Aqueduct that extends from the terminus of the Petaluma Aqueduct at McNear Avenue to the vicinity of the Kastania Booster Station, located near the border of Marin County with Sonoma County. The remainder of the North Marin Aqueduct is owned and maintained by the NMWD, which transfers water to the District's service area. The Water Agency's storage facilities are located at Ralphine (36 millon gallons [MG]), Cotati (36 MG), Kawana Springs (20 MG), Kastania (12 MG), Sonoma (10 MG), Eldridge (8.0 MG), Annadel/Los Guilicos (5.5 MG) and Forestville (1.3 MG).

5.1.3 Restructured Agreement for Water Supply

The Restructured Agreement for Water Supply (Restructured Agreement), which was executed in 2006, generally provides for the finance, construction, and operation of existing and new diversion facilities, transmission lines, storage tanks, booster pumps, conventional wells, and appurtenant facilities. The Restructured Agreement provides the contractual relationship between the Water Agency and its eight contractors, and includes quantities of water they require and at flow rates that are necessary to meet their

peak day's demand subject to delivery limitations (Entitlement Limits)[10] The Water Agency also has agreements that allow certain entities to divert water from the Russian River under the Water Agency's water rights using their own diversion facilities. These "Russian River Customers" include: City of Healdsburg, Town of Windsor, Camp Meeker Recreation and Park District, and Occidental Community Services District (pending petition approval from the SWRCB). The Water Agency's agreements with these customers require them to use any water right they may have before using the Water Agency's water rights.

5.1.4 Potter Valley Project License

As noted in Section 5.1.2.1, PG&E's PVP diverts water from the Eel River into a powerhouse in Potter Valley to generate electricity, after which the water flows into the East Fork of the Russian River. Operation of the PVP is licensed by the FERC. PG&E's license to operate the PVP expires in 2022. PG&E's diversions from the Eel River watershed are subject to the terms of the FERC license.

On June 2, 2004, FERC issued its final order on an application filed by PG&E in 1998 to amend its FERC license to include an Eel River flow proposal to benefit Eel River fisheries that reduces the amount of water diverted into the Russian River watershed. The FERC order implemented a modified PVP flow regime based upon a PVP Biological Opinion issued by the NMFS as part of a consultation initiated by FERC under Section 7 of the federal ESA. The evaluation of future Russian River water supply availability in this Plan is based upon the assumption that the PVP diversions into the Russian River watershed permitted by the existing FERC license will continue. The reasons for this assumption are described in Section 1.3.1.

5.1.5 Threatened and Endangered Species – Russian River Biological Opinion

As noted in Section 1.3.2, the Russian River Biological Opinion places certain terms and conditions on the Water Agency with respect to its water supply operations in order to have incidental take protection under the ESA. In particular, NMFS concluded in the Biological Opinion that the artificially elevated summertime minimum flows in the Russian River and Dry Creek that are currently required by the Water Agency's water rights permits under Decision 1610 result in high water velocities that reduce the quality and quantity of rearing habitat for Coho salmon and steelhead. Additionally, NMFS concluded that maintaining these flows disrupts lagoon formation in the Russian River estuary and that allowing a lagoon to develop would likely enhance juvenile steelhead habitat.

NMFS' Russian River Biological Opinion concludes that reducing Decision 1610 minimum instream flow requirements will enable alternative flow management scenarios that will increase available rearing habitat in Dry Creek and the upper Russian River, and provide a lower, closer-to-natural inflow to the estuary between late spring and early fall, thereby enhancing the potential for maintaining a seasonal freshwater lagoon that would likely support increased production of juvenile steelhead. NMFS also concluded that, in addition to providing fishery benefits, the lower instream flow requirements "should promote water conservation and limit effects on in-stream river recreation." NMFS stated that the following changes may achieve these goals:

During Normal Years:

1. Reduce the minimum flow requirement for the Russian River from the East Fork to Dry Creek from 185 cfs to 125 cfs between June 1 and August 31; and from 150 cfs to 125 cfs between September 1 and October 31.
2. Reduce the minimum flow requirement for the Russian River between the mouth of Dry Creek and the mouth of the Russian River from 125 cfs to 70 cfs.

[10] The Restructured Agreement also includes an aggregate maximum allocation for "other Agency customers" (see Section 1). The Water Agency's deliveries to Marin Municipal Water District are authorized by the Restructured Agreement and are subject to the terms of a Supplemental Water Supply Agreement, dated July 1, 2015, between the Water Agency and the Marin Municipal Water District, which amended two existing agreements (the "Offpeak Water Supply Agreement" and the "Agreement for the Sale of Water").

3. Reduce the minimum flow requirement for Dry Creek from Warm Springs Dam to the Russian River from 80 cfs to 40 cfs from May 1 to October 31.

During Dry Years:

1. Reduce the minimum flow requirement for the Russian River between the mouth of Dry Creek and the mouth of the Russian River from 85 cfs to 70 cfs.

As required by the Russian River Biological Opinion, in September 2009 the Water Agency filed a petition with the SWRCB to permanently change the Decision 1610 minimum instream flow requirements to those recommended in the Biological Opinion, in order to avoid jeopardizing the populations of and improve habitat conditions for endangered Central California Coast Coho salmon and threatened Central California Coast steelhead. This petition presently is pending before the SWRCB. The SWRCB will act on this petition after an Environmental Impact Report is prepared in compliance with the California Environmental Quality Act. However, as required by the Biological Opinion, the Water Agency requests the SWRCB reduce mainstem, but not Dry Creek, minimum flows each year on an interim basis until the SWRCB acts on the petition for permanent changes.

The Biological Opinion also specifies specific maximum flow releases from Warm Springs and Coyote Valley Dams, which, if exceeded, would result in an unacceptable take of listed salmonids, both before and after changes to minimum instream flow requirements under Decision 1610.

When evaluating the amount of water supply available for delivery by the Water Agency to its Customers, the Water Agency assumes that (a) the Biological Opinion will remain in effect for its term, (b) the minimum instream flow reductions required by the Biological Opinion will be implemented to meet the goals identified in the Biological Opinion, on an interim basis each year, in the mainstem until the SWRCB acts on permanent changes and in the mainstem and Dry Creek thereafter and (c) and that the Water Agency will be subject to the instream flow constraints and obligations contained in the Biological Opinion. These assumptions are reasonable for the reasons described in Section 1.3.2.

5.1.6 Russian River System Model

The projections of the future water supply available to the Water Agency, which are presented in Section 5.8, are based on the results of operations modeling of the Russian River system. This section describes the modeling effort.

5.1.6.1 Model Approach

The Russian River System Model (RR ResSim) is an operations modeling system for the Russian River developed using the USACE Hydrologic Engineering Center (HEC) ResSim code.[11] The model is used as a planning tool to simulate the effects of various climatic conditions, levels of demand, and operational criteria on the water supply available for use by the Water Agency and others. RR ResSim calculates what releases must be made from Lake Mendocino and Lake Sonoma, taking into account USACE flood control operations criteria, Decision 1610 minimum instream flow requirements, and the requirements of the Biological Opinion. RR ResSim calculates flows at discrete locations (or "nodes") within the Russian River system using water balance hydrologic methods.

The model incorporates 104 years of hydrologic data (1910 - 2013), represented as daily unimpaired tributary flows into the Russian River and Dry Creek. Unimpaired flows are the "natural" flows, unaffected by man-made influences, such as water demands, or reservoir operations. These unimpaired flows, which form the basis of the hydrology in the model, were synthetically derived by the USGS using their Basin Characterization Model (BCM) using historical weather, climate, and hydrologic data. Unimpaired tributary flows are aggregated by reach between RR ResSim model nodes.

[11] See http://www.hec.usace.army.mil/software/hec-ressim/index.html for more information about the ResSim program.

Diversions from the Eel River into the Russian River are defined explicitly in the model. These diversions are computed separately using the Eel River Model version 2.5.[12] In the fall of 2006, operations of the PVP changed due to PG&E's implementation of amended flow requirements resulting from the 2004 FERC order terminating the license amendment proceedings. As a result, historical PVP diversions would not be representative of current operations. To determine the PVP diversions to be used in the RR ResSim model, the Water Agency analyzed PVP diversions from the Eel from October 1, 2006 to January 31, 2011. Using the Eel River Model and the results of this analysis, input datasets were developed for the RR ResSim Model, which represent inflows from the PVP under current PVP operating conditions under the different hydrological years.

Another major component of the RR ResSim model is the distributed losses throughout the Russian River system. These losses include not only the Water Agency's diversions, but all other depletions from the watershed including: evapotranspiration by riparian vegetation, aquifer recharge, agricultural diversions, and non-Water Agency municipal and industrial (M&I) diversions. Much like the unimpaired flow datasets, system losses are aggregated by reach between each node. System losses not associated with the Water Agency's diversions were estimated through an analysis of historical M&I data, flow gage data, and climate data. Because the model calculates the reservoir releases necessary to meet minimum instream flow requirements, all water uses in the watershed are satisfied by such simulated flow releases, not just demands of the Water Agency's transmission system.

The RR ResSim model divides the Russian River and Dry Creek into 9 primary reaches:

1. Calpella: Potter Valley Project to Calpella Gage (USGS 11461500);
2. Upper East Fork Russian River: Calpella Gage to Coyote Valley Dam;
3. Lower East Fork Russian River: Coyote Valley Dam to Confluence of the West Fork;
4. West Fork Russian River: upstream of the Confluence with the East Fork;
5. Hopland: East Fork/ West Fork Confluence to the Hopland Gage (USGS 11462500);
6. Cloverdale: Hopland Gage to the Cloverdale Gage (USGS 11463000);
7. Healdsburg: Cloverdale Gage to the Healdsburg Gage (USGS 11465350);
8. Lake Sonoma: upstream of Lake Sonoma to Warm Springs Dam;
9. Dry Creek: Warm Springs Dam to the Dry Creek/ Russian River Confluence (USGS ; and
10. Lower River: Healdsburg Gage to the Guerneville Gage (Hacienda Bridge, USGS 11467000).

Within each reach gains associated with unimpaired flows and losses associated with M&I diversions and/or other distributed demands are accounted for.

The Lower River reach includes diversions made by the Water Agency at the Wohler and Mirabel facilities, diversions made by the Town of Windsor and Russian River Customers downstream from Healdsburg, agricultural diversions, and other losses.

The Water Agency's water rights permits include a provision that requires the Water Agency to impose a 30 percent deficiency in deliveries from the Russian River to its service area when Lake Sonoma storage levels drop below 100,000 ac-ft before July 15 of any year. According to the Water Agency's water rights permits this deficiency must remain in effect until "(1) storage in Lake Sonoma rises to greater than 70,000 ac-ft subsequent to December 31 after having fallen below that level, or (2) permittee has projected, to the satisfaction of the Chief, Division of Water Rights, that storage at Lake Sonoma will not fall below 70,000 ac-

[12] This model was developed by Natural Resources Consulting Engineers, Inc. on behalf of the U.S. Department of the Interior for the FERC license amendment of the PVP in 2004. The model was refined in 2008 by the Water Agency in collaboration with the Round Valley Indian Tribes to account for diversion restrictions through the PVP as a result of the 2004 license amendment. Further refinements were made in 2015 to improve simulation of current operational practices of PVP including compliance with minimum instream flow requirements below Cape Horn Dam and constraining PVP diversions through the project to more closely replicate actual post-2004 license amendment imports.

ft, or (3) hydrologic conditions result in sufficient flow to satisfy permittee's demands at Wohler and Mirabel Park and minimum flow requirements in the Russian River at Guerneville." This provision is intended to ensure the maintenance of minimum in-stream flows required by Decision 1610. This provision is accounted for in the modeling, although the model assumes delivery deficiencies remain in effect at least until storage has recovered in Lake Sonoma to greater than 70,000 ac-ft after December 31. The model does not allow for earlier termination of deficiencies based on hydrologic conditions.

Ongoing sedimentation of Lake Pillsbury, Lake Mendocino, and Lake Sonoma will result in a gradual small reduction in the water supply available to the Agency's water transmission system. Thus, the total storage available under the future scenarios is slightly less than under the current scenarios. Sedimentation rates for each of these reservoirs have been estimated to develop future reservoir elevation-storage relationships (storage curves) from 2020 to 2040 in five year increments. These future storage curves are accounted for in the Eel River model and RR ResSim model. For Lake Pillsbury, sedimentation rates were estimated based on 1952, 1985, and 1994 (effective 2001) bathymetric survey information. For Lake Mendocino, sedimentation rates were estimated based on 1984 and 2001 bathymetric survey information. The USACE has not conducted a bathymetric survey at Lake Sonoma since the construction of the reservoir was completed. Therefore, sedimentation rates for Lake Sonoma were estimated based on observed sedimentation rates at the Dry Creek near Geyserville USGS gaging station. For the 15-year period, 1965 to 1979, an average suspended sediment yield of 3,640 tons per square mile was measured (USACE, 1984). From this, an annual sedimentation rate of approximately 2.3 ac-ft per square mile of watershed area was estimated and applied to calculate storage for the future scenarios.

Verification of the model was performed by developing a historical simulation of actual Russian River system operations from water years 2000 to 2013. Results of this historical simulation indicate that simulated reservoir storage levels trend well compared to actual storage levels for the simulated time period. Differences that were observed between simulated and actual reservoir storage levels are primarily attributable to managed encroachment into the reservoir flood pools that deviated from the reservoir rule curves. The RR ResSim model simulates reservoir operations with strict adherence to reservoir storage rule curves.

To determine the water available at the Water Agency's water transmission system diversion facilities, RR ResSim was used to simulate different hydrologic periods as specified in California Water Code Section 10631(c). These periods were selected from the historical hydrologic record to best represent an average year, a single dry year, and multiple dry years. To represent an average year, 1962 was selected. Year 1962 was slightly drier than average and was preceded by two similar years. To represent a single dry year, year 1977 was selected. Year 1977 is the second year of the driest two-year period of record as well as the single driest year of record. To represent multiple dry years, years 1988 through 1991 were selected.

Although not required by the Act, when running simulations for these different hydrologic scenarios, the RR ResSim model uses reservoir levels predicted by the model for the start date of the simulation (a more conservative assumption) rather than assuming full reservoir conditions. For example, when simulating the single dry year (1977), the model assumes that Lake Sonoma and Lake Mendocino levels at the start of 1977 are at the levels estimated by the model at the end of 1976.

Moreover, although the RR ResSim model assumes that the Water Agency will reduce its diversions by 30 percent to take into account diversion reductions required when Lake Sonoma storage falls below 100,000 ac-ft before July 15 (as described above), the model does not assume any other reductions in water demands during dry periods. Because it is likely that water demands from other Russian River water users would be reduced during drought periods, the ResSim model likely overestimates the drawdown of Lake Sonoma and especially Lake Mendocino during such periods.

5.1.6.2 Model Study Results

The evaluation of the Russian River water supply available to the Water Agency's water transmission system consists of using the estimated annual water demand for 2020 to 2040 and simulating the hydrologic periods of interest to determine the water remaining in storage in Lake Mendocino and Lake Sonoma. The modeled estimated future Water Agency demands are presented in Table 5-1.

Table 5-1. Future Water Agency Russian River Demands Modeled

Scenario Year	Demand ac-ft
2020	66,260
2025	70,309
2030	73,011
2035	75,117
2040	75,988

Tables 5-2 through 5-7 summarize the simulated minimum storage levels of Lakes Mendocino and Sonoma for average, single dry year, and multiple dry year scenarios. The results of the model analysis indicate that adequate water supplies are available in Lakes Mendocino and Sonoma to meet in-stream flows, system losses, and demands for average and multiple dry year scenarios through 2040. In particular, Lake Sonoma has ample water supplies for average and multiple dry year scenarios. For the purpose of this Plan, if a projected Water Agency demand can be met while maintaining adequate storage in Lakes Mendocino and Sonoma, that demand is considered the supply for that scenario. The water stored in the reservoirs (especially Lake Sonoma) is typically greater than the supply needed to meet demands.

For all single dry-year scenarios, storage levels in Lake Mendocino decline to the lowest level that water can be released from the reservoir. Reservoir releases past this date and until the reservoir storage recovers are controlled by net inflow into the Lake Mendocino. During this period, downstream demands and minimum instream flow requirements are not met due depleted reservoir storage and inadequate inflow into the reservoir. This occurs even with the modeling assumption that the Water Agency would pursue a Temporary Urgency Change from the SWRCB by October 1, 1976 to implement reduced minimum instream flow requirements of 50 cfs for the Upper Russian River (from Coyote Valley Dam to the confluence of Dry Creek). A similar minimum instream flow reduction was implemented in August of 2014 due to extreme drought conditions at that time. Because reducing minimum instream flows alone does not prevent depletion of Lake Mendocino storage, demand reduction by Upper Russian River water users would also be necessary. Additional modeling was performed to estimate the approximate levels of demand reduction that would be required by municipal, industrial and agricultural water users in the Upper Russian River (in conjunction with reduced minimum instream flows) to prevent the lake from dropping below a storage level of 5,000 ac-ft for the single dry year scenario. Results of this modeling indicate that starting January 1st, 18, 25, 32, 40 and 44 percent demand reductions would be required by Upper Russian River water users for 2020, 2025, 2030, 2035 and 2040 projections respectively.

For the single dry-year scenario starting in 2025 and continuing through 2040, storage levels in Lake Sonoma decline to below 100,000 ac-ft prior to July 15. As described in Section 5.1.6.1, this will require all diversions under the Water Agency's water rights to be reduced by 30 percent.

Average Year. For the average year (1962), the hydrologic model simulations results for Lake Mendocino and Lake Sonoma are presented in Tables 5-2 and 5-3, respectively.

Table 5-2. Average Year Minimum Lake Mendocino Storage (1962)		
Scenario Year	Lake Storage, ac-ft	Date of Minimum Lake Elevation
2020	49,241	10/10/1962
2025	48,838	10/10/1962
2030	48,435	10/10/1962
2035	48,031	10/10/1962
2040	47,628	10/10/1962

Note: Minimum lake storage remaining after demands are met.

Table 5-3. Average Year Minimum Lake Sonoma Storage (1962)		
Scenario Year	Lake Storage, ac-ft	Date of Minimum Lake Elevation
2020	199,866	10/10/1962
2025	197,852	10/10/1962
2030	195,936	10/10/1962
2035	194,221	10/10/1962
2040	192,777	10/10/1962

Note: Minimum lake storage remaining after demands are met.

Single Dry Year. For the single dry year (1977), minimum lake storage for Lake Mendocino and Lake Sonoma are presented in Tables 5-4 and 5-5, respectively.

Table 5-4. Single Dry Year Minimum Lake Mendocino Storage (1977)		
Scenario Year	Lake Storage ac-ft	Date of Minimum Lake Elevation
2020	1,853	11/2/1977
2025	1,779	10/23/1977
2030	1,704	10/14/1977
2035	1,629	10/4/1977
2040	1,555	9/29/1977

Note: Minimum lake storage remaining after demands are met.

Table 5-5. Single Dry Year Minimum Lake Sonoma Storage (1977)		
Scenario Year	Lake Storage ac-ft	Date of Minimum Lake Elevation
2020[a]	62,624	11/20/1977
2025[a]	63,684	11/20/1977
2030[a]	58,756	11/20/1977
2035[a]	54,431	11/20/1977
2040[a]	51,801	11/20/1977

Note: Minimum lake storage remaining after demands are met.

[a] Reduction of demands will be required during a portion of the year as required by D1610.

Multiple Dry Years. For the multiple dry years (1988-1991), minimum lake storage for Lake Mendocino and Lake Sonoma are presented in Tables 5-6 and 5-7, respectively.

Table 5-6. Multiple Dry Year Minimum Lake Mendocino Storage (1988-91)		
Scenario Year	Lake Storage ac-ft	Date of Minimum Lake Elevation
2020	23,167	11/12/1988
2025	22,593	11/12/1988
2030	22,171	11/12/1988
2035	21,706	11/12/1988
2040	21,287	11/12/1988

Note: Minimum lake storage remaining after demands are met.

Table 5-7. Multiple Dry Year Minimum Lake Sonoma Storage (1988-91)		
Scenario Year	Lake Storage ac-ft	Date of Minimum Lake Elevation
2020	161,324	2/28/1991
2025	157,643	2/28/1991
2030	154,473	2/28/1991
2035	151,753	2/28/1991
2040	149,743	2/28/1991

Note: Minimum lake storage remaining after demands are met.

The Water Agency is currently working on two initiatives to improve the water supply reliability of Lake Mendocino. The first initiative is Forecast Informed Reservoir Operations (FIRO), which is a management strategy that uses data from watershed monitoring programs and improved weather and water forecasting to help water managers retain or release water from reservoirs that more accurately reflects antecedent and anticipated hydrologic conditions. A FIRO Steering Committee has been formed to oversee the evaluation and hopeful implementation of FIRO for Lake Mendocino. The Steering Committee is comprised of members

representing the USGS, USACE, National Oceanic and Atmospheric Administration, Scripps Institution of Oceanography, United States Bureau of Reclamation, DWR and the Water Agency.

The second initiative is the development of a new hydrologic index for the Russian River System. This is being completed as a component of the Fish Habitat Flow and Water Rights Project which seeks to modify the Water Agency's water rights and operations of the Russian River system to improve habitat for native salmonids and comply with the Russian River Biological Opinion. The hydrologic index is a metric that sets the water supply condition and the corresponding minimum instream flow schedule for the Russian River System. The current hydrologic index defined in Decision 1610 is a three-schedule index with conditions designated as *Normal*, *Dry* and *Critical*. The existing index is calculated based on cumulative flow into Lake Pillsbury. For each index schedule there is a corresponding flow schedule for the Upper Russian River, Dry Creek and the Lower Russian River. The existing hydrologic index was developed during very different operations of PVP and is no longer representative of water supply conditions in the Russian River System.

The Water Agency has developed a new index which is a five schedule index and is based on cumulative inflow into Lake Mendocino. In addition to cumulative inflow into Lake Mendocino, the proposed index will also evaluate storage conditions in Lake Mendocino to potentially trigger reductions in minimum flow requirements for the Upper Russian River (Coyote Valley Dam to the confluence of Dry Creek) to help conserve lake storage. The new index will be proposed and evaluated (along with changes to the minimum instream flow requirements) in an Environmental Impact Report (EIR) to be released as a public draft in summer 2016.

5.2 Groundwater

This section presents a description of groundwater resources and groundwater resource initiatives related to the Water Agency interests.

- Section 5.2.1 describes the Water Agency's groundwater supply in the Santa Rosa Plain groundwater sub-basin, including the basin description, Water Agency's groundwater facilities, groundwater management activities, and Water Agency's historical groundwater production.
- Section 5.2.2 describes other groundwater initiatives and programs the Water Agency is involved in, including local activities related to the Sustainable Groundwater Management Act (SGMA).

5.2.1 Water Agency's Santa Rosa Plain Groundwater Supply

DWR has identified a total of fourteen groundwater basins and sub-basins in Sonoma County, which are shown on Figure 5-2. As described in Section 5.2.2, below, the Water Agency has groundwater supply wells only in the Santa Rosa Plain Sub-basin of the Santa Rosa Valley Basin.

The Santa Rosa Plain is a sub-basin (DWR number 1-55.01) of the Santa Rosa Valley Basin, which also includes the Healdsburg Area Sub-basin (1-55.02) and Rincon Valley Sub-basin (1-55.03) (DWR, 2003). The Santa Rosa Plain drains northwest toward the Russian River, and is thus part of the North Coast Hydrologic Region. The 78,720-acre Santa Rosa Plain Groundwater Sub-basin is located within the larger 167,680-acre Santa Rosa Plain watershed (generally corresponding to the Laguna de Santa Rosa and Mark West Creek watersheds), which was the subject of the groundwater studies and management activities described in Section 5.2.1.1 and 5.2.1.2.

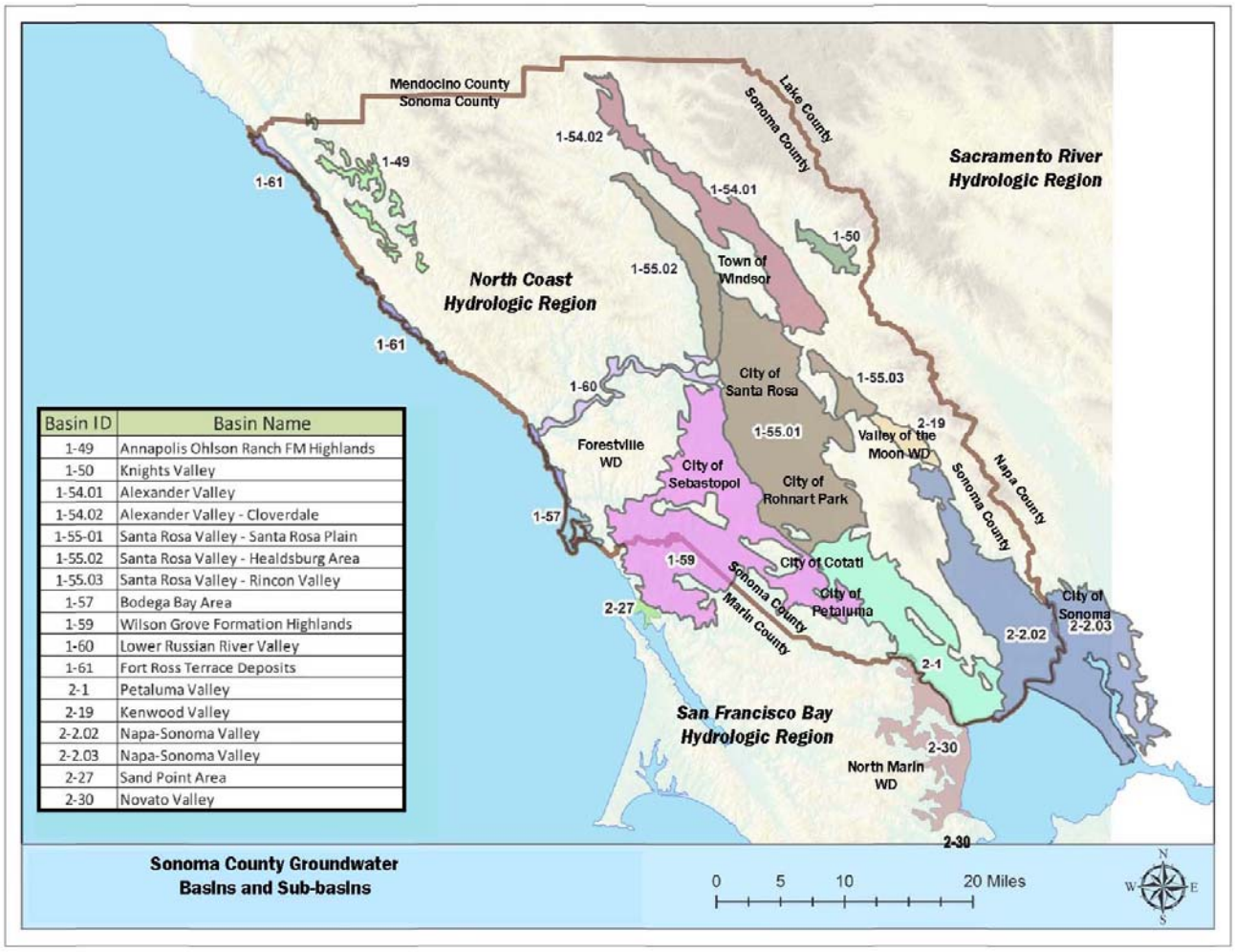

Figure 5-2. Groundwater Basins within the Water Agency Service Agency

Several of the Water Agency's contractors and customers also use local groundwater supplies from the Santa Rosa Plain, along with the Sonoma Valley, and Petaluma Valley Groundwater Basins. Descriptions of these other basins, in addition to the Alexander Valley Groundwater Basin which underlies a large portion of the main stem of the Russian River, are provided in Section 5.2.2.

Water Code Section 10631(b) requires that urban water management plans state DWR's characterization of the basin with respect to overdraft. DWR did not identify "critical conditions of overdraft" in any of these groundwater basins in Bulletin 118 – 80 (DWR, 1980), and no Sonoma County basins or sub-basins are included on DWR's most recent list of Critically Overdrafted Basins (DWR, 2016).[13] There are no adjudicated groundwater basins in Sonoma County. While this Plan also summarizes other available information (including previous groundwater studies and investigations) and evaluates limited data, it is beyond this Plan's scope to make an independent assessment of basin conditions with respect to overdraft.

[13] DWR defines groundwater overdraft as the condition of a groundwater basin or sub-basin in which the amount withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions (DWR, 2003). Overdraft can be characterized by groundwater levels that decline over a number of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts (DWR, 2003).

5.2.1.1 USGS Santa Rosa Plain Groundwater Study

In 2014, the USGS completed a study of the Santa Rosa Plain groundwater basin in collaboration with the Water Agency, the cities of Cotati, Rohnert Park, Santa Rosa and Sebastopol, the town of Windsor, the County of Sonoma, and the California American Water Company. The study has four principal elements: (1) a comprehensive geographic information system (GIS) to compile, analyze and visualize hydrologic and related data; (2) collection of new data, with a focus of water-quality sampling; (3) data interpretation and hydrogeologic characterization – including refining hydrologic budgets, and updating conceptual models of the groundwater flow system based on the new data and the results of ongoing USGS geologic and geophysical studies in the basin; and (4) the development of a fully-coupled numerical surface water/groundwater flow model for Santa Rosa Plain. The USGS study also incorporates information and data from previous studies of groundwater in the Santa Rosa Plain, including previous studies by the USGS (Cardwell, 1958) and DWR (1975 and 1982).

The USGS study reveals a large geologically complex groundwater basin, with multiple aquifers that exhibit wide variations in well yields and groundwater quality. In addition, the groundwater system is subdivided into several compartments that are separated by fault zones, including the Rodgers Creek Fault, the Sebastopol Fault, and the Trenton Fault. Groundwater flows through and is stored in sedimentary and volcanic formations, which form the primary aquifers in the Santa Rosa Plain including sedimentary deposits of the Alluvium and Glen Ellen Formation, the Wilson Grove Formation, the Petaluma Formation, and the Sonoma Volcanics. Groundwater generally flows from recharge areas (e.g., highlands to the east and west of the basin) toward discharge areas (primarily the Laguna de Santa Rosa). Groundwater is removed from the Santa Rosa Plain through wells and as both subsurface outflow and groundwater discharge to the Laguna de Santa Rosa. Primary findings from the USGS study include:

- Groundwater levels in the shallow aquifer range from close to ground surface near the Laguna de Santa Rosa to about 15 to 30 feet below ground surface along the eastern basin boundary and 50 feet near southern end of the Santa Rosa Plain and are relatively stable over time.
- Groundwater levels in intermediate and deeper wells in southern Santa Rosa Plain exhibit seasonal fluctuations and a decline in groundwater levels in the late 1970s and 1980s. The declines reached a maximum in the early 1990s, followed by recovery in the early 2000s. The recovered groundwater levels coincide with increased conservation, reduced groundwater pumping and increased deliveries of Russian River supplies from the Water Agency to the City of Rohnert Park.
- Many wells in the Santa Rosa Plain produce high quality water, but naturally occurring elements such as iron, manganese, boron, and arsenic are widely variable in groundwater and can pose problems in some areas. Areas in southern Santa Rosa Plain also exhibit increasing chloride concentrations.
- Groundwater within shallow aquifers of the Santa Rosa Plain also supports stream flows.

Water supply in the Santa Rosa Plain is met by combinations of deliveries of water by the Water Agency from the Russian River (for municipal water supplies) and ground water from water wells (for rural residential, agricultural irrigation, and a portion of municipal water supplies). Based on recent analysis of water demands, the total amount of groundwater used in the Santa Rosa Plain between 2004 and 2010 was estimated to be approximately 42,000 ac-ft and represents nearly 50% of the total water use in the basin.

- The majority of groundwater produced in the Santa Rosa Plain is estimated to be used for rural residential demands (50%) and agricultural irrigation (32%).
- Municipal groundwater use accounts for only approximately 18% of the total.

As part of the study, the USGS developed a state-of-the-art computer model for the Santa Rosa Plain Watershed area that couples surface water with groundwater flows, called GSFLOW. The water budget for the Santa Rosa Plain (amount and sources of water entering versus the amounts and sources of water exiting) has been estimated using a computer model of groundwater flow. The results indicate that over the

35 year period simulated by the model (1975 through 2010) more water exited the basin through a combination of groundwater pumping and natural outflows than entered the basin, resulting in an average annual loss of groundwater storage of approximately 3,300 ac-ft/yr. Although the estimated storage loss is a relatively small percentage of the total inflows estimated for the basin (~80,600 ac-ft/yr), because groundwater helps support stream flows, declines in groundwater levels can also result in decreased stream flows. The model also simulates the effects of several potential climate change scenarios on surface water flows and groundwater supplies. The results indicate a potential for:

- Overall lowering of groundwater levels compared to historic baseline conditions.
- Reduced groundwater contribution to stream flow (also known as *baseflow*).
- Reduced groundwater evapotranspiration in riparian areas and reduced groundwater flow to wetlands and springs.
- More infiltration of surface water (stream flow) to groundwater, further reducing stream baseflow.

5.2.1.2 Santa Rosa Plain Groundwater Management Plan Development

Results from the USGS study demonstrate the need for careful monitoring and management of groundwater and surface water resources in the Santa Rosa Plain to provide a sustainable supply of water for groundwater users and the environment. To address this need the Water Agency convened a robust stakeholder process to guide development of a groundwater management plan, which included an impartial Stakeholder Assessment conducted by the Center for Collaborative Policy, the formation of advisory bodies and significant public outreach over a four year period. The Santa Rosa Plain Watershed Groundwater Management Plan (GMP) was formally adopted by the Water Agency Board of Directors in late 2014 after being recommended for adoption by a Basin Advisory Panel of diverse stakeholder interests. The voluntary GMP complies with requirements of the 1992 Assembly Bill 3030 and the 2002 Senate Bill 1938.

The GMP covers the entire Santa Rosa Plain watershed, including the Santa Rosa Plain sub-basin, the Rincon Valley groundwater basin, portions of other groundwater basins and sub-basins, and upland areas that are outside of DWR-defined groundwater basins and sub-basins. The GMP informs and guides local groundwater management planning decisions. Moreover, the GMP fosters proactive coordination of public and private groundwater management efforts and enables opportunities to acquire additional funds to maintain a sustainable, locally-managed, high-quality groundwater resource for current and future users, while sustaining natural groundwater and surface water functions. To accomplish this goal, the following components are incorporated into the GMP:

1. Basin Management Objectives;
2. Components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, interaction of surface water and groundwater, and hydrometeorological conditions;
3. Monitoring protocols to track changes in conditions related to the above components and to generate information for the purpose of meeting Basin Management Objectives and establishing effective management of groundwater;
4. A plan to involve other local agencies, water purveyors, and private well owners in the implementation of the groundwater management plan.

Implementation of the GMP began in 2015 and is funded through 2016 by the Water Agency and County of Sonoma, the Sonoma County Agricultural Preservation & Open Space District, City of Santa Rosa, City of Rohnert Park, Town of Windsor, City of Cotati, City of Sebastopol, California-American Water Company, and United Wine Growers. The GMP continues to be guided by a Basin Advisory Panel comprised of the Water Agency, general public, agricultural groundwater users, business and developers, residential groundwater users, government (Tribal, County and City), environmental organizations, natural resources management

organizations, water suppliers, and technical groundwater professionals and is initially focused on stakeholder involvement, advancing monitoring activities and conducting additional scenario modeling.

5.2.1.3 Water Agency Groundwater Facilities, Historical Groundwater Production and Monitoring

The Water Agency's three groundwater supply wells are located along the Water Agency's aqueduct in the Santa Rosa Plain at Occidental Road, Sebastopol Road, and Todd Road. The wells were initially constructed in 1977, as emergency supply wells in response to the 1976-1977 drought. Two of the wells (Occidental and Sebastopol) were replaced in 1998. The three production wells range in depth from 794 to 1,060 feet with pumping capacities ranging from 1,300 to 2,200 gpm. The locations of the wells are depicted on Figure 3-1 and their operational history is described below.

Relatively continuous operations of the Todd, Sebastopol, and Occidental Road water supply wells began in April 1999, June 2001, and July 2003, respectively, and continued through 2008. The groundwater quantities pumped by the Water Agency between 2006 and 2010 ranged from a high of 3,922 ac-ft in 2008 to a low of 52 ac-ft in 2010, and averaged 2,514 ac-ft/yr. Beginning in 2009, the use of the wells was shifted to a seasonal and as-needed basis to better balance the conjunctive management of Russian River and groundwater supplies (during years when sufficient supplies are available from the Russian River, use of the groundwater wells are limited). As indicated in Table 5-8, annual production from the three wells has ranged from 172 to 1,271 ac-ft from 2011 to 2015 and averaged 643 ac-ft/yr.

The Water Agency conducts a groundwater monitoring program of water levels in seventeen dedicated monitoring wells in the vicinity of its three water supply wells to assess the effects of these wells on local groundwater conditions. The monitoring wells are instrumented with pressure transducers, which record groundwater elevations from the wells at intervals ranging from every 1 to 4 hours. Data collection near the Occidental and Sebastopol Road wells began in 2001, while semiannual manual groundwater level measurements from the Todd Road monitoring wells was initiated in 1978. In general, the data document normal seasonal fluctuations and initial declines in water levels when pumping begins for the monitoring wells near the three water supply wells. A pump test of the Water Agency's three wells in 1979 found that "deep wells near the three emergency wells and some of the shallow wells near the Occidental and Sebastopol wells were influenced" by pumping the Water Agency wells (Sonoma County Water Agency, 1979). In general, the data collected as part of the Water Agency's groundwater monitoring program document:

- Normal seasonal fluctuations in groundwater levels;
- Rapid drawdown and recovery in response to pumping cycles within the deeper monitoring wells perforated across the same horizon as the groundwater supply wells;
- No discernable short-term responses to pumping cycles within shallower monitoring wells;
- An overall trend of lowering of deeper zone groundwater levels between approximately 2000 and 2009 when the groundwater supply wells were operating relatively continuously followed by subsequent recovery of groundwater levels between 2009 and 2015; and
- General stability of shallow zone groundwater levels, with the exception of shallow zone monitoring wells located near the Occidental Road well which exhibited declines ranging between 15 to 30 feet between approximately 2000 and 2009 followed by subsequent recovery or stabilization of groundwater levels between 2009 and 2015.

The groundwater quantities pumped by the Water Agency in the last five years are shown on Table 5-8, while the Water Agency's projected future production through 2040 is shown in Table 5-12. While the amount of groundwater pumped from the last five years has ranged from 172 to 1,271 ac-ft/yr, the Water Agency does not plan to utilize groundwater from the three wells as a normal year source of supply. Rather, groundwater from the Santa Rosa Plain wells will be utilized on an as-needed basis during periods of drought or when Russian River supplies are otherwise constrained.

Table 5-8. Wholesale: Groundwater Volume Pumped, ac-ft (DWR Table 6-1)						
Groundwater Type	Location or Basin Name	2011	2012	2013	2014	2015
Alluvial Basin	Santa Rosa Plain Sub-basin (1-55.01)	172	175	821	1,271	775
TOTAL		172	175	821	1,271	775

5.2.2 Water Agency Groundwater-Related Studies/Programs

Due to the importance of groundwater resources within the region, history of conjunctive management practiced by the Water Agency and many of its contractors and customers, and hydrologic connection between surface water and groundwater, the Water Agency is involved in or has led many other groundwater related studies and initiatives described in this section.

5.2.2.1 Groundwater Studies and Management

Based on direction received in January 2000 from its Board of Directors, the Water Agency has developed and implemented a program (Groundwater Basin Assessment and Management Program) intended to enhance the knowledge and local management of groundwater resources within Sonoma County. The approach for the program is to conduct scientific basin-wide studies of the four larger and more developed groundwater basins in Sonoma County (Alexander Valley, Petaluma Valley, Santa Rosa Plain and Sonoma Valley) to provide a basis for subsequent groundwater management planning activities which emphasize local and regional coordination and collaboration (if basin stakeholders and the Water Agency's Board support development of a management planning process). To implement the groundwater characterization program, Water Agency staff has worked with scientists from USGS to develop cooperative technical study programs that evaluate groundwater resources in the four basins and sub-basins. The Sonoma Valley and Alexander Valley groundwater studies were completed in 2006 (USGS, 2006a and b) and, as described in Section 5.2.1.1, the Santa Rosa Plain groundwater study was completed in 2014 (USGS, 2013 and 2014). The USGS technical study for Petaluma Valley commenced in 2014 and is scheduled to be completed in 2017. Summaries of the groundwater studies and management activities in the Alexander Valley, Sonoma Valley and Petaluma Valley are described below.

Alexander Valley Groundwater Basin. The Alexander Valley Sub-basin includes the Alexander Area Sub-basin (1-54.01) and the Cloverdale Area Sub-basin (1-54.02). The USGS study of the hydrogeology and water chemistry of the Alexander Valley provides an improved scientific basis for addressing emerging water-management issues, including potential increases in water demand and potential changes in flows in the Russian River to improve conditions for listed fish species under the State and Federal ESA. The USGS study tasks included (1) evaluation of existing hydrogeological, geophysical, and geochemical data; (2) collection and analysis of new hydrogeologic data, including subsurface lithologic data, ground-water levels, and streamflow records; and (3) collection and analysis of new water-chemistry data. The estimated total water use for the Alexander Valley for 1999 was approximately 15,800 ac-ft. About 13,500 ac-ft of this amount was estimated to be for agricultural use, primarily vineyards, and about 2,300 ac-ft was for municipal/industrial use. Groundwater was reported to be the main source of water supply (estimated to meet 78% of the total water demands) in the basin, although the estimate may include some diversions made through wells under surface water rights (USGS, 2006b). The Water Agency has no water supply wells in the Alexander Valley.

Sonoma Valley Groundwater Sub-basin. The Sonoma Valley Groundwater Sub-basin (2-2.02) is a sub-basin of the Napa-Sonoma Valley Groundwater Basin. The basin drains southeast and is thus part of the San Francisco Bay Hydrologic Region (DWR, 2003). The 44,700-acre Sonoma Valley Groundwater Sub-basin is located within the larger 106,680-acre Sonoma Creek watershed. The Water Agency has no water supply

wells in the Sonoma Valley. An existing GMP adopted by the Water Agency's Board of Directors in 2007 covers the entire Sonoma Creek watershed, including the southern half of the Kenwood groundwater basin and upland areas that are outside of DWR-defined groundwater basins. The existing GMP was developed following completion of the USGS study with stakeholder consensus and approved by the Water Agency's Board, the City of Sonoma, and Valley of the Moon Water District in November 2007 and is currently in its eighth year of implementation. Local stakeholders representing diverse groundwater users and interests continue to guide implementation of the GMP through a Basin Advisory Panel (BAP) and a TAC. The BAP identified four primary management strategies consisting of water conservation, increased use of recycled water and implementation of groundwater banking and stormwater recharge.

Notable findings from the USGS study and subsequent monitoring and studies conducted under the GMP as reported in the Five Year Review Report (Water Agency, 2014) indicate the following:

- Groundwater level declines within deep zone aquifers (primarily in the southwestern and southeastern Sonoma Valley) have persisted for the last decade or more and appear to be expanding. Groundwater levels in many wells in these two areas are declining at rates of several feet per year and have locally fallen below sea level.
- While groundwater quality within the Sonoma Valley is generally good, brackish groundwater present beneath the southernmost Sonoma Valley has historically affected water wells located in this area and represents a threat to groundwater resources should groundwater declines continue to persist.
- Based on recent analysis of water demands, the total amount of groundwater used in Sonoma Valley for 2012 was estimated to be approximately 10,500 ac-ft and represents nearly 60% of the total water use.
- Groundwater within shallow aquifers of Sonoma Valley plays a significant role in supporting streamflows in Sonoma Creek and its tributaries.
- The groundwater budget for Sonoma Valley (amount and sources of water entering versus the amounts and sources of water exiting) has been estimated using computer models of groundwater flow. The results indicate that more water is exiting than entering, resulting in average annual losses of groundwater storage ranging from approximately 600 to 1,400 ac-ft/yr.

In response to these conditions, the Water Agency, BAP and TAC are performing an alternatives analysis to assess scenarios and consider and screen a range of possible approaches (including technical, regulatory and institutional response actions) to address groundwater depletion in southern Sonoma Valley. The Water Agency has no water supply wells in the Sonoma Valley Groundwater Sub-basin.

Petaluma Valley Groundwater Basin. The 46,000-acre Petaluma Valley Groundwater Basin is located within the larger 93,440-acre Petaluma Valley watershed. In 2014, the Sonoma County Water Agency and City of Petaluma partnered with the USGS to conduct a three-year groundwater study of the Petaluma Valley, which is scheduled to be completed in 2017. The objective of the study is to develop an updated assessment of the hydrogeology, geochemistry, and geology of the Petaluma Valley, including development of a geographical information system database, collection, and interpretation of water quality data and streamflow measurements, estimates of groundwater recharge and annual groundwater pumping, and development of a computer model to simulate groundwater flow. The Water Agency has no water supply wells in the Petaluma Valley Groundwater Basin. A GMP has not been developed for the Petaluma Valley.

5.2.2.2 Groundwater Banking Feasibility Study

The California Water Plan Update 2009 emphasizes the role of groundwater storage as a viable means for water supply. Additionally, evaluating the feasibility of groundwater banking was recommended in the GMPs for both the Santa Rosa Plain and Sonoma Valley. In an effort to improve the region's water supply reliability, the Water Agency and its partners (Cities of Cotati, Rohnert Park and Sonoma, Valley of the Moon Water District, and the Town of Windsor) began investigating the viability of conjunctively managing surface water and groundwater resources by conducting a feasibility study for a regional groundwater banking program.

The conjunctive management of Russian River supplies and groundwater is reflected in several of the strategies contained in the Water Agency's Water Supply Strategies Action Plan, summarized in Section 5.8.1. Conceptually, the groundwater banking program would involve the diversion and transmission of surplus Russian River water produced at the Water Agency's existing production facilities for storage in the Santa Rosa Plain Groundwater Basin and/or Sonoma Valley Groundwater Basin during wet weather conditions (i.e., the winter and spring seasons) for subsequent recovery and use during dry weather conditions (i.e., the summer and fall seasons) or emergency situations. Primary findings from the Groundwater Banking Feasibility Study, which was completed in 2012, indicate the following:

- A groundwater banking program would provide enhanced reliability of the regional water supply during droughts, natural hazard events (e.g., earthquakes), and periods of peak seasonal water demands.
- Additional potential benefits within the Russian River watershed include improved habitat conditions by enhancing tributary base flows from reducing groundwater pumping, or in the case of Dry Creek, reducing summer releases from Warm Springs Dam (due to reduced peak demands) thus improving flow conditions for Endangered Species Act-listed salmonids.
- Facilities owned and operated by the study participants, including drinking water production facilities along the Russian River and groundwater supply wells within the groundwater basins, are well suited for further testing and developing a groundwater banking program in an incremental and phased manner.
- In evaluating methods for implementing a groundwater banking program, Aquifer Storage & Recovery (ASR)
- was deemed to be more practical than surface spreading for near term implementation based on: (1) the ability to incrementally establish an ASR program; (2) the ability to pilot test ASR in a phased manner; (3) the relatively lower costs associated with ASR; and (4) uncertainties related to the ability of surface spreading alternatives to convey water to aquifers suitable for storage and subsequent recovery.

The Groundwater Banking Feasibility Study recommended the performance of pilot studies to further assess the feasibility and potential operational parameters associated with ASR. The Water Agency is coordinating with the City of Sonoma to implement a pilot study using one of the City's municipal supply wells. Permitting and initiation of the pilot study is expected to occur in 2016.

5.2.2.3 CASGEM Compliance

The Water Agency or County have been designated by DWR as Monitoring Entities for 13 of the 14 groundwater basins and sub-basins in Sonoma County. The Water Agency is designated as the lead Monitoring Entity for the Kenwood Valley Groundwater Basin and the Sonoma Valley Groundwater Sub-basin where the Water Agency serves as the lead agency for the Sonoma Valley Groundwater Management Program, which encompasses these two basins. The City of Petaluma has been designated as Monitoring Entity for the Petaluma Valley Groundwater Basin. The County is the lead Monitoring Entity for the following 11 groundwater basins and sub-basins: Annapolis Ohlson Ranch Formation Highlands Groundwater Basin, Bodega Bay Area Groundwater Basin, Fort Ross Terrace Deposits Groundwater Basin, Knights Valley Groundwater Basin, the Wilson Grove Formation Highlands Groundwater Basin, Alexander Area Groundwater Sub-basin, Cloverdale Area Groundwater Sub-basin, Healdsburg Area Groundwater Sub-basin, Lower Russian Groundwater Basin, Rincon Valley Groundwater Sub-basin, and Santa Rosa Plain Groundwater Sub-basin.

To comply with California Statewide Groundwater Elevation Monitoring Program (CASGEM) requirements, the designated Monitoring Entities have prepared monitoring plans and coordinate with other local entities involved in collecting groundwater-level measurements to compile and report groundwater-level data to DWR on a semiannual basis, as required by DWR.

5.2.2.4 Sustainable Groundwater Management Act

In September 2014, Governor Brown signed legislation requiring that California's critical groundwater resources be sustainably managed by local agencies. SGMA gives local agencies (cities, counties and water

districts) powers to sustainably manage groundwater over the long-term, and requires Groundwater Sustainability Agencies (GSAs) be formed and Groundwater Sustainability Plans (GSPs) be developed for medium- and high-priority groundwater basins. In Sonoma County, the Petaluma Valley groundwater basin, Santa Rosa Plain groundwater sub-basin, and Sonoma Valley groundwater sub-basin (as defined in DWR's Bulletin 118) are identified as a medium priority basin and are, therefore, subject to the requirements of SGMA.

In Sonoma County, staff of the Water Agency and other local GSA-eligible agencies have conducted numerous activities to inform the public about SGMA and begin addressing the formation of local GSAs, as summarized below:

- Formed a working group of Water Agency and County staff who are meeting with other GSA eligible agencies in each of the three basins to discuss and recommend governance structures and details for the GSAs.
- Performed a stakeholder assessment to explore stakeholder issues and interests related to forming GSAs
- Developed consensus principles for forming GSAs and recommendation for developing a single GSA and single GSP for each of the three basins.
- Held public outreach meetings, conducted briefings to local boards, councils, and interest group organizations, developed a communication and outreach plan, and formed an informational website for interested parties (SonomaCountyGroundwater.org),

Following formation of GSAs by June 2017, local GSAs will work on developing GSPs for the three basins.

5.3 Stormwater

The Water Agency is responsible for managing eight flood control zones throughout Sonoma County. In three of the zones, the Water Agency is working with local stakeholders to identify opportunities to better manage stormwater and alleviate flooding, while possibly recharging groundwater aquifers or providing other benefits. The "*Stormwater Management-Groundwater Recharge*" studies are currently assessing the feasibility of projects in the Laguna-Mark West watershed, the Sonoma Creek Watershed and the Upper Petaluma River watershed. In the Sonoma Valley, the Water Agency and its partners are implementing a regionally integrated, multi-benefit flood management project in a sub-watershed that includes the City of Sonoma. The project entitled "City Watersheds" represents the first project being implemented in a suite of integrated projects in the watershed envisioned to effectively manage stormwater as a resource addressing water supply and water quality. The objectives include: stormwater management/flood alleviation, targeted stormwater drainage and culvert enhancements to the municipal storm drain system, improving channel capacity through strategic vegetative and habitat enhancement, removing barrier to fish passage, enhancing groundwater recharge and enhancing recreational and educational opportunities for the public. In addition, Storm Water Resource Plans, compliant with California Water Code Sect. 10565 and Proposition 1 Water Bond funds are being developed for the three watersheds to guide effective implementation of stormwater and dry weather runoff capture projects.

5.4 Wastewater and Recycled Water

The Water Agency does not supply recycled water to its Customers and does not provide supplemental treatment to recycled water prior to its distribution, however recycled water is supplied to some of the Agency's Customers by other agencies. This section describes recycled water coordination and identifies the wastewater and recycled water agencies within the service area.

5.4.1 Recycled Water Coordination

The use of recycled water reduces peak demands on the Water Agency's water supply system and the need to construct additional water storage facilities. The Water Agency is involved with coordinating recycled water programs including funding for projects that offset Water Agency water deliveries.

The Water Agency and its water contractors encourage recycled water use by funding recycled water projects. Funds are collected as part of the Water Agency water rates, for the Local Supply/Recycled Water/Tier 2 Conservation Fund known, also known as LRT2. A total of $4,144,272 has been disbursed for recycled water projects between the program's inception on July 1, 2000 and June 30, 2010. There are no currently planned recycled water projects utilizing these funds. DWR Table 25 is not included since the Water Agency does not directly supply recycled water.

Recognizing the growing need for an integrated and regional approach to water management, the Water Agency helped form the North Bay Water Reuse Authority (Authority). The Authority consists of water and wastewater Agencies in Sonoma, Marin, and Napa Counties. These agencies joined forces to plan and promote projects that would considerably expand the use of recycled water region-wide, including areas in Sonoma Valley and North Marin. Projects would build on commitments to long-term inter-agency cooperation to address common needs related to reliable water supplies and enhanced environmental restoration. The Authority provides a model for maximizing the benefits of limited water resources in the west.

Some of the Water Agency's Customers have developed recycled water plans in coordination with the wastewater treatment facilities within their local service areas. The Water Agency is involved with planning potential future recycled water projects with the Town of Windsor and in the Sonoma Valley with the City of Sonoma and the Valley of the Moon Water District. The Water Agency would not be the agency that would supply these potential future recycled water supplies, so these future supply amounts are not included in this Plan.

5.4.2 Wastewater Collection, Treatment, and Disposal

The agencies that collect, treat, or discharge municipal wastewater generated and treated within the service area are identified in Table 5-9. There are eight smaller wastewater agencies in the MMWD area that are not included in Table 5-9 that provide wastewater collection service. The collection, treatment, and disposal of treated wastewater (i.e., non-recycled) is discussed in each of the Customers' individual urban water management plans.

Table 5-9. Wastewater and Recycled Water Agencies		
Name of Agency	Wastewater Role	Recycled Water Role
Santa Rosa Subregional Reclamation System (Subregional System)	Provides wastewater collection and treatment for Santa Rosa, Cotati, Rohnert Park, Sebastopol, and Windsor areas.	Recycled water provided to the Geysers Recharge Project and to Rohnert Park and Santa Rosa areas.
City of Petaluma	Provides wastewater collection and treatment.	Provides recycled water to agricultural, landscape, and industrial customers.
Town of Windsor	Provides wastewater collection and treatment for Windsor area.	Provides recycled water to Windsor area and to Geysers Project.
Sonoma Valley County Sanitation District	Provides wastewater collection and treatment for Valley of the Moon and Sonoma areas.	Provides recycled water for urban, environmental and agricultural use near Sonoma.
Airport-Larkfield-Wikiup Sanitation Zone (ALWSZ)	Provides wastewater collection and treatment for the Larkfield and Wikiup areas in Sonoma County, including the Airport Business Park	Provides recycled water for agricultural use
Novato Sanitary District	Provides wastewater collection and treatment for NMWD area.	Provides recycled water for agricultural use and landscape use in the Novato area of NMWD.
Marin Municipal Water District		Distributes recycled water.
Las Galinas Valley Sanitary District	Provides wastewater collection and treatment in MMWD area.	Provides treated recycled water to MMWD area.
Central Marin Sanitation Agency	Provides wastewater treatment in MMWD area.	
Sanitary District No. 5 (Tiburon)	Provides wastewater collection and treatment in MMWD area.	
Sausalito-Marin City Sanitary District	Provides wastewater collection and treatment in MMWD area.	
Sewerage Agency of Southern Marin	Provides wastewater collection and treatment in MMWD area.	

The Santa Rosa Subregional Reclamation System and the Town of Windsor Water Reclamation Division both export some of their treated wastewater to the Geysers Recharge Project, which is located outside of the service area. The wastewater facilities owned by the Sonoma Valley County Sanitation District are operated and maintained under contract by the Water Agency. The Water Agency also operates other wastewater treatment facilities in the region including the Airport-Larkfield-Wikiup Sanitation Zone (ALWSZ).

Within the Water Agency's service area, discharge of treated wastewater is regulated by the North Coast Regional Water Quality Control Board and the San Francisco Bay Regional Water Quality Control Board depending on the point of discharge.

5.4.3 Recycled Water Systems

Table 5-9 identifies the agencies involved in recycled water within the Water Agency's service area. As stated earlier, the Water Agency does not supply recycled water and does not provide supplemental treatment. Individual Customers' urban water management plans provide information related to amount of recycled water used and projected to be used.

In general, the majority of the wastewater generated and treated during the summer months that is not delivered to Geysers Recharge Project is used for alternative beneficial uses such as wetland habitat and restoration and irrigation for agriculture, pastures, vineyards, urban uses and golf courses. The use of the

recycled water helps offset part of the potable and agricultural water demand during the peak summer months.

Some of the Water Agency's Customers have developed recycled water system master plans and programs. Current programs include using recycled water for irrigation of agricultural areas, parks, commercial properties, residential landscapes, golf courses and vineyards to offset potable and nonpotable water demands.

The wastewater facilities and their current and planned use of recycled water for the wastewater systems operated and maintained under contract by the Water Agency are described below. These wastewater systems are not owned by the Water Agency.

5.4.3.1 Sonoma Valley County Sanitation District

Municipal wastewater services in the Sonoma Valley are provided by the Sonoma Valley County Sanitation District (SVCSD), which is managed and operated by the Water Agency. SVCSD collects, treats, and disposes of wastewater generated from within the service areas of the Valley of the Moon Water District and the City of Sonoma. The SVCSD reclamation facility provides a tertiary level of treatment. The facility has a permitted average dry weather flow capacity of 3 million gallons per day (mgd) and is capable of treating up to 16 mgd. From 2010 to 2015, the annual volume of wastewater treated by the plant ranged from approximately 2,900 (in 2013) to 4,000 (in 2014) ac-ft.

Treated wastewater is currently either discharged to the San Pablo Bay via Schell and Hudeman Slough or is reused by dairy operations, vineyard irrigation and wetland enhancement in the southern part of the Sonoma Valley and southwest portion of Napa County. On average in the last 5 years, approximately 1,500 ac-ft of recycled water was reused, thus offsetting groundwater pumping by this amount. In recent years, the SVCSD has explored the feasibility of expanding recycled water use to offset local groundwater pumping or imported Russian River water in addition to reducing or eliminating discharges to San Pablo Bay.

The City of Sonoma and Valley of the Moon Water District meet the water supply needs of their customers by importing water into the valley from the Water Agency, pumping local groundwater within the valley, and implementing water conservation programs. A recent USGS study has found that saline water intrusion in the southern part of the valley could be occurring in the vicinity of a groundwater depression within and to the southeast of the City of Sonoma's service area. The use of recycled water to offset Valley of the Moon Water District, City of Sonoma, and agricultural groundwater pumping can help alleviate the potential for saline water migration in the Sonoma Valley, thus enhancing the reliability of their water supply.

5.4.3.2 Airport-Larkfield-Wikiup Sanitation Zone

The Water Agency owns and operates ALWSZ, which includes the Airport Business Park in its service area. The Town of Windsor supplies potable water to the Airport Business Park. In 2013 the Water Agency and the Town conducted a feasibility study to evaluate the use of ALWSZ and Town recycled water in the business park and other areas of the Town of Windsor's water service area to offset use of the Russian River water for landscaping purposes. The study identified several projects that could be implemented to offset potable water usage within the Airport Business Park. The Water Agency is researching funding oppurtunites that could assist in the implementation of one of these projects.

5.5 Desalinated Water Opportunities

Desalination of sea water is not currently an economically viable option for use as a Water Agency water supply. Additionally, the Water Agency's wells produce neither brackish nor impaired groundwater that would require desalination.

While the Water Agency does not foresee pursuing desalination as a potential water supply, some of its water contractors or customers may explore the option in the future. MMWD has constructed a pilot-scale

desalination plant (the Seawater Desalination Pilot Plant). The status of MMWD's desalination program is provided in their Plan.

5.6 Exchanges or Transfers

Currently, the Water Agency does not transfer and/or exchange water with other entities, and it is not anticipated that transfers or exchanges will occur in the future. Water transfers between the Water Agency's Customers have been necessary in the past and may be necessary in the future to improve water reliability. The Restructured Agreement authorizes water transfers between water contractors in certain limited circumstances.

5.7 Future Water Projects

The Water Agency evaluated the projected demands requested by its Customers and Russian River customers through 2040. Based on this assessment, additional water supply projects will be needed to meet these projected demands. The types of projects and their estimated schedule are summarized in Table 5-10. These projects consist of obtaining additional water rights and modifying the terms of existing water rights, new water supply diversion facilities, and certain transmission system projects necessary to convey these additional supplies to portions of the transmission system where the demands are anticipated to occur. The schedule shown in Table 5-10 assumes that the Water Agency's Customers will determine these projects are prudent and support their financing. The following describes how these projects were identified.

Based on the water demand projections described in Section 4, the Water Agency estimates the existing overall annual diversion and rediversion limit of 75,000 ac-ft in the Water Agency's water-right permits may be exceeded in approximately 2035. The Water Agency estimates that its total annual diversions and rediversions of Russian River water may exceed the 75,000 ac-ft/yr limit by about 117 ac-ft/yr in 2035 and by about 988 ac-ft/yr in 2040. If the trends in these projections continue, then it may be necessary for the Water Agency to make the necessary filings with the SWRCB (which may be an application for a new water-right permit or petitions to amend the Water Agency's existing permits) in approximately 2030, so that the Water Agency will be authorized to divert and redivert more than 75,000 ac-ft annually in 2035. Even with an incremental increase of 1,000 ac-ft/yr in the annual diversion and rediversion limit of Russian River water, there still will be sufficient water in the Russian River and Lake Mendocino and Lake Sonoma for the Water Agency to make these diversions and rediverisons. The Water Agency will need to prepare an environmental impact analysis under CEQA before the SWRCB may act on any such request from the Water Agency.

The Water Agency's 2010 Plan estimated that an additional 5,000 ac-ft annually (above the 75,000 ac-ft/yr limit) would be needed by about 2027. The new, lower estimates described in the preceding paragraph reflect the increased water conservation implemented by the Water Agency's customers and resulting lower projected future demands for water. The need to increase the 75,000 ac-ft/yr diversion and rediversion limit in the Water Agency's water-right permits and the schedule for requesting any new water-right permit or changes to the Water Agency's existing permits will be reevaluated in the Water Agency's 2020 Plan.

Additional water diversion facilities will be needed to meet future demands. To estimate the additional capacity and schedule for these new facilities, the projected annual deliveries were translated to peak system demands based on analyses of recent historical peaking factors under normal water supply conditions. These estimated peak demands were then compared to the estimated firm capacity of the existing production facilities to determine if additional production capacity will be necessary to meet projected demands. Based on this evaluation, the Water Agency estimates that approximately 3 mgd of additional diversion capacity will be needed to meet demands out to 2040 with additional capacity required online by about 2030. This additional production capacity can likely be developed by installing new wells (or perhaps retrofitting existing wells) in the Wohler and Mirabel areas. Additional studies will be necessary to

refine this future project and to examine alternatives. The Water Agency will need to comply with CEQA to implement such a project.

As discussed in Section 1.3.2, the Water Agency assumes that the Biological Opinion will be successfully implemented, including the Dry Creek habitat enhancement work. If the habitat enhancement work is not as successful as anticipated by the Water Agency, NMFS, and CDFW, it may be necessary to construct a Dry Creek bypass pipeline to convey flows necessary for water supply purposes past Dry Creek. The Water Agency has completed a feasibility study of a bypass pipeline should it be necessary to persue that option. The Biological Opinion requires that a determination regarding the effectiveness of the Dry Creek habitat enhancement be made by 2018. Should a bypass pipeline be deemed necessary in 2018, it is anticipated that it could be operational by approximately 2025-2026. The Water Agency will continue to monitor the progress of the Dry Creek habitat enhancement project and will re-evaluate the situation as new information becomes available.

Additional transmission system facilities will be needed to ensure that future peak demands can be met in all portions of the water transmission system. Similar to the water supply facilities, the timing of completing these facilities is dictated by the projected peak demands. The Water Agency simulated the transmission system operation under these peak demands using its hydraulic model to identify capacity constraints and evaluate which transmission system projects are necessary and when those projects are needed. In the Water Agency's transmission system, using the sustained levels in the storage facilities is one of the key criteria to determine sufficient capacity. For this analysis, a pipeline or group of pipelines would be identified with a capacity deficiency if the downstream storage facility was unable to maintain storage levels above 50% of the total storage capacity after five consecutive days of projected peak day demands.

Based on the modeling results, the South Transmission Main Project that will provide a secondary pipeline from the Cotati Tanks to the Kastania Meter Station will be needed as early as 2025 with at least the first phase (Cotati Tanks to Ely Booster Station) to alleviate capacity deficits during periods of peak demand projected to occur in the southern portion of the Petaluma Aqueduct. Phase 2 of the South Transmission Main Project (Ely Booster Station to Kastania Meter Station) is expected to be needed by 2030.

Additionally, although Table 5-10 doesn't specify any transmission system projects in the Sonoma Valley, modeling results indicate that between 2025 and 2030, the Sonoma Aqueduct will begin to exhibit capacity deficiencies. While the deficiency does not exceed the criteria for identifying a capacity constraint, deliveries to Sonoma Valley are dependent on non-redundant facilities and hence system reliability is a concern. Further analysis is recommended for consideration of infrastructure projects that would improve the system reliability.

Finally, the Kawana-Ralphine-Sonoma Booster Pipeline Project (comprising a pipeline from the Kawana Tanks to the Sonoma Booster Station) is a reliability project that is scheduled for completion by 2025. The Water Agency will need to comply with the requirements of CEQA and evaluate alternatives prior to implementation of these projects.

There is uncertainty regarding the rate that water demands will increase, especially in the near-term, given the recent drought events. The project schedule described in Table 5-10 is based on the demand projections provided by the water contractors and MMWD. As described in Section 4.2, these near-term projections (through 2030) are conservative estimates and the growth rate of water demand may be lower, thus extending the dates when the transmission system projects (including the South Transmission Main Project) will be needed. The Water Agency will continue to work with its water contractors and other customers to monitor actual water demands relative to their demand projections. Also, the Water Agency will assist the water contractors' evaluation of local projects (e.g., new storage, additional conservation, or recycled water projects) to help mitigate the necessity, or delay the need for the transmission system projects identified in Table 5-10. The Water Agency will also continue to monitor demands on the Sonoma Aqueduct and update

its hydraulic analysis as new information regarding demand projections become available from the Valley of the Moon Water District and the City of Sonoma.

Table 5-10. Wholesale: Expected Future Water Supply Projects or Programs (DWR Table 6-7)

	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.
	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format. LOCATION OF THE NARRATIVE_____

Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year [d]	Planned for Use in Year Type	Expected Increase in Water Supply to Agency, ac-ft/yr
South Transmission Section 1 (Cotati to Ely) [a]	No			2025	All year types	
South Transmission Section 2 (Ely to Kastania) [a]	No			2030	All year types	
Kawana – Ralphine-Sonoma Booster Station Pipeline[a]	No			2025	All year types	
Petition to Increase Annual Diversion Limit[b]	No			2035	Average Year and Multiple-Dry Years	1,000
Mirabel West Wells[c]	No			2030	Average Year and Multiple-Dry Years	7,800

[a] *Transmission system projects are scheduled to provide water deliveries to specific portions of the Water Agency's transmission system per the projection of net water demands by the Agency's customers and therefore do not represent on their own an additional water supply.*

[b] *Based on net demand projections of Russian River supplies from Water Agency Customers and direct diverters.*

[c] *Additional annual water supply is based on increased peak capacity from the new facilities using historical correlation of peak capacities to annual diversions.*

[d] *Year project needs to be ready for use.*

5.8 Summary of Existing and Planned Sources of Water

This section provides projections of the future water supply quantities available for delivery by the Water Agency to its Customers. Future water supply projections are dependent upon planned infrastructure improvements being approved and constructed as summarized in Table 5-10 and upon the assumptions discussed in Section 1.3.

Table 5-11 summarizes the Water Agency's use of 2015 water supplies. Table 5-12 summarizes the projected water supplies available to the Water Agency, for delivery to the Customers.

Table 5-11. Wholesale: Water Supplies — Actual (DWR Table 6-8)				
Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume, ac-ft	Water Quality	Total Right or Safe Yield, ac-ft
Purchased or Imported Water		0		
Supply from Storage		0		
Groundwater	The Water Agency does not plan to utilize groundwater as a normal year source of supply. Rather, groundwater from the Santa Rosa Plain wells will be utilized on an as-needed basis during periods of drought or when Russian River supplies are otherwise constrained.	774	Drinking Water	2,300
Surface water		43,959	Drinking Water	75,000
Recycled Water		0		0
Desalinated Water		0		0
Stormwater Use		0		0
Transfers		0		0
Exchanges		0		0
Other		0		0
Total		44,733		77,300

Table 5-12. Wholesale: Water Supplies — Projected (DWR Table 6-9)

Water Supply	Additional Detail on Water Supply	Projected Water Supply Report to the Extent Practicable, ac-ft									
		2020		2025		2030		2035		2040 (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Purchased or Imported Water											
Supply from Storage											
Groundwater		2,300	[a]	2,300	[a]	2,300	[a]	2,300	[a]	2,300	[a]
Surface water		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Recycled Water											
Desalinated Water											
Stormwater Use											
Transfers											
Exchanges											
Other											
Total		77,300	75,000	77,300	75,000	77,300	75,000	77,300	75,000	77,300	75,000

[a] *Safe yield not defined at this time.*

5.8.1 Water Supply Strategies

The Water Agency's commitment to providing a reliable water supply to its Customers in future years prompted development of new water supply strategies. In September 2010, following 16 months of community outreach and involvement the Water Agency's Board of Directors (Board) approved nine Water Supply Strategies developed to increase water supply system reliability, resiliency and efficiency in the face of limited resources, regulatory constraints and climate change uncertainties.

Under Board direction, the 2010 Water Supply Strategies Action Plan described how each strategy was being carried out through specific activities and projects, identified involved parties and provided the state and budget information for each activity or project. The Board recognized that the plan is a living document and requested regular updates. The Action Plan was updated in 2011 and most recently in 2013. The Action Plan included a revised set of nine strategies, as presented in Table 5-13.

The strategies and Action Plan are based on the following considerations:

- No entity can do it alone: Coordination and partnerships are essential to achieving reliable, efficient, and sustainable water resource management.
- None of the strategies stand alone: The strategies are interconnected.
- The Action Plan is a living document: The plan is a snapshot and should be modified as progress is made and conditions change.
- Public education and input: Transparency is critical to success.

For each of the nine strategies, the Action Plan defines specific activities and projects, involved parties, activity/project status, budget, and timing. The timing of each activity is categorized as either immediate, near term, or long term. The Action Plan is available on the Agency's web site (http://www.scwa.ca.gov/water-supply-strategy/).

Table 5-13. Water Supply Strategies

Strategy 1	Ensure Adequate Summertime Water Flow Through Dry Creek Valley
Strategy 2	Improve Management of Russian River System to Protect Fisheries and Meet Water Demands
Strategy 3	Plan for the Impact of Climate Change on Water Supply and Flood Protection
Strategy 4	Identify and Implement Projects that Integrate Stormwater Recharge and Flood Protection
Strategy 5	Build Partnerships with Stakeholders to Facilitate Information Based Water Supply Planning
Strategy 6	Implement Projects to Improve Transmission System Reliability
Strategy 7	Improve the Energy Efficiency of the Water Transmission System and Increase Renewable Power Use
Strategy 8	Implement Projects that Improve Integration of Water Management
Strategy 9	Improve Internal and External Processes, Data Exchange and Analysis to Promote Organizational Efficiency

5.9 Climate Change Impacts to Supply

DWR suggests, but does not require, that water suppliers consider in their 2015 Plans the potential water supply and demand effects related to climate change. This section provides an overview of the recent direction that has been developed for California water agencies regarding climate change planning and a description of the Water Agency's current related activities.

In June 2005, Governor Arnold Schwarzenegger issued Executive Order # S-3-05 acknowledging the potential impacts of climate change on California. The executive order sets targets for greenhouse gas emissions reductions in the state, directs the formation of a Climate Action Team led by the California

Environmental Protection Agency, and sets up a biannual reporting schedule for state agencies to identify impacts and potential mitigation plans.

The Executive Order's key declarations and actions include:

- link between greenhouse gas emissions and climate change;
- need for statewide consistency in planning to mitigate sea level rise and the anticipated impacts to coastal area resources and populations;
- state agencies are to work cooperatively to mitigate impacts; and
- a water adaptation strategy to be led by DWR.

DWR has been providing guidance to California water suppliers on addressing climate change impacts through the issuance of several key reports and guidelines. The Water Agency is familiar with the climate change planning guidance that has been provided by DWR and others and is incorporating climate change planning into its water planning activities. The Water Agency's Water Supply Strategy 3 is to evaluate potential climate change impacts on water supply and flood protection. The strategy defines immediate actions that consist of initiating climate change modeling and support of installation of weather sensors. The near term action is the development of adaptation measures once the climate change predictive modeling is completed. The long term action is to update the climate change analysis.

As part of Strategy 3, the Water Agency is funding ongoing USGS studies on the potential effects of climate change on the Water Agency's water supply. Potential changes in air temperature and precipitation due to changes in climate are likely to result in changes in hydrology in the Russian River drainage basin. The Water Agency is interested in understanding how runoff and streamflow may change and hopes to obtain scientifically defensible information upon which to base infrastructure planning and approaches for resource management.

The objectives of the USGS study are to:

(1) Develop the downscaled future climate scenarios necessary for hydrologic modeling of the Russian River Water System,

(2) Develop and calibrate a regional-scale hydrologic model to provide daily inputs for future climate for the Water Agency's water management models of the Russian River water system,

(3) Prepare future climate inputs for groundwater models in Sonoma Valley and the Santa Rosa Plain.

The results of the USGS study may allow the Water Agency to assess the impact of climate changes in future years on the water demands of its Customers and the water supply available to the Water Agency. This new information will form the basis of future Urban Water Management Plans. In the interim, customers of the Water Agency, local planning agencies, and other persons relying on this Plan as a reference for analysis of water supply availability are encouraged to check with the Water Agency for updated information regarding the USGS study. In addition, the Water Agency, Scripps Institute for Western Weather Extremes and the USGS have partnered on research to evaluate how climate change may impact extreme weather events such as floods and droughts.

5.10 Energy Intensity

Reporting of the energy intensity associated with sources of water is a voluntary item. Water energy intensity is the total amount of energy on a per ac-ft basis associated with water management processes occurring within the Water Agency's operational control. The Water Agency has selected to report its energy intensity using the total utility approach Option B. Table 5-14 presents the energy intensity of the Water Agency's water supplies for the year 2014. Energy is used to divert surface water from the Russian River and to convey it to the Water Agency's Customers.

In 2011, the Water Agency's Board adopted its Energy Policy which established the goal of achieving Carbon Free Water by 2015. The goal was reached by increased water-use efficiency, water system operational efficiency, and development of renewable energy sources. Ongoing conservation efforts resulted in the Water Agency reducing its total energy use by 27 percent since 2005. Through a combination of constructing its owner power sources and contracting for renewable and carbon free sources, such as hydroelectric, landfill gas, and solar energy, the Water Agency supplies 100% of its electricity needs through renewable sources.

Table 5-14. Voluntary Energy Intensity-Total Utility Approach (DWR Table O-1B)

Urban Water Supplier:	Sonoma County Water Agency

Water Delivery Product

Wholesale Potable Deliveries

Table O-1B: Voluntary Energy Intensity - Total Utility Approach

Enter Start Date for Reporting Period 1/1/2014 End Date 12/31/2014	Urban Water Supplier Operational Control		
	Sum of All Water Management Processes	Non-Consequential Hydropower	
	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (ac-ft)	50,462	64,857	na
Energy Consumed (kilowatt-hour [kWh])	36,339,539	-9,457,182	26,864,357
Energy Intensity (kWh/ac-ft)	720	-146	532

Quantity of Self-Generated Renewable Energy

2,550,452	kWh

Data Quality

Metered Data

Data Quality Narrative:

Energy data comes from aggregating annual kilowatt hours as measured with utility scale meters used for billing on both the consumed side and the hydropower generation side.

Narrative:

Water Agency has 23 electric power accounts from Power and Water Resources Pooling Authority (PWRPA). Water Agency has 74 electric power accounts from Sonoma Clean Power.

Non-consequential hydropower – Not all water passing through the hydropower system is withdrawn from the water way downstream for delivery to customers. So hydropower water volume is greater than water delivered/processed. "Net Utility" value is therefore not applicable Hydropower from Warm Springs Dam is sold to PWRPA. Water Agency then purchases the same hydropower from PWRPA. The balance of power purchases from PWRPA and Sonoma Clean Power are from renewable sources, making the Water Agency's power sources "carbon free."

Self Generated Renewable Energy only includes solar PV generated at three Water Agency facilities, as suggested for reporting in guidelines Appendix O. It does not include the power from our own Warm Springs Dam hydropower system, from PWRPA's WAPA hydropower sources, PWRPA's landfill gas to energy source, or from Sonoma Clean Power's geothermal source.

Section 6

Water Supply Reliability

This section describes the constraints on water supplies, reliability by type of year, the supply and demand assessment, and regional supply reliability. During short-term periods of water supply shortages, or in the event of a temporary impairment of transmission system capacity, the Water Agency would implement its water shortage contingency plan, which is described in Section 7.

6.1 Constraints on Water Sources

The availability of water in the Russian River and the delivery capacity of Water Agency's transmission system are potential physical constraints on the delivery of water to the Water Agency's Customers, particularly during high demand periods in the summer months. As previously described in Section 5.1.6, the Water Agency uses the ResSim program developed by the Hydrologic Engineering Center of the USACE to evaluate the amount of water available for diversion from the Russian River, and a transmission system hydraulic model to evaluate transmission capacity constraints on delivering water. Depending on their location in the transmission system, some customers are more susceptible than others to the impacts of transmission system constraints. Delivery of projected future water supplies depends on planned infrastructure improvements being approved and constructed, as discussed in Section 5.7.

The water quality of the Water Agency's water deliveries is regulated by the SWRCB's Division of Drinking Water, which requires regular collection and testing of water samples to ensure that the quality meets Federal and state regulatory standards and does not exceed maximum contaminant levels (MCLs). The Water Agency's water quality testing has consistently yielded results within the acceptable regulatory limits since the late 1950s.

The Water Agency treats its water supplies by chlorination for residual disinfection. The Water Agency also adds sodium hydroxide for pH adjustment to prevent copper plumbing corrosion. The Water Agency's water is of high quality, due to the natural filtration process utilized by the Water Agency's diversion facilities.

Based on existing data, water quality issues are not anticipated to have significant impact on water supply reliability. The quality of the Water Agency's surface water and groundwater supply sources over the next 25 years is expected to continue to meet state and federal regulatory standards. Surface and groundwater will continue to be treated to meet drinking water standards and no impacts to water supplies due to water quality deficiencies are foreseen to occur in the next 25 years. Although there is no current evidence of groundwater contamination or constituents being close to current drinking water standards, if chemical contamination occurs in the future or if MCLs for constituents are lowered, new treatment facilities could be constructed. These treatment facilities could have a significant cost.

As noted in Section 1.3, the Plan is based upon reasonable assumptions about the Water Agency's sources of water supply. There are a number of actions and projects the Water Agency could undertake to mitigate any adverse water supply impacts resulting from future changes in those assumptions.

6.2 Reliability by Type of Year

The Water Agency's surface water supply is subject to reductions during dry years. When the Lake Sonoma water volume is less than 100,000 ac-ft before July 15, a 30 percent reduction of diversions is required, as dictated by the Water Agency's water rights permits and Decision 1610 and as described in Section 5.1.6.1.

The Water Agency's groundwater supply capacity is assumed to not be impacted by single-dry years given the short duration and low frequency of occurrence and Agency staff analysis of existing pumping data.

Consistent with the Water Supply Strategies Action Plan and state policies (e.g., California Water Plan 2013), the Water Agency will continue to work with its Customers to conjunctively manage Russian River and groundwater supplies to promote sustainability of these resources. These strategies may include using groundwater supplies during hydrologic dry years for the Russian River (e.g., 2013- 2015, or conversely, reducing groundwater pumping from non-Russian River aquifers during years when there are high Russian River flows (e.g., 2010, 2011 and 2012).

In addition, the Water Agency and its partners are exploring opportunities to enhance groundwater recharge of stormwater in the Sonoma Valley, Petaluma Valley, and Santa Rosa Plain watersheds (Section 5.2.4.2). Finally, as discussed in Section 5.2.4.1, the Water Agency and five of its water contractors are evaluating the feasibility of implementing aquifer storage and recovery projects in the Sonoma Valley and Santa Rosa Plain basins utilizing winter Russian River water. These strategies, either individually or in combination with conservation and recycled water projects, provide enhanced reliability of the regional water supply during droughts, natural hazard events (e.g., earthquakes), and periods of peak seasonal water demands. These measures can also help improve habitat conditions by enhancing tributary base flows by reducing groundwater pumping, or in the case of Dry Creek, reducing summer releases from Warm Springs Dam (due to reduced peak demands) thus improving flow conditions for ESA-listed salmonids.

The reliability of the Water Agency's two water supply sources (Russian River surface water and groundwater) to demands for average, single- and multiple-dry water years is summarized in Table 6-1, as well as the years upon which the supplies are based.

6.3 Supply and Demand Assessment

This section provides a comparison of the projected water supply and demand for the Water Agency from 2020 through 2040. The demand for the Water Agency represents the demand by the Water Agency's Customers for Water Agency wholesale water from the transmission system and Russian River Customers diverting water under the Water Agency's water rights. It does not include the portion of the customers' retail demand met by water conservation, recycled water, and local supplies. Water supply to demand comparisons are also provided for single-dry year and multiple-dry year scenarios. Table 6.1 lists the years identified as the historical average, single driest and driest mulit-year period, along with the available supply if the year type hydrology was to repeat. The water demands are developed in Section 4, and water supplies are defined in Section 5. As noted in Section 5.1.6.2, water supply identified in the Plan represents the water demand that can be met while maintaining adequate storage in Lakes Mendocino and Sonoma. With the exception of Lake Mendocino in a single dry year condition, the water stored in the reservoirs is typically greater than the supply needed to meet demands (especially Lake Sonoma).

The overall conclusion is that the Water Agency has adequate water supply through the 2040 planning horizon of this Plan, except for single-dry years, starting after 2020. For single-dry years, the model simulations predict that storage levels in Lake Sonoma will drop below 100,000 ac-ft prior to July 15th , thus requiring demand curtailments by Water Agency customers per Decision 1610 (Section 5.1.6.1) for some portion of the year. In these circumstances, the Water Agency will work with its Customers to reduce water demands as described in the Water Shortage Contingency Plan described in Section 7, or to utilize additional local sources, or both. Based on efforts over the last five years during dry conditions, the Water Agency does not anticipate any difficulty in maintaining an adequate water supply during the single-dry year. The magnitude of these single-dry year potential shortfalls is estimated to be about 18% of average annual demand by 2040.

Table 6-1. Wholesale: Bases of Water Year Data (2020 as basis) (DWR Table 7-1)			
Year Type	Base Year	Available supplies if year type repeats	
		Volume available, ac-ft	% of avg supply
Average Year	1962	66,260	100%
Single-Dry Year	1977	66,260	100%
Multiple-Dry Years 1st Year	1988	66,260	100%
Multiple-Dry Years 2nd Year	1989	66,260	100%
Multiple-Dry Years 3rd Year	1990	66,260	100%

The comparison of projected water supply and demand for normal years is presented in Table 6-2. As Table 6-2 shows, there is adequate water supply in normal years to meet demands through 2040. For this analysis, if a projected Water Agency demand can be met while maintaining adequate storage in Lakes Mendocino and Sonoma, that demand is considered the supply for that scenario. See section 5.1.6.2.

Table 6-2 Wholesale: Normal Year Supply and Demand Comparison, ac-ft (DWR Table 7-2)						
	2015	2020	2025	2030	2035	2040
Supply totals[a]	42,254	66,260	70,309	73,011	75,117	75,987
Demand totals[b]	42,254	66,260	70,309	73,011	75,117	75,987
Difference	0	0	0	0	0	0

Table 6-3 provides a comparison of a single dry year water supply with projected total water use over the next 25 years, in five-year increments. As shown in Table 6-3, in single dry years starting after 2020, water demands will exceed water supplies due to Lake Sonoma declining below 100,000 ac-ft before July 15 and the requirement by the Water Agency's water rights to decrease diversions by 30 percent. During these single dry years, the Water Agency would work with its Customers to reduce water demands as described in Section 7, and the Water Agency does not anticipate any difficulty in so doing. In addition, the Water Agency would work with the State Water Resources Control Board and other Russian River water users to reduce water demands, as occurred in 2015, as well as in 2007, 2009, 2013 and 2014. In 2015, the Water Agency's Customers were ordered as a result of the Governor's drought mandate to reduce water use. It is possible that similar demand reductions will be required in future dry years. These dry year demand reductions are not included in the demands presented in Table 6-3.

Table 6-3. Wholesale: Single Dry Year Supply and Demand Comparison, ac-ft (DWR Table 7-3)						
	2015	2020	2025	2030	2035	2040
Supply totals	42,254	66,260	59,363	60,696	61,567	61,837
Demand totals	42,254	66,260	70,309	73,011	75,117	75,987
Difference	0	0	(10,946)	(12,315)	(13,550)	(14,150)

Table 6-4 compares the total water supply available in multiple dry water years with projected total water use over the next 25 years, in five-year increments. As these tables show, there is adequate water supply during multiple dry years to meet demands through 2040.

Table 6-4. Wholesale: Multiple Dry Years Supply and Demand Comparison, ac-ft (DWR Table 7-4)

		2015	2020	2025	2030	2035	2040
First year	Supply totals	42,254	66,260	70,309	73,011	75,117	75,987
	Demand totals	42,254	66,260	70,309	73,011	75,117	75,987
	Difference	0	0	0	0	0	0
Second year	Supply totals	42,254	66,260	70,309	73,011	75,117	75,987
	Demand totals	42,254	66,260	70,309	73,011	75,117	75,987
	Difference	0	0	0	0	0	0
Third year	Supply totals	42,254	66,260	70,309	73,011	75,117	75,987
	Demand totals	42,254	66,260	70,309	73,011	75,117	75,987
	Difference	0	0	0	0	0	0

6.4 Regional Supply Reliability

The Water Agency utilizes water management tools to maximize the efficient use of water resources. The Water Agency does not import water.[14] The Water Agency has been working with its water contractors and other water transmission system customers to implement water conservation measures and supports implementation of recycled water projects by its water contractors and MMWD. The Water Agency is working with the USGS to conduct groundwater basin studies in Sonoma County. The Water Agency is also involved in groundwater management activities with stakeholder groups and is evaluating conjunctive use strategies to further improve water resources sustainability. For groundwater basins and sub-basins subject to SGMA requirements (Petaluma Valley, Santa Rosa Plain and Sonoma Valley), the Water Agency is engaged in the process of forming GSAs, which will be required to demonstrate that groundwater resources in those basins are sustainable by 2042. The Water Agency has been an active supporter and participant in the integrated regional water management planning process for the North Coast Hydrologic Region (Region 1) and the San Francisco Bay Hydrologic Region (Region 2), because the Water Agency provides water supply within both hydrologic regions. By working to integrate water resources planning across jurisdictional boundaries, the Water Agency maximizes water resources. Table 6-5 presents the historical and projected future use of the different supply sources. Values in Table 6-5 represent water supply amounts used to satisfy demands or allocated for projections for all public water system customers of the Water Agency.

[14] As noted in Section 4.1, however, Pacific Gas and Electric Company's Potter Valley Project uses water from the Eel River watershed for hydroelectric power generation, and discharges water into the East Fork of the Russian River.

Table 6-5. Wholesale: Increasing Regional Supply Reliability

	1980 (Actual)		1990 (Actual)		2000 (Actual)		2010 (Actual)		2020 (Projected)		2030 (Projected)	
Water Supply Sources	Volume, ac-ft	% of Supply	Volume, ac-ft	% of Supply	Volume, ac-ft	% of Supply	Volume, ac-ft	% of Supply	Volume, ac-ft	% of Supply	Volume, ac-ft	% of Supply
Local groundwater	5,127	7%	6,988	8%	8,663	8%	4,924	5%	4,350	4%	3,597	3%
Local surface water	63,820	92%	84,383	91%	89,253	84%	75,512	81%	87,516	88%	93,458	85%
Recycled water	0	0%	300	0%	2,161	2%	2,061	2%	2,739	3%	2,997	3%
Desalination ocean	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Desalination brackish water	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Stormwater capture	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Imported Water (By Source)	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Transfers into Service Area	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Other	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Conservation [a]	645	1%	852	1%	5,662	5%	11,258	12%	5,232	5%	9,922	9%
Total Water Supplies	69,592	100%	92,523	100%	105,739	100%	93,756	100%	99,837	100%	109,974	100%

[a] Conservation is included as a source of water for this table only. It is not considered a source for use in the tables found in Sections 5 and 6. Recycled water values reflect only that supply used for urban potable-offset.

Section 7

Water Shortage Contingency Planning

This section describes the Water Agency's planning for responding to water shortages including stages of action, prohibitions, penalties, consumption reduction methods, mechanisms for determining actual reductions in use, revenue and expenditure impacts, a shortage contingency resolution, plans for catastrophic events, and the estimated multiple dry-year minimum water supply.

As a water wholesaler, the Water Agency does not have the ability to impose use restrictions or other requirements directly on end users of water in the event of a shortage; such actions must be taken by the Water Agency's Customers. Accordingly, this water shortage contingency analysis is limited to those actions that the Water Agency can take vis-à-vis its retail customers in the event of a water shortage.

7.1 Stages of Action

Section 3.5(a) of the Restructured Agreement for Water Supply describes the manner in which the Water Agency is to allocate water to its customers in the event of a water supply shortage, and Section 3.5(b) of the Restructured Agreement describes the manner in which the Water Agency is to allocate water to its customers in the event of a temporary impairment of the capacity of some or all of the Water Agency's transmission system. Section 3.5(d) of the Restructured Agreement requires the Water Agency to "have an adopted water shortage allocation methodology sufficient to inform each Customer of the water that would be available to it pursuant to Section 3.5(a) in the event of reasonably anticipated shortages, which methodology shall be consistent with this Section 3.5 and shall be included in the Urban Water Management Plan prepared pursuant to Section 2.7."

On April 18, 2006, the Water Agency's Board of Directors adopted Resolution No. 06-0342, which approved a water allocation methodology developed by the Water Agency and the water contractors. Resolution No. 06-0342 recognized that the methodology could be modified in the future as additional data regarding customer demands, local supply, and recycled water became available or changed. In order to address changes that have occurred over the last five years, the Water Agency is updating the water allocation methodology and anticipates finalizing the update in 2016.

In addition, the Water Agency's water rights permits contain a term requiring the Water Agency to impose "a mandatory thirty percent deficiency in deliveries from the Russian River … whenever the quantity water in storage at Lake Sonoma drops below 100,000 ac-ft before July 15 of any year." The deficiency remains in effect until:

1. Storage in Lake Sonoma is greater than 70,000 ac-ft by December 31 of the same year;
2. The Water Agency has demonstrated to the Chief, Division of Water Rights, that storage in Lake Sonoma will not fall below 70,000 ac-ft; or
3. Hydrologic conditions result in sufficient flow to satisfy the Water Agency's demands at Wohler and Mirabel Park and minimum flow requirements in the Russian River near Guerneville.

One of the most important functions provided by the Water Agency is to monitor water supply conditions to gauge the likelihood of water shortages so that the Water Agency's wholesale customers will be prepared to respond to the shortages. The Water Agency constantly monitors the reservoir levels at Lake Pillsbury, Lake Mendocino, and Lake Sonoma, and estimates flows in and out of those reservoirs, as well as natural flows into and diversions from the Russian River and Dry Creek. By using this data as well as historical data

regarding water use in different climatic conditions, the Water Agency can obtain an idea of when a water shortage may be imminent. As noted in Section 6 of the Water Agency's 2010 Urban Water Management Plan, except in a critically dry year, the Water Agency's water supplies are sufficient to meet its transmission system demands.

If it appeared that a water supply shortage might occur, the Water Agency's first stage of action would be to notify its Customers and the general public of that possibility. Depending on the severity of the shortage, the Water Agency would work with its Customers to encourage voluntary demand reduction measures. The Water Agency would also encourage its Customers to maximize use of local water supplies. Finally, the Water Agency would take steps to publicize the potential shortage, and to encourage agricultural and non-Water Agency-related diverters from the Russian River and Dry Creek to reduce diversions to the extent possible.

If these voluntary measures were insufficient, the 30 percent cutback provision in the Water Agency's water rights permits were triggered or if hydrologic conditions were likely to lead to a situation in which transmission system demands would exceed the Water Agency's available water supply, the Water Agency would then calculate the amount of water available to its water contractors, other water transmission system customers, Russian River customers, and MMWD under existing contractual provisions, including Section 3.5 of the Restructured Agreement, by using the then-existing allocation methodology adopted pursuant to Section 3.5(d) of the Restructured Agreement. In the event of a severe water supply shortage, the Water Agency could also petition the State Water Resources Control Board for temporary relief from the minimum instream flow requirements in the Russian River and Dry Creek, in order to conserve the remaining water supply in Lake Sonoma and Lake Mendocino. Table 7-1 presents the stages of action.

Table 7-1. Wholesale: Stages of WSCP (DWR Table 8-1)

Stage	Complete One or Both	
	Percent Supply Reduction	Water Supply Condition
1	0 to 10	Total system storage level and rate of decline and Water Agency customer demands
2	10 to 65	Total system storage level and rate of decline and Water Agency customer demands

Under the allocation methodology currently adopted by the Water Agency, in the event of a 50% cutback in the Water Agency's Russian River water supply, the amounts allocated to contractors and others would be as presented in Table 7-2 (assumes available water supply is 39,800 ac-ft, which is 50% of the 75,000 ac-ft of Russian River diversions plus 2,300 ac-ft of groundwater production). It is possible that the Water Agency's groundwater wells could produce more than 2,300 ac-ft during a water supply shortage condition.

Table 7-2. Allocations to Regular Customers in the Event of a 50 percent Cutback in the Water Agency's Russian River Supply	
Regular Customers	Allocation, ac-ft/yr
Cotati	689
Petaluma	6,129
Rohnert Park	2,906
Sonoma	1,253
Windsor (From Transmission System)	315
North Marin Water District (MMWD)	4,751
Santa Rosa	16,787
Valley of the Moon Water District	2,147
Other Water Agency Customers	946
Sub-Total	35,922
Marin Municipal Water District	712
Russian River Customers (includes Windsor direct diversions)	3,166
Total	39,800

7.2 Consumption Reduction Methods

As noted earlier, as a wholesale supplier, the Water Agency has no ability to directly restrict the use of water by end users, or to impose financial penalties on end users for excessive use. Under the Restructured Agreement, the Water Agency has a number of methods available to it to ensure that its contractors do not use more than the amount of water allocated by the Water Agency during a time of shortage.

Under Section 3.5(e) of the Restructured Agreement, a contractor taking more than its allocated amount of water during a shortage is subject to a liquidated damages surcharge equal to 50% of the then-current operations and maintenance charge for each ac-ft of water taken by the contractor in excess of its allocation. Section 3.5(e) also reserves to the Water Agency all other rights it may have to limit contractors and other customers to their allocated amounts, including physically limiting the quantity of water taken to the amounts allocated, and pursuing all other available legal and equitable remedies applicable to such violations. Finally, Section 3.5(e) allows the Water Advisory Committee to request that the Water Agency physically limit the quantity of water taken by a Regular Customer to the amounts authorized by Section 3.5, or pursue all other available legal and equitable remedies applicable to such violations.

In addition to these methods of reducing consumption, water contractors have ordinances placing limitations on the uses of water by end customers in the event of a water shortage. These ordinances were developed in consultation with the Water Agency and are described in detail in the water contractors' individual Urban Water Management Plans.

The Water Agency is involved with different regional programs and partnerships to provide help and information for consumption reduction. The Sonoma Marin Saving Water Partnership was formed in late 2010 to maximize the cost effectiveness of implementing water conservation programs. They offer information about appliance rebates, gardening programs, and drought drive-up events that give away household items for water conservation. Of the $6.5 million spent in fiscal year 2013-2014, the Water Agency provided $1.6 million (Saving Water Partnership, 2014). Another program held by the Sonoma Valley County Sanitation District has opened a residential recycled water fill station near the wastewater treatment

plant to provide free recycled water for local residents that can be used to water lawns, gardens, and landscaped areas.

Tables 7-3 through 7-5 present the mandatory provisions, penalties and charges, and consumption reduction methods and the stages when the methods take effect, respectively.

Table 7-3. Water Shortage Contingency – Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Use of Water in Excess of Allocation under Section 3.5 of Restructured Agreement or other contractual provision	Stage 2

Table 7-4. Water Shortage Contingency – Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Liquidated Damage Surcharge for Taking in Excess of Allocation	Stage 2
Physical Limitation on Deliveries to Customers Taking in Excess of Allocation	Stage 2
Legal Remedies against Customers Taking in Excess of Allocation	Stage 2

Table 7-5. Water Shortage Contingency – Consumption Reduction Methods

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Notification of Potential Water Shortage	Stage 1	
Encourage Reduction in Use by Customers, RR Diverters, and Agricultural Diverters through Public Outreach	Stage 1	Varies
Imposition of Section 3.5 Allocations	Stage 2	Varies

7.3 Determining Water Shortage Reductions

When the Water Agency allocates water supplies to its Customers pursuant to Section 3.5 of the Restructured Agreement, other contractual provisions, and the allocation methodology, the Water Agency would monitor compliance with the allocation by increasing the frequency of its readings of meters showing the amount of water being taken by its contractors and customers.

7.4 Revenue and Expenditure Impacts

Although a water shortage would result in reduced water deliveries by the Water Agency, a water shortage would not have any material impacts on the Water Agency's financial condition.

Under the Restructured Agreement, the Water Agency imposes charges on the contractors and other customers on an ac-ft basis. The charges are set in an amount necessary to produce revenues to meet the Water Agency's revenue bond obligations and expected operations and maintenance, and to produce a

prudent reserve in an amount determined by the Water Advisory Committee. Charges are set annually each spring to be effective for the following fiscal year (July 1 to June 30). In computing the charges, the Restructured Agreement requires the Water Agency to assume that the amount of water to be delivered from each aqueduct of the transmission system will be the same as the amount of water delivered from said aqueduct during the twelve months preceding such establishment, or the average annual amount of water delivered during the preceding 36 months, whichever is less. In addition, however, the Restructured Agreement provides that "[i]f because of drought or other water-supply reduction, state or federal order, or other similar condition, the Water Agency anticipates that any such quantities will not be predictive of future usage, the Water Agency may use a different amount with the prior approval of the Water Advisory Committee." Thus the Water Agency has the ability to increase water rates, with Water Advisory Committee approval, in order to address a pending water supply shortage.

In addition, in order to protect the interest of the holders of revenue bonds issued to finance transmission system facilities, the Restructured Agreement provides that "it is the intention of the parties that the charges set forth herein will be sufficient to pay the Revenue Bonds and to meet the Revenue Bond Obligations not met from other sources of funds," and that the contractors "agree to pay promptly such charges notwithstanding any deficiency in the quantity or quality of water to which they or any of them would be entitled pursuant to this Agreement." The term "Revenue Bond Obligations" includes the Water Agency's operations and maintenance costs. The Restructured Agreement thus requires the contractors to ensure that the Water Agency has sufficient funds to operate and maintain the transmission system, and to pay off the holders of revenue bonds, notwithstanding a water supply shortage leading to a reduction in deliveries.

A water shortage would reduce the Water Agency's transmission system expenses. The biggest component of the Water Agency's transmission system expenses is the cost of electrical power to pump water from the Russian River and deliver it through the various aqueducts to its customers. The less water the Water Agency pumps, the less the Water Agency pays for power; thus a water shortage would reduce, not increase, the Water Agency's transmission system expenses. Table 7-6 summarizes the measures to overcome revenue impacts. As stated above, expenditures would be reduced during a water shortage due primarily to less pumping costs; therefore no expenditure impact mitigation measures are defined.

Table 7-6. Proposed Measures to Overcome Revenue Impacts

Names of Measures	Summary of Effects
Rate adjustments	Offset loss in revenue
Use of financial reserves	Offset loss in revenue

7.5 Resolution or Ordinance

The Water Agency's Board has adopted a resolution approving an allocation methodology for use by the Water Agency in the event of a water supply shortage. That resolution is included as Appendix D. Each of the Water Agency's contractors would adopt a water shortage contingency resolution in the event of a water shortage.

7.6 Catastrophic Supply Interruption Plan

An occurrence where there is an insufficient amount of available water to meet the region's needs because of a disaster is considered a catastrophic water shortage. Sudden interruption of water supply with no to minimal advance warning can be caused by events that include earthquakes, toxic spills, and power outages. The Act requires urban water agencies to provide a catastrophic supply interruption plan.

In accordance with the Emergency Services Act, the Water Agency has developed an Emergency Operation Plan (EOP). The EOP guides response to unpredicted catastrophic events that might impact water delivery. The EOP outlines standard operating procedures for all levels of emergency, from minor accidents to major disasters and are coordinated with the water contractors EOPs. Table 7-7 summarizes the actions to be implemented by the Water Agency in the event of specific catastrophic events. In addition to the Water Agency's actions, the water contractors and MMWD would initiate their own actions to address a catastrophic water supply interruption in accordance with their own water shortage contingency plans. Many of the Water Agency's customers have local water supplies that would be relied upon during the period of water supply interruption.

Table 7-7. Preparation Actions for a Catastrophe

Possible Catastrophe	Summary of Actions
Earthquake	Shut-off isolation valves and above ground use of flexible piping for ruptured mains. Initiate rapid repair of damaged water facilities.
Toxic Spills	Use of groundwater wells.
Fire	Storage supplies for fire flows.
Power outage or grid failure	Portable and emergency generators available for most Water Agency facilities
Severe winter storms	Portable and emergency generators available for most Water Agency facilities
Hot weather	Portable and emergency generators available for most Water Agency facilities

7.7 Minimum Supply Next Three Years

An estimate of the minimum water supply available during the next three years is presented in Table 7-8.

Table 7-8. Wholesale: Minimum Supply Next Three Years, ac-ft (DWR Table 8-4)

	2016	2017	2018
Available Water Supply	77,300	77,300	77,300

Section 8

Demand Management Measures

This section provides a narrative description of the Water Agency's water conservation program and its best management practices (BMPs) or water demand management measures (DMMs). The Water Agency utilizes wholesale water conservation BMPs as a method to reduce water demands, thereby reducing the water supply needed to supply its customers.

The Water Agency is a member of the California Urban Water Conservation Council (CUWCC). The CUWCC was created to assist in increasing water conservation statewide, under a MOU. As signatory to the MOU, the Water Agency has pledged its good faith effort towards implementing BMPs identified in the CUWCC MOU Regarding Urban Water Conservation. The two primary purposes of the MOU are:

1. to expedite implementation of reasonable water conservation measures in urban areas, and
2. to establish assumptions for use in calculating estimates of reliable future water conservation savings resulting from proven and reasonable conservation measures.

The Water Agency is the first wholesale water agency in the state to have all its water contractors sign the CUWCC MOU. The Water Agency signed the CUWCC MOU on June 1, 1998, and submits annual BMP reports to the CUWCC in accordance with the MOU. The MOU requires that a water utility implement only the BMPs that are economically feasible.

If a BMP is not economically feasible or has legal barriers to implementation, the utility may request an economic exemption for that BMP. The Water Agency has not requested an exemption from any BMP at this time.

Signatories to the urban MOU are allowed by Water Code Section 10631(i) to include their biennial CUWCC BMP reports in a Plan to meet the requirements of the DMM sections of the Act. The BMP reports for 2013 and 2014 are attached as Appendix E.

As a wholesaler MOU signatory, the Water Agency assists its retailers with BMP implementation where appropriate. The Water Agency is responsible for the implementation of a subset of the BMPs. Table 8-1 lists the CUWCC's BMPs and identifies which retail and wholesale BMPs are being implemented by the Water Agency.

Table 8-1. Water Conservation Demand Management Measures Listed in MOU

CUWCC BMP Category			Water Agency Retail BMPs	Water Agency Wholesale BMPs
Category	BMP No.	BMP Name		
Foundational BMPs	BMP 1	Utility Operations		
	BMP 1.1	Operations Practices		
	BMP 1.1.1	Conservation Coordinator		✓
	BMP 1.1.2	Water Waste Prevention		NA
	BMP 1.1.3	Wholesale Agency Assistance	NA	✓
	BMP 1.2	Water Loss Control		✓
	BMP 1.3	Metering with Commodity Rates		NA
	BMP 1.4	Retail Conservation Pricing		✓
	BMP 2	Educational		
	BMP 2.1	Public Information	(a)	✓
	BMP 2.2	School Education	(a)	✓
Programmatic BMPs	BMP 3	Residential		
	BMP 3.1	Residential Assistance	(a)	NA
	BMP 3.2	Landscape Water Survey	(a)	NA
	BMP 3.3	High-Efficiency Clothes Washers		NA
	BMP 3.4	Water Sense Standard (WSS) Toilets	(b)	NA
	BMP 3.5	Water Sense Standard (WSS) for New Residential Development		NA
	BMP 4	Commercial Industrial Institutional (CII)	(b)	NA
	BMP 5	Landscape		NA

Notes:

(a) These programs are being run in part by Sonoma County Water Agency.

(b) Sonoma Valley County Sanitation District operates a program in the Valley of the Moon Water District and City of Sonoma service areas.

NA = Not applicable.

8.1 Metering

All of the Water Agency's potable water and irrigation customers have a system connection with a flow meter for volumetric billing. Currently, there are approximately 172 active billing meters. On an annual basis, each of these meters is switched out and replaced with a thoroughly tested and calibrated meter. In the water supply agreement with its contractors, the Water Agency is required to conduct this annual testing and replace any meters that are found to have less than a 2% accuracy.

The Water Agency's transmission system also has approximately ten fire service connections and 19 fire hydrants connected. Each fire service connection is fitted with a flow detector meter. While fire hydrants are not fitted with any metering equipment, each fire district customer is responsible for reporting water use at their individual hydrants.

8.2 Public Education and Outreach

As described in Section 8.4, the Water Agency works with some of its retail water agencies to promote water conservation, including a Water Education Program and a Public Outreach Program.

8.2.1 Water Education Program

The Water Education Program is a comprehensive approach to helping educators teach students the "value" of water as an important natural resource. Water conservation and stewardship of the service area watersheds is promoted throughout the program. Students are encouraged to use water wisely and make environmentally sustainable choices to help secure a reliable source of freshwater now and in the future. The program includes classroom instructional presentations, field study opportunities, free curriculum materials aligned with the existing California State Frameworks and the California Science Standards, a lending library of videos, interactive models and printed materials, production of a newsletter for teachers and endorsement, participation and financial sponsorship of events, assemblies and workshops. All of the programs and materials are free to teachers in the service area. The service area covers over 200 schools throughout Sonoma and northern Marin counties. In addition to ongoing program, there is a new and permanent locationfor the 5th grade field study program, the Westside Education Facility.

The total number of students receiving direct instruction in 2014/2015 was 10,520 (2,564 students in the field study programs and 4,256 in the classroom only programs, 1,775 students in the secondary education program and 1,925 students in the kinder/transitional kinder program. An additional 356 adults participated in the field study program while serving as adult chaperones with the participating classes.

8.2.2 Public Outreach Program

Annually the Partnership develops a regional outreach campaign that aligns with our current water supply conditions and promotes water use efficiency programs. Over the last few years the campaigns have included the following:

- There's Never Enough to Waste. Turn the Water Off. (2015)
- There's a Drought On. Turn the Water Off. (2014)
- The 20 Gallon Challenge (2013)
- Save our Water - Statewide campaign with a local focus (2011 and 2012)

The Water Agency, in collaboration with the members of the Partnership, produces collateral material that aligns with the specific campaign. The Water Agency coordinates an annual media buy that includes outreach in English and Spanish. Each member of the Partnership can choose to supplement the campaign with their own media buys. The buys generally includes the following:

- Radio
- Newsprint in 14 various local publications
- Sonoma County Fair presence
- Social Media (Facebook, Twitter, Instagram, YouTube)
- Mall banners
- Movie theater trailers

The Partnership ran its biggest promotion ever with the Drought Drive-Up event held simultaneously at 10 locations throughout Sonoma and Marin Counties on April 23, 2014. The event distributed over 5,100 custom drought kits. Participants customized their own kits at this drive-thru event by selecting items from an order sheet so each participant only received what they needed. Items included:

- A shower bucket
- WaterSense labeled adjustable spray showerheads (up to two)
- A five-minute shower timer
- WaterSense labeled bathroom faucet aerators (up to two)
- WaterSense labeled swivel spray kitchen faucet aerator
- Up to three packets of toilet leak test dye tablets

8.3 Water Conservation Program Coordination and Staffing Support

The Water Agency coordinates the work of the Partnership in conjunction with the Water Advisory Committee (WAC) which provides input to the Water Agency and holds certain powers and responsibilities enumerated in the Restructured Agreement for Water Supply between the Water Agency and the Partnership. The Partnership is committed to continued water conservation and is on track to meet long terms water conservation targets. The contact information for the Conservation Coordinator is:

Carrie Pollard
Principal Programs Specialist
Sonoma County Water Agency
carriep@scwa.ca.gov
Office: 707-547-1968

8.4 Asset Management

Wholesale water agencies are required to describe their distribution system asset management program in the Plan. Asset management is typically considered to include asset information, level of service and performance measures, risk management, condition assessment, maintenance management, and asset needs. The Water Agency's strategic plan includes strategies to improve the reliability of transmission system by completing projects that reduce hazards to the transmission system and improve its reliability, evaluating the condition of the transmission system, updating the local hazard mitigation plan, and evaluating the performance of the collector wells.

The Water Agency's water transmission system includes the pipelines, storage tanks, collector wells, groundwater wells and pumps stations that make up the system. The Water Agency's asset management program includes components to ensure: (1) these assets are properly maintained, and (2) components are replaced at the end of their useful life.

The Water Agency uses a computerized maintenance management system to help manage the ongoing maintenance of the transmission system and sets annual budgets that provide the funding necessary to adequately operate and maintain the system as well as providing funding to cover the cost of depreciation. The Water Agency has a comprehensive inventory of all of its infrastructure assets that is maintained on a database that can be accessed using GIS mapping tools.

The Water Agency's natural hazard reliability improvement program is the basis of its assessment of level of service and performance and risk management. The Water Agency updated its Local Hazards Mitigation Plan in 2012, which creates a framework for risk based decision making to reduce the risk to people and property from hazards. As a result of the plan, several hazard mitigation projects have been initiated.

The Water Agency has also been actively assessing the condition of the transmission system through the use of emerging pipeline inspection technologies.

8.5 Wholesale Supplier Assistance Programs

As mentioned earlier, the Water Agency assists its retailers with BMP implementation where appropriate to help the retailers meet their per capita water use targets. The retail BMPs are being implemented with the assistance of the Water Agency are identified in Table 8-1.

The Cities of Santa Rosa, Rohnert Park, Sonoma, Cotati, Petaluma, Town of Windsor, North Marin and Valley of the Moon Water Districts, California- American Water Company, and the Water Agency formed the Sonoma-Marin Saving Water Partnership (Partnership) in 2010. The purpose of the Partnership is to establish the financial obligation, identify and recommend implementation of water conservation projects, and to maximize implementation of cost-effective projects for the Partnership. The Partnership coordinates all water use efficiency focused media buys in the region and provides support to members that need additional assistance meeting conservation targets.

8.5.1 Funding

The Water Agency's wholesaler water conservation programs are funded by the Partners annually through a WAC recommended budget that allocates a Water Conservation Sub-charge for each ac-ft sold. The Partnership members have agreed to expend $15 million dollars on water conservation implementation from July 2008 through July 2018 and have agreed to maintain membership in good standing with the CUWCC and implement the BMPs as outlined by the CUWCC.

The Water Agency pursues grant funding on behalf of the Partnership to off-set some of the programmatic costs associated with water use efficiency (WUE) programs and to test new technology. In the last five years, the Agency has been awarded over $3,240,000 for implementing WUE programs in the region.

8.5.2 Annual Report

The Partners are committed to remain as members in good standing of the CUWCC and implement the BMPs for water conservation. The Partners will implement or use best efforts to secure the implementation of any water conservation requirements and will publish an Annual Report to track progress. The Annual Report will track program implementation, highlight program milestones, and reinforce the importance of protecting and preserving water resources for future generations.

Section 9

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Appendix A: Documentation of City/County Notification and Water Supplier Coordination

Coordination post card

Coordination mailing list

Coordination emails with other agencies

About Urban Water Management Plans (UWMP)

The Sonoma County Water Agency is working to update its 2015 Urban Water Management Plan. We look forward to working with our community to update this important water supply planning document. Please read below for more information and contact us with any questions.

The Water Agency is a wholesaler of potable water, serving nine primary municipal customers in Sonoma and Marin Counties. The Water Agency's UWMP discusses and describes:

- Existing water supplies and transmission system facilities;
- Projected water demands in the Water Agency's service area over the next 25 years;
- Projected water supplies available to the Water Agency over the next 25 years, the reliability of that supply, and general schedules for water supply projects;
- Climate change impacts to water supply;
- Energy intensity;
- Current and planned Water Agency water conservation activities;
- A water shortage contingency analysis;
- And a comparison of water supply and water demand over the next 25 years under different hydrological assumptions (normal year, single dry year, multiple dry years).

www.sonomacountywater.org/uwmp

SONOMA COUNTY WATER AGENCY

Sonoma County Water Agency
404 Aviation Blvd.
Santa Rosa, CA 95403

2015 Urban Water Management Plan (UWMP)

We appreciate your participation in this important planning process. To provide feedback or comments, visit us online at sonomacountywater.org/uwmp or call the Public Affairs hotline at 707.524.6430.

A copy of the Water Agency's 2010 UWMP and current schedule for preparation and approval of the UWMP Update is available online at www.sonomacountywater.org/uwmp

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Thomas	Chapman	Colonel	U S Army Corps of Engineers	Commander Sacramento District	1325 J Street Room 1420	Sacramento	CA	95814	(916) 557-7322	(916) 557-7859
Randy	DeCaminada	Executive Manager, North Coast	Pacific Gas and Electric Company		111 Stony Circle	Santa Rosa	CA	95401-9507		
Robert B.	Finucane	Regional Director	Federal Energy Regulatory Commission	San Francisco Regional Office	100 1st. Street, Ste. 2300	San Francisco	CA	94105-3084	(415) 369-3368	(415) 369-3322
Chris	Yates	Assistant Regional Administrator for Protected Resources	National Marine Fisheries Service		650 Capitol Mall Suite 8-300	Sacramento	CA	95814-4708	(916) 930-3600	
Jane A.	Chambers	City Manager	City of Ukiah		300 Seminary Avenue	Ukiah	CA	95482	(707) 463-6217	(707) 463-6204
Larry	McLaughlin	City Manager	City of Sebastopol		PO Box 1776	Sebastopol	CA	95473	(707) 823-1153	(707) 823-1135
Steven	Elliott	Superintendent	Potter Valley Irrigation District		PO Box 186, 10170 Main Street	Potter Valley	CA	95469	(707) 743-1109	(707) 743-2410
Bill	Koehler	General Manager	Redwood Valley County Water District		PO Box 399	Redwood Valley	CA	95470	(707) 485-0679	(707) 486-5148
David	Andres	General Manager	Sweetwater Springs Water District		PO Box 48	Guerneville	CA	95446-0048		
Karen	Ball	Manager	Kenwood Water Company		4984 Sonoma Hwy	Santa Rosa	CA	95409	(707) 569-6397	
James	Dunton	President	Russian River Utility		7131 Mirabel Road	Forestville	CA	95436	(707) 887-7735	
Matthias	St. John	Executive Officer	North Coast Regional Water Quality Control Board		5550 Skylane Blvd. Ste. A	Santa Rosa	CA	95403-1072	(707) 576-2220	

FirstName	LastName	Email	Comments
Damien	O'Bid	dobid@cotaticity.org	updated 2/24/15
Chris	DeGabriele	cdegabriele@nmwd.com	Phone ext. 8470
John C.	Brown	citymgr@ci.petaluma.ca.us	Updated 2/24/2015
Darrin W.	Jenkins	admin@rpcity.org	
Sean	McGlynn	CMOffice@srcity.org	
Carol	Giovanatto	cgiovanatto@sonomacity.org	Updated 2/25/15
Daniel	Muelrath	dmuelrath@vomwd.com	updated June 2014
Linda	Kelly	lkelly@townofwindsor.com	new 2013 replaced retiring M. Mullan; updated 2/2015
Matthew	Froneberger	fwd@sonic.net	2012 per Judy at FWD this position vacant. No additional information available at this time.NON-PRIME WATER CONTRACTOR; 2006
Krishna	Kumar	kkumar@marinwater.org	New: 12-15-2012 Krishna Kumar PER NEW RELEASE of 10-12-12 ? replaced Mr Tom Cronin, Interim GM, Facilities and Watershed Division Manager (415) 945-1140 October 12, 2012
Andrew	Soule	asoule@amwater.com	4-18-12 Updated contact information.
Karen	Ball	no email service per Debbie on 4-19-12	4-19-12 current ok. Penngrove & Kenwood Water Company or Kenwood Pengrove Water Co one in the same. Records files are separate and each contain their own File ID.
Jim	Geib	jgeib@comcast.net (Jim Geib); Robin Lane 833-2930.	4-24-12 Emergency info: Jerry and Don's Yager Pump & Well Service (707) 762-1473 jdypumpwell@sbcglobal.net
Lori K.	Ford		
Hal	Wood		
David	Mickaelian	dmickaelian@ci.healdsburg.ca.us	2009 correct information. Chet Wystepek retired 12-31-08
William	Keene		"Bill" New August 2008 TA & Rachel Vail
Arnold	Heike		
Robert	Wood		new address efc. 9/03
Thomas	Howard		
Tim	Farley	TFARLEY@NQ.DFG.CA.GOV	
Thomas	Chapman		Oct 2007 as per Lori Whitmer, Executive Secretary for Col. Chapman (formerly Ronald Light)```+
Randy	DeCaminada		
Robert B.	Finucane		Home phone: (646) 256-4779. Newly appointed 10-18-10. Project No. 3351-CA. Contact: Mr. Wing Lee @ (415) 369-3390 if any questions.
Chris	Yates	kimberly.speech@noaa.gov	updated 5/11/11
Jane A.	Chambers	jchambers@cityofukiah.com	
Larry	McLaughlin	lwmclaughlin@juno.com	Updated 2/25/15
Steven	Elliott	pvid@willitsonline.com	Updated 2/2015
Bill	Koehler	gmrvcwd@pacific.net	Updated 2/2015
David	Andres		
Karen	Ball		
James	Dunton		
Matthias	St. John		

From: Donald Seymour
To: "tcrowley@ci.healdsburg.ca.us"
Subject: FW: 2015 UWMP Water Supply Modeling Results
Attachments: Copy of Chp56Tables_160415.xls

Terry – As we just discussed. The reservoir storage levels are summarized in Tables 5-2 through 5-7 of the attached spreadsheet for both Lake Mendocino and Lake Sonoma for the three water supply conditions. The modeling was performed for a normal year type (1962), multiple dry year type (1988 – 1991) and a single dry year type (1977) in 5 year increments out to 2040. For the normal year type and multiple dry year type there is adequate water supply in Lake Mendocino to meet instream minimum flow requirements and downstream demands. However, for the single dry year scenario, modeling results indicate that Lake Mendocino is significantly impacted. The reservoir drops below 2,000 acre-feet of storage beginning in 2020, which means it basically becomes a flow through system (outflow is equal to inflow). This occurs even with minimum instream flow reductions beginning on October 1, 1976. Additional modeling indicates that the following demand reduction would be required beginning January 1 to prevent Lake Mendocino from dropping below 5,000 acre-feet: 18 percent in 2020; 25 percent in 2025; 32 percent in 2030; 40 percent in 2035; and 44 percent in 2040. Please give me a call if you like to discuss further.

Don

From: Donald Seymour
To: Carothers, Kent
Cc: Walker, Leah; Todd Schram
Subject: Petaluma 2015 UWMP Projections.xlsx
Attachments: Petaluma 2015 UWMP Projections.xlsx

Hi Kent – Attached are the projected demands, local water supply, recycled water and SCWA deliveries for the 2015 UWMP. Can you please confirm the values and change as necessary? As we discussed yesterday, the values need to match what the City of Petaluma will be using in its UWMP. Also, if there is any information that could provide guidance on how to distribute the increased deliveries to the different turnouts it would be very helpful.

With regards to the South Transmission System Project, The Water Agency's 2010 UWMP identified it as being needed by 2020. So the potential for the City of Petaluma moving recycled water to serve the west side might not be that far off on the planning horizon.

Don Seymour, P.E.
Water Agency Principal Engineer
Engineering, Resource & Planning
Sonoma County Water Agency

From: Donald Seymour
To: swhite@cityofukiah.onmicrosoft.com
Cc: "Sean White"
Subject: 2015 UWMP Water Supply Modeling Results
Attachments: Copy of Chp56Tables_160415.xls

Sean/Tamara – I meant to share this information with you yesterday regarding water supply modeling results for the Agency's 2015 UWMP, unfortunately, I totally forgot. The modeling was performed for a normal year type (1962), multiple dry year type (1988 – 1991) and a single dry year type (1977) in 5 year increments out to 2040. For the normal year type and multiple dry year type there is adequate water supply in Lake Mendocino to meet instream minimum flow requirements and downstream demands. However, for the single dry year scenario, modeling results indicate that Lake Mendocino is significantly impacted. The reservoir drops below 2,000 acre-feet of storage beginning in 2020, which means it basically becomes a flow through system (outflow is equal to inflow). This occurs even with minimum instream flow reductions beginning on October 1, 1976. Additional modeling indicates that the following demand reduction would be required beginning January 1 to prevent Lake Mendocino from dropping below 5,000 acre-feet: 18 percent in 2020; 25 percent in 2025; 32 percent in 2030; 40 percent in 2035; and 44 percent in 2040. The storage levels are summarized in Tables 5-2 through 5-7 of the attached spreadsheet for both Lake Mendocino and Lake Sonoma for the three water supply conditions. Please give me a call if you like to discuss further.

Don

From: Donald Seymour
To: "pcayler@ci.cloverdale.ca.us"
Subject: 2015 UWMP

Hi Paul – The Water Agency recently completed Russian River water supply modeling for its 2015 UWMP. The modeling analyzes the available water supply for both Lake Mendocino and Lake Sonoma for a normal water year scenario (1962), a multi-dry year scenario (1988-1991) and a dry year scenario (1977) in five year increments going out to 2014. Who with the City of Cloverdale should the Water Agency provide these results to help inform the City's 2015 UWMP activities? For the normal year and multiple dry year scenrarios there is adequate water supply in Lake Mendocino to meet instream minimum flow requirements and downstream demands. However, for the single dry year scenario, modeling results indicate that Lake Mendocino is significantly impacted. Please let me know when you have a chance.

Don Seymour

From:	Chris DeGabriele
To:	Donald Seymour
Subject:	RE: October TAC Ad Hoc Meeting
Date:	Wednesday, September 02, 2015 10:40:07 AM

Don,
I'm hopeful the Water Contractors will conclude by mid September and we'll be able to share the information then, but I can't promise at this point.
Chris

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Wednesday, September 02, 2015 10:08 AM
To: Chris DeGabriele
Subject: RE: October TAC Ad Hoc Meeting

Hey Chris – Thank you for the update. Is it possible to share the Maddaus demand and water conservation projections now? Also, Paul Selskey will likely attend the TAC Ad Hoc meeting in October to share any updates to the 2015 UWMP requirements and also discuss the Agency's schedule.

Don

From: Chris DeGabriele [mailto:cdegabriele@nmwd.com]
Sent: Tuesday, September 01, 2015 4:00 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: RE: October TAC Ad Hoc Meeting

Thanks Don,
I'll make sure we include this as a discussion topic at the TAC Ad Hoc in October.
The Water Contractors are now compiling the Maddaus demand and water conservation projections along with looking at local supply and RW, just as we did 5 years ago. I'm hopeful we can conclude that exercise in September.
Chris

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Tuesday, September 01, 2015 3:55 PM
To: Chris DeGabriele
Subject: October TAC Ad Hoc Meeting

Hi Chris – The Agency is starting to move forward with preparing its 2015 UWMP. Would it be possible to add UWMP coordination to the October TAC Ad Hoc meeting agenda? Also, I was hoping to get an update on the status of the contractors demand projections being prepared by Maddous Water Management. Please get back to me when you have a chance.

Don

From:	Chris DeGabriele
To:	Jay Jasperse; Pam Jeane; Donald Seymour; Carrie Pollard
Cc:	Grant Davis; Jane Gutierrez
Subject:	FW: October 5 TAC Ad Hoc Meeting
Date:	Thursday, October 01, 2015 11:58:42 AM
Attachments:	2015 UWMP Water Contractor 2040 Projections.xlsx WAC_TAC 040714 Item 8 Allocation Methodology.pdf Draft Water Shortage Allocation Methodology.pdf

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I mistakenly excluded you on this email notice of the subject meeting. My apologies.
Chris

From: Chris DeGabriele
Sent: Wednesday, September 30, 2015 4:26 PM
To: 'Guhin, David'; 'Burke, Jennifer'; 'Vogler, Rocky'; 'Damien O'Bid'; 'St. John, Dan'; 'Walker, Leah'; 'kcarothers@ci.petaluma.ca.us'; 'Pawson, Mary Grace'; 'mbautista@rpcity.org'; 'Dan Takasugi'; 'Toni Bertolero'; 'ecargay@townofwindsor.com'; Jim M. Smith; 'Paul Piazza'; 'Daniel Muelrath'; Michael Ban; 'Carl Gowan'; 'Krishna Kumar'; Drew McIntyre
Subject: October 5 TAC Ad Hoc Meeting

What:	TAC Ad Hoc Meeting
When:	October 5
	Immediately following TAC Meeting
Where:	Santa Rosa
	69 Stony Circle
	Conference Room 5
Topics:	2015 UWMP 2040 Projections (see attached)
	Draft Water Shortage Allocation Methodology

Chris DeGabriele
General Manager
North Marin Water District
(415)897-4133 ext.8905

From: Vogler, Rocky
To: Donald Seymour
Subject: RE: SR 2015 UWMP Projections.xlsx
Date: Tuesday, December 08, 2015 5:14:00 PM
Attachments: SR 2015 UWMP Projections.xlsx

Hi Don –

Only one very minor edit (in red).

Rocky

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Tuesday, December 08, 2015 11:00 AM
To: Vogler, Rocky
Subject: SR 2015 UWMP Projections.xlsx

Hi Rocky – Could you please review and edit (if necessary) the attached spreadsheet that summarizes 2015 UWMP projections for the City of Santa Rosa?

Don

From:	Drew McIntyre
To:	Donald Seymour
Cc:	Chris DeGabriele; Ryan Grisso
Subject:	FW: NMWD 2015 UWMP Projections.xlsx
Date:	Wednesday, December 09, 2015 2:02:16 PM
Attachments:	NMWD 2015 UWMP Projections 12-9-15.xlsx

Don,

Attached is the corrected table. Very minor changes in "Conservation Savings" for the Low Demand years of 2035 and 2040 to match the Maddaus July 1 2015 Final Water Demand Update Report (Table ES-2)

Thanks

Drew

From: Chris DeGabriele
Sent: Tuesday, December 08, 2015 11:44 AM
To: Drew McIntyre
Cc: Ryan Grisso
Subject: FW: NMWD 2015 UWMP Projections.xlsx

Drew,
Please review and edit as appropriate, then return to Don.
Thanks,
Chris

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Tuesday, December 08, 2015 11:05 AM
To: Chris DeGabriele
Subject: NMWD 2015 UWMP Projections.xlsx

Hi Chris - Could you please review and edit (if necessary) the attached spreadsheet that summarizes 2015 UWMP projections for NMWD?

Don

From: Dan Takasugi
To: Donald Seymour
Subject: RE: Sonoma 2015 UWMP Projections.xlsx
Date: Wednesday, December 09, 2015 12:44:32 PM

Thanks Don. That looks correct for the City of Sonoma.

Dan Takasugi, P.E.
Public Works Director / City Engineer
City of Sonoma
No. 1 the Plaza
Sonoma, CA 95476-6618
Office: (707) 933-2230

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Wednesday, December 09, 2015 11:17 AM
To: Dan Takasugi
Subject: Sonoma 2015 UWMP Projections.xlsx

Hi Dan – Could you please review and edit (if necessary) the attached spreadsheet that summarizes 2015 UWMP projections for the City of Sonoma?

Don

From: Daniel Muelrath
To: Donald Seymour
Subject: RE: VOMWD 2015 UWMP Projections.xlsx
Date: Wednesday, December 09, 2015 11:25:06 AM

Hi Don,

The spreadsheet is correct.

Thank you,

Dan

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Wednesday, December 09, 2015 11:00 AM
To: Daniel Muelrath
Subject: VOMWD 2015 UWMP Projections.xlsx

Hi Dan – Could you please review and edit (if necessary) the attached spreadsheet that summarizes 2015 UWMP projections for VOMWD?

Don

From:	Jim M. Smith
To:	Donald Seymour
Cc:	Elizabeth Cargay; Paul Piazza
Subject:	RE: Windsor 2015 UWMP Projections.xlsx
Date:	Thursday, December 10, 2015 2:22:15 PM
Attachments:	Windsor 2015 UWMP Projections - 5 Yr Increments.xlsx

Don: Here you go-

Please contact Elizabeth with any questions re this or any 'next steps'. Thx

Thank you,

James M. Smith, P.E.
Senior Civil Engineer

Town of Windsor
707-838-5343 Voice

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Thursday, December 10, 2015 10:20 AM
To: Jim M. Smith
Subject: Windsor 2015 UWMP Projections.xlsx

Hi Jim – Can you please review and add the local supply and recycled water values in the attached spreadsheet summarizing the Town of Windsor's 2015 UWMP projections.

Thanks,

Don

From: Donald Seymour
To: Craig Scott
Subject: RE: Cotati 2015 UWMP Projections.xlsx

Thanks Craig - Don

From: Craig Scott [mailto:CScott@cotaticity.org]
Sent: Tuesday, January 26, 2016 10:57 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: RE: Cotati 2015 UWMP Projections.xlsx

Don –
Attached is the supply spreadsheet with Cotati's projections.
Thanks.
Craig

Craig Scott
Public Works Director/City Engineer
City of Cotati
707 665-3620

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Wednesday, January 06, 2016 12:57 PM
To: Craig Scott
Subject: RE: Cotati 2015 UWMP Projections.xlsx

Hey Craig – have you had a chance yet to review?

Don

From: Craig Scott [mailto:CScott@cotaticity.org]
Sent: Thursday, December 10, 2015 5:02 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: RE: Cotati 2015 UWMP Projections.xlsx

Will do.

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Thursday, December 10, 2015 9:53 AM
To: Craig Scott
Subject: Cotati 2015 UWMP Projections.xlsx

Hi Craig – Can you please review the attached spreadsheet that summarizes the City of Cotati's 2015 UWMP projections? Also, please fill in the projected local supplies for 2020 -2040.

Don

From: Carothers, Kent
To: Donald Seymour
Cc: Walker, Leah
Subject: Petaluma UWMP numbers
Date: Friday, January 29, 2016 2:25:49 PM
Attachments: image001.png
image002.png

Hi Don,

Below is the City of Petaluma Demand Projections we plan to use in the UWMP:

City of Petaluma Demand

Year	Gross Demand	Conservation Savings (Plumbing Code + Program A)	Recycled Water	Local Supply	SCWA Demand
2015					
2020	9,686	578	371	0	8,737
2025	10,179	747	534	0	8,898
2030	10,672	963	572	0	9,137
2035	11,196	1,146	572	0	9,478
2040	11,726	1,312	657	0	9,757

Thanks, Kent

Kent Carothers, P.E.
Operations Manager
~~~~~~
City of Petaluma – Department of Public Works and Utilities
Tel. (707) 778-4546 Fax (707) 778-4508


~~~~~~

From: Donald Seymour
To: Pawson, Mary Grace
Subject: RE: data needing Rohnert Park review

Hey Mary Grace – Thank you for confirming the projections.

Don

From: Pawson, Mary Grace [mailto:mpawson@rpcity.org]
Sent: Tuesday, February 16, 2016 10:46 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: RE: data needing Rohnert Park review

Hi Don,

These look perfect.
Thank you for being patient with us.

Mary Grace Pawson, PE
Director of Development Services/City Engineer
City of Rohnert Park
mpawson@rpcity.org
(707) 588-2234

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Monday, February 01, 2016 2:27 PM
To: Pawson, Mary Grace
Subject: RE: data needing Rohnert Park review

Thanks Mary Grace, please let me know if you have any questions.

Don

From: Pawson, Mary Grace [mailto:mpawson@rpcity.org]
Sent: Monday, February 01, 2016 12:54 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: data needing Rohnert Park review

Hi Don,

I've ransacked my inbox and not found the request for data review from the water agency. Outlook's auto-entry feature sometimes sends things to my old GHD or Winzler & Kelly email and that might be part of the problem.

If you could resend what you need from me, I'll make sure to get it reviewed this week.

Thanks in advance.

mg

Mary Grace Pawson, PE
Director of Development Services/City Engineer
City of Rohnert Park
mpawson@rpcity.org
(707) 588-2234

From:	Chris DeGabriele
To:	Guhin, David; Burke, Jennifer; Reed, Linda; Vogler, Rocky; St. John, Dan; Walker, Leah; kcarothers@ci.petaluma.ca.us; Pawson, Mary Grace; mbautista@rpcity.org; "Dan Takasugi"; Toni Bertolero; Jim M. Smith; Paul Piazza; Elizabeth Cargay; Daniel Muelrath; Michael Ban; Carl Gowan; Drew McIntyre; Jay Jasperse; Pam Jeane; Donald Seymour; Carrie Pollard; Lynne Rosselli; Michael Gossman; Dorotinsky, Nicole
Cc:	Grant Davis; Jane Gutierrez; Krishna Kumar; Toni Bertolero
Subject:	RE: March 7 TAC Ad Hoc Meeting
Date:	Tuesday, March 08, 2016 3:26:08 PM
Attachments:	dwr letter re regional alliance w agreement.doc.pdf

Pursuant to our discussion on Monday about the SBx7-7 Regional Alliance, attached is the May 2011 letter to DWR with the Regional Alliance Letter Agreement. Provision 2 of the Agreement provides that "the Parties agree to review and re-analyze the Regional Alliance and the Regional Alliance Target as part of the preparation of the 2015 Urban Water Management Plan."

From my perspective I believe that is exactly what we are doing and there is no need to "reconfirm" or update the Regional Alliance Letter Agreement.

Carrie, please again request the data from those parties which have not yet provided same, to re-analyze the Regional Alliance Target.

Thanks,

Chris

From: Chris DeGabriele
Sent: Thursday, March 03, 2016 3:33 PM
To: 'Guhin, David'; Burke, Jennifer; 'Reed, Linda'; 'Vogler, Rocky'; 'St. John, Dan'; 'Walker, Leah'; 'kcarothers@ci.petaluma.ca.us'; 'Pawson, Mary Grace'; 'mbautista@rpcity.org'; 'Dan Takasugi'; 'Toni Bertolero'; 'Jim M. Smith'; 'Paul Piazza'; 'Elizabeth Cargay'; 'Daniel Muelrath'; 'Michael Ban'; 'Carl Gowan'; Drew McIntyre; 'Jay Jasperse'; 'Pam Jeane'; 'Donald Seymour'; 'Carrie Pollard'; 'Lynne Rosselli'; 'Michael Gossman'; Dorotinsky, Nicole
Cc: 'Grant Davis'; 'Jane Gutierrez'; 'Krishna Kumar'; 'Toni Bertolero'
Subject: March 7 TAC Ad Hoc Meeting

What: TAC Ad Hoc Meeting
When: March 7
Immediately following TAC Meeting
Where: Santa Rosa
69 Stony Circle
Conference Room 5
Topics: 2015 UWMP
SWRCB Emergency Water Conservation Regulations
Take it From The Tap – links to Contractor Water Quality Reports needed
Other

Chris DeGabriele
General Manager
North Marin Water District
(415)897-4133 ext.8905

From: Chris DeGabriele
To: Guhin, David; Burke, Jennifer; Reed, Linda; Vogler, Rocky; St. John, Dan; Walker, Leah; kcarothers@ci.petaluma.ca.us; Pawson, Mary Grace; mbautista@rpcity.org; "Dan Takasugi"; Toni Bertolero; Jim M. Smith; Paul Piazza; Elizabeth Cargay; Daniel Muelrath; Michael Ban; Carl Gowan; Drew McIntyre; Jay Jasperse; Pam Jeane; Donald Seymour; Carrie Pollard; Lynne Rosselli; Michael Gossman
Cc: Grant Davis; Jane Gutierrez; Krishna Kumar
Subject: April 4 TAC Ad Hoc
Date: Wednesday, March 30, 2016 4:03:18 PM

What: TAC Ad Hoc Meeting
When: April 4
Immediately following WAC Meeting
Where: Santa Rosa
69 Stony Circle
Conference Room 5
Topics: 2015 UWMP
SWRCB Emergency Water Conservation Regulations
Take it From The Tap
Other

Chris DeGabriele
General Manager
North Marin Water District
(415)897-4133 ext.8905

From: Donald Seymour
To: Daniel Muelrath
Subject: RE: SCWA distribution map

Hey Dan – There have not been any changes to the transmission system since the 2010 UWMP, so the map you have is still current.

Don

From: Daniel Muelrath [mailto:dmuelrath@vomwd.com]
Sent: Monday, April 11, 2016 2:36 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: SCWA distribution map

Hi Don,

Do you have a current distribution system map for SCWA that we can use in our UWMP…if not we will use the one from the 2010 plan?

Thanks,

Dan

Dan Muelrath | General Manager
Valley of the Moon Water District
Office: (707) 996-1037
19039 Bay Street, P.O. Box 280
El Verano, CA 95433
www.vomwd.com

It is the mission of the Valley of the Moon Water District to provide our customers with reliable, safe water at an equitable price and to ensure the fiscal and environmental vitality of the District for future generations.

From: Donald Seymour
To: "Daniel Muelrath"
Subject: RE: Review language for UWMP

Hey Dan – Just one suggested change. Other than that it looks fine to me.

Don

From: Daniel Muelrath [mailto:dmuelrath@vomwd.com]
Sent: Tuesday, April 19, 2016 1:30 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: Review language for UWMP

Hi Don,

Can you review/edit the language below that is used to describe SCWA's water rights?

The SCWA is currently authorized by the SWRCB to store up to 245,000 AFY of water in Lake Sonoma and up to 122,500 AFY of water in Lake Mendocino. Per a series of four permits issued by the SWRCB, the SCWA may divert and redivert 180 cubic feet per second ("cfs") of water, up to a maximum of 75,000 AFY, from the Russian River at the SCWA's Wohler and Mirabel facilities and other points of diversion. The permits also establish minimum instream flow requirements for fish and wildlife protection and recreation. The SCWA has a pending application with the SWRCB to increase SCWA's Russian River diversion limit from 75,000 AFY to 101,000 AFY.

Thanks,

Dan

From:	Donald Seymour
To:	Daniel Muelrath
Cc:	Marcus Trotta
Subject:	FW: UWMP questions
Attachments:	160415_Appendix 1_ 2015 SUMMARY OF RECYCLED WATER USAGE - SONOMA VALLEY COUNTY SANITATION DISTRICT.docx

Hey Dan – Below is the SVCSD water reuse information that you requested.

Don

From: Ryan Kirchner
Sent: Friday, April 22, 2016 2:10 PM
To: Marcus Trotta <Marcus.Trotta@scwa.ca.gov>; Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: RE: UWMP questions

Marcus,

In 2015, the Sonoma Valley County Sanitation District treatment plant effluent totaled 2378 acre-feet, of which 2024 acre-feet (85%) was reused. Vineyard irrigation accounted for approximately 61% and pasture irrigation approximately 26% of the total recycled water used in 2015, 0.01% for use through our trucking water program and 0.004% used by the residential fill customers. The remaining 13% was used in management units and the salt marsh project.

Cheers,

RTK

From: Marcus Trotta
Sent: Wednesday, April 20, 2016 11:53 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Cc: Ryan Kirchner <Ryan.Kirchner@scwa.ca.gov>
Subject: FW: UWMP questions

Don - Jay suggested that you respond to Dan to make sure that the numbers we provide him match up with what we are reporting in our UWMP.

-Marcus

From: Daniel Muelrath [mailto:dmuelrath@vomwd.com]
Sent: Wednesday, April 20, 2016 9:27 AM
To: Marcus Trotta <Marcus.Trotta@scwa.ca.gov>
Subject: UWMP questions

Hi Marcus,

I have two questions I think you can answer (or send me to the right person) that I need to include in our UWMP.

1. How much water did the SVCSD treat in 2011, 2012, 2013, 2014 and 2015?
2. In 2015 how much was reused that offset pumping?

Thanks,

Dan

From:	Donald Seymour
To:	Vogler, Rocky
Subject:	RE: ACWA reminder
Attachments:	Draft Groundwater Section.docx

Hey Rocky – Attached is the Groundwater Section from the Water Agency's DRAFT 2015 UWMP. Jessica is still reviewing and commenting on language regarding the Biological Opinion. Consequently, it is not available yet.

Don

From: Vogler, Rocky [mailto:rvogler@srcity.org]
Sent: Monday, May 09, 2016 10:44 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: ACWA reminder

Hi Don –

Just a quick reminder re our conversation at ACWA last week: Santa Rosa requesting the Agency provide any draft 2015 UWMP language related to groundwater and the biological opinion (I did talk to David Manning about the BO, and he said to refer to you).

Thanks.

Rocky

From: Donald Seymour
To: Daniel Muelrath
Subject: RE: SCWA Water Rights

Hi Dan – Below is the language that is in the Future Water Projects section of the Water Agency's 2015 UWMP describing the need for additional water rights to meet future projected demands. Let me know if you have any questions.

Don

Based on the water demand projections described in Section 4, the Water Agency estimates the existing annual diversion and rediversion limit of 75,000 ac-ft will be exceeded by 2035. Consequently, it will be necessary for the Water Agency to file an application with the SWRCB by around 2030 to increase its annual diversion and rediversion limit. The projected shortfall in the Water Agency's annual diversion and rediversion limit of Russian River water is estimated to be about 117 ac-ft/yr in 2035 increasing to nearly 1,000 ac-ft/yr by 2040. Because seeking additional water rights is a lengthy and costly process, the Water Agency anticipates that when the current supply limit is no longer sufficient that it would file an application to increase its annual diversion and rediversion limit by an additional 5,000 ac-ft annually to accommodate future demand increases over a longer planning horizon. In order for the SWRCB to act on an application to increase these limits, the Water Agency will need to prepare an Environmental Impact Report under CEQA. The increase to the Water Agency's annual diversion and rediversion limit of Russian River water and the schedule for filing an application with the SWRCB will be reevaluated in the Water Agency's 2020 UWMP.

From: Daniel Muelrath [mailto:dmuelrath@vomwd.com]
Sent: Monday, May 09, 2016 10:06 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: SCWA Water Rights

Hi Don,

I am reviewing my close to final draft UWMP and in our 2010 plan we had some wording about the additional 26,000AF pending water rights application to help fulfill the Agencies today demand requirements over the horizon of the plan. Now that you have everyone's demands for our 2015 plans I wanted to confirm that this is still correct wording. Essentially, that SCWA will keep these rights as pending.

Thanks,

Dan

Dan Muelrath | General Manager

Valley of the Moon Water District
Office: (707) 996-1037
19039 Bay Street, P.O. Box 280
El Verano, CA 95433
www.vomwd.com

It is the mission of the Valley of the Moon Water District to provide our customers with reliable, safe water at an equitable price and to ensure the fiscal and environmental vitality of the District for future generations.

From: Donald Seymour
To: Vogler, Rocky
Subject: RE: and one more...

Here you go. Also, see comment to bullet 5.

Don

6.1 CLIMATE CHANGE IMPACTS TO SUPPLY

DWR suggests, but does not require, that water suppliers consider in their 2015 Plans the potential water supply and demand effects related to climate change. This section provides an overview of the recent direction that has been developed for California water agencies regarding climate change planning and a description of the Water Agency's current related activities.

In June 2005, Governor Arnold Schwarzenegger issued Executive Order # S-3-05 acknowledging the potential impacts of climate change on California. The executive order sets targets for greenhouse gas emissions reductions in the state, directs the formation of a Climate Action Team led by the California Environmental Protection Agency, and sets up a biannual reporting schedule for state agencies to identify impacts and potential mitigation plans.

The Executive Order's key declarations and actions include:

- link between greenhouse gas emissions and climate change;
- need for statewide consistency in planning to mitigate sea level rise and the anticipated impacts to coastal area resources and populations;
- state agencies are to work cooperatively to mitigate impacts; and
- a water adaptation strategy to be led by DWR.

DWR has been providing guidance to California water suppliers on addressing climate change impacts through the issuance of several key reports and guidelines. The Water Agency is familiar with the climate change planning guidance that has been provided by DWR and others and is incorporating climate change planning into its water planning activities. The Water Agency's Water Supply Strategy 3 is to evaluate potential climate change impacts on water supply and flood protection. The strategy defines immediate actions that consist of initiating climate change modeling and support of installation of weather sensors. The near term action is the development of adaptation measures once the climate change predictive modeling is completed. The long term action is to update the climate change analysis.

As part of Strategy 3, the Water Agency is funding ongoing USGS studies on the potential effects of climate change on the Water Agency's water supply. Potential changes in air temperature and precipitation due to changes in climate are likely to result in changes in hydrology in the Russian River drainage basin. The Water Agency is interested in understanding how runoff and streamflow may change and hopes to obtain scientifically defensible information upon which to base infrastructure planning and approaches for resource management.

The objectives of the USGS study are to:

(1) Develop the downscaled future climate scenarios necessary for hydrologic modeling of the Russian River Water System,

(2) Develop and calibrate a regional-scale hydrologic model to provide daily inputs for future climate for the Water Agency's water management models of the Russian River water system,

(3) Prepare future climate inputs for groundwater models in Sonoma Valley and the Santa Rosa

Plain.

The results of the USGS study may allow the Water Agency to assess the impact of climate changes in future years on the water demands of its Customers and the water supply available to the Water Agency. This new information will form the basis of future Urban Water Management Plans. In the interim, customers of the Water Agency, local planning agencies, and other persons relying on this Plan as a reference for analysis of water supply availability are encouraged to check with the Water Agency for updated information regarding the USGS study. In addition, the Water Agency, Scripps Institute for Wester Weather Extremes and the USGS have partnered on research to evaluate how climate change may impact extreme weather events such as floods and droughts.

From: Vogler, Rocky [mailto:rvogler@srcity.org]
Sent: Thursday, May 12, 2016 4:16 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: and one more...

Sorry about the barrage of emails…I'm getting peppered with ?'s too…

Can we get your section on Climate Change Impacts to Supply (or can you verify the statements below)? Want to make sure we are consistent with the Agency. Below is what we currently have in our draft:

6.1 CLIMATE CHANGE IMPACTS TO SUPPLY

The City's water supply is not vulnerable to climate change impacts based on a review of the topics in Part II Water Supply of the Climate Change Vulnerability Assessment:

1. No portion of the City's water supply comes from snowmelt.
2. No portion of the City's water supply comes from the Delta, is imported from the Colorado River, or is imported from other climate-sensitive areas.
3. No portion of the City's water supply comes from coastal aquifers, and salt intrusion has not been a problem in the past.
4. The Agency water supply does not have difficulty in storing carry-over water from year to year. The current storage volume is more than several years' water demand.
5. The City has not experienced a drought that has caused it to not meet local water demands. There have been water supply shortages that have resulted in curtailed deliveries. So I assume you mean that some of the local water demand was met through conservation?
6. The region does not have invasive species management issues at the water supply facilities.

From: Donald Seymour
To: Vogler, Rocky
Subject: RE: another ?

Hey Rocky – Below is the Section from the Agency's draft plan regarding future water projects. Your proposed language is consistent with the text below.

Don

1.1 Future Water Projects

The Water Agency evaluated the projected demands requested by its Customers and Russian River customers through 2040. Based on this assessment, additional water supply projects will be needed to meet these projected demands. The types of projects and their estimated schedule are summarized in Table 5-10. These projects consist of obtaining additional water rights and modifying the terms of existing water rights, new water supply diversion facilities, and certain transmission system projects necessary to convey these additional supplies to portions of the transmission system where the demands are anticipated to occur. The schedule shown in Table 5-10 assumes that the Water Agency's Customers will determine these projects are prudent and support their financing. The following describes how these projects were identified.

Based on the water demand projections described in Section 4, the Water Agency estimates the existing annual diversion and rediversion limit of 75,000 ac-ft will be exceeded by approximately 2035. Consequently, it will be necessary for the Water Agency to file an application with the SWRCB by around 2030 to increase its annual diversion and rediversion limit. The projected shortfall in the Water Agency's annual diversion and rediversion limit of Russian River water is estimated to be about 117 ac-ft/yr in 2035 increasing to nearly 1,000 ac-ft/yr by 2040. Because seeking additional water rights is a lengthy and costly process, the Water Agency anticipates that when the current supply limit is no longer sufficient that it would file an application to increase its annual diversion and rediversion limit by an additional 5,000 ac-ft annually to accommodate future demand increases over a longer planning horizon. This incremental increase in the annual diversion and rediversion limit of Russian River water is well below the Water Agency's annual storage rights of 122,500 acre-feet and 245,000 acre-feet for Lake Mendocino and Lake Sonoma, respectively. In order for the SWRCB to act on an application to increase these limits, the Water Agency will need to prepare an environmental impact analysis under CEQA.

The Water Agency's 2010 UWMP estimated that an additional 5,000 acre-feet annually would be needed by about 2027. This new estimate reflects the reduced demand for water and increased water conservation implemented by the Water Agency's customers. The increase to the Water Agency's annual diversion and rediversion limit of Russian River water and the schedule for filing an application with the SWRCB will be reevaluated in the Water Agency's 2020 UWMP.

Additional water diversion facilities will be needed to meet future demands. To estimate the additionalcapacity and schedule for these new facilities, the projected annual deliveries were translated to peak system demands based on analyses of recent historical peaking factors under normal water supply conditions. These estimated peak demands were then compared to the estimated firm capacity of the existing production facilities to determine if additional production capacity will be necessary to meet projected demands. Based on this evaluation, the Water Agency estimates that approximately 6 mgd of additional diversion capacity will be needed starting about 2030. This additional production capacity can likely be developed by installing new wells (or perhaps retrofitting existing wells) in the Wohler and Mirabel areas. Additional studies will be necessary to refine this

future project and to examine alternatives. The Water Agency will need to comply with CEQA to implement such a project.

As discussed in Section 1.3.2, the Water Agency assumes that the Biological Opinion will be successfully implemented, including the Dry Creek habitat enhancement work. If the habitat enhancement work is not as successful as anticipated by the Water Agency, NMFS, and CDFW, it may be necessary to construct a Dry Creek bypass pipeline to convey flows necessary for water supply purposes past Dry Creek. The Water Agency has completed a feasibility study of a bypass pipeline should it be necessary to persue that option. The Biological Opinion requires that a determination regarding the effectiveness of the Dry Creek habitat enhancement be made by 2018. Should a bypass pipeline be deemed necessary in 2018, it is anticipated that it could be operational by approximately 2025-2026. The Water Agency will continue to monitor the progress of the Dry Creek habitat enhancement project and will re-evaluate the situation as new information becomes available.

Finally, additional transmission system facilities will be needed to ensure that future peak demands can be met in all portions of the water transmission system. Similar to the water supply facilities, the timing of completing these facilities is dictated by the projected peak demands. The Water Agency simulated the transmission system operation under these peak demands using its hydraulic model to identify capacity constraints and evaluate which transmission system projects are necessary and when those projects are needed. In the Water Agency's transmission system, using the sustained levels in the storage facilities is one of the key criteria to determine sufficient capacity. For this analysis, a pipeline or group of pipelines would be identified with a capacity deficiency if the downstream storage facility was unable to maintain storage levels above 50% of the total storage capacity after five consecutive days of projected peak day demands.

Based on the modeling results, the South Transmission Main Project that will provide a secondary pipeline from the Cotati Tanks to the Kastania Meter Station will be needed as early as 2025 with at least the first phase (Cotati Tanks to Ely Booster Station) to alleviate capacity deficits during periods of peak demand projected to occur in the southern portion of the Petaluma Aqueduct. Phase 2 of the South Transmission Main Project is expected to be needed by 2030.

Additionally, although Table 5-10 doesn't specify any transmission system projects in the Sonoma Valley, modeling results indicate that between 2025 and 2030, the Sonoma Aqueduct will begin to exhibit capacity deficiencies. While the deficiency doesn't exceed the criteria for identifying a capacity constraint, deliveries to Sonoma Valley are dependent on non-redundant facilities and hence system reliability is a concern. Further analysis is recommended for consideration of infrastructure projects that would improve the system reliability.

Finally, the Kawana-Ralphine-Sonoma Booster Pipeline Project (comprising a pipeline from the Kawana Tanks to the Sonoma Booster Station) is a reliability project that is scheduled for completion by 2025. The Water Agency will need to comply with the requirements of CEQA and evaluate alternatives prior to implementation of these projects. .

There is uncertainty regarding the rate that water demands will increase, especially in the near-term, given the recent drought events. The project schedule described in Table 5-10 is based on the demand projections provided by the water contractors and MMWD. As described in Section 4.2, these near-term projections (through 2030) are conservative estimates and the growth rate of water demand may be lower, thus extending the dates when the transmission system projects (including the South Transmission MainProject) will be needed. The Water Agency will continue to work with its water contractors and other customers to monitor actual water demands relative to their demand projections. Also, the Water Agency will assist the water contractors' evaluation of local projects (e.g., new storage, additional conservation, or recycled water projects) to help mitigate the necessity, or delay the need for the transmission system projects identified in Table 5-10. The Water Agency will

also continue to monitor demands on the Sonoma Aqueduct and update its hydraulic analysis as new information regarding demand projections become available from the Valley of the Moon Water District and the City of Sonoma.

Table 5-10. Wholesale: Expected Future Water Supply Projects or Programs

	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.
	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format. LOCATION OF THE NARRATIVE_____

Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Agency, ac-ft/yr
South Transmission Section 1 (Cotati to Ely) [a]	No			2025	All year types	
South Transmission Section 2 (Ely to Kastania) [a]	No			2030	All year types	
Kawana – Ralphine-Sonoma BST Pipeline[a]	No			2025	All year types	
Petition to Increase Annual Diversion Limit[b]	No			2030	Average Year and Multiple-Dry Years	5,000
Mirabel West Wells[c]	No			2025	Average Year and Multiple-Dry Years	7,800

(a) *Transmission system projects are scheduled to provide water deliveries to specific portions of the Water Agency's transmission system per the projection of net water demands by the Agency's customers and therefore do not represent on their own an additional water supply.*

(b) *Based on net demand projections of Russian River supplies from Water Agency Customers and direct diverters.*

(c) *Additional annual water supply is based on increased peak capacity from the new facilities using historical correlation of peak capacities to annual diversions.*

From: Vogler, Rocky [mailto:rvogler@srcity.org]
Sent: Thursday, May 12, 2016 4:13 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: another ?

Don – please confirm if still accurate:

As described in the Agency's 2015 UWMP, based on the water demand projections of the Agency's customers, additional water supply, additional water supply diversion facilities, and additional water supply transmission capacity will be needed in order to meet the 2040 water demand projections. Detailed descriptions of these projects are included in the Agency's 2015 UWMP.

From: Donald Seymour
To: Vogler, Rocky
Subject: RE: UWMP questions

My responses are below in red.

From: Vogler, Rocky [mailto:rvogler@srcity.org]
Sent: Thursday, May 12, 2016 10:51 AM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Subject: UWMP questions

Don –

Please review the following and indicate if the information shown (from the Agency's 2010 Plan) is still valid or if updates (including the date) should be included (per Agency's 2015 Plan). Please provide any updates/sections as necessary.

1. Text from Santa Rosa's UWMP: *In August 2006, NMFS and CDFG filed complaints with FERC regarding PG&E's compliance with their FERC license. On October 16, 2006, PG&E sent a letter to FERC acknowledging three errors regarding compliance with their FERC license and implementation of the flow requirements of the Biological Opinion RPA. In response, PG&E has adjusted operation of the project. This change has resulted in an approximately 50 percent reduction in annual diversions of water into the Russian River Watershed. PG&E's license to operate the PVP expires in 2022. Per the Agency's 2015 Urban Water Management, future Russian River supply availability is based upon the assumption that the PVP diversions permitted under the FERC license will continue.*
2. Question: Regarding the Agency modeling to determine reliability, what assumptions are made for the Dry Creek habitat restoration (if any) and/or the potential future bypass pipeline (if habitat restoration Is not successful)?*[]* The modeling assumes that the Water Agency will continue filing annual Temporary Urgency Change Petitions. It does not assume permanent flow changes

Rocky

From:	Drew McIntyre
To:	Donald Seymour
Subject:	RE: 2015 UWMP - Draft Climate Change Language
Date:	Tuesday, May 24, 2016 11:22:58 AM

Thanks Don.

From: Donald Seymour [mailto:Donald.Seymour@scwa.ca.gov]
Sent: Tuesday, May 24, 2016 10:24 AM
To: Drew McIntyre
Cc: Carrie Pollard; Ryan Grisso
Subject: RE: 2015 UWMP - Draft Climate Change Language

Hi Drew – Below is the discussion of climate change impacts to supply that is in the Agency's draft 2015 UWMP. Let me know if you have any questions.

Don

Climate Change Impacts to Supply

DWR suggests, but does not require, that water suppliers consider in their 2015 Plans the potential water supply and demand effects related to climate change. This section provides an overview of the recent direction that has been developed for California water agencies regarding climate change planning and a description of the Water Agency's current related activities.

In June 2005, Governor Arnold Schwarzenegger issued Executive Order # S-3-05 acknowledging the potential impacts of climate change on California. The executive order sets targets for greenhouse gas emissions reductions in the state, directs the formation of a Climate Action Team led by the California Environmental Protection Agency, and sets up a biannual reporting schedule for state agencies to identify impacts and potential mitigation plans.

The Executive Order's key declarations and actions include:

- link between greenhouse gas emissions and climate change;
- need for statewide consistency in planning to mitigate sea level rise and the anticipated impacts to coastal area resources and populations;
- state agencies are to work cooperatively to mitigate impacts; and
- a water adaptation strategy to be led by DWR.

DWR has been providing guidance to California water suppliers on addressing climate change impacts through the issuance of several key reports and guidelines. The Water Agency is familiar with the climate change planning guidance that has been provided by DWR and others and is incorporating climate change planning into its water planning activities. The Water Agency's Water Supply Strategy 3 is to evaluate potential climate change impacts on water supply and flood protection. The strategy defines immediate actions that consist of initiating climate change modeling and support of installation of weather sensors. The near term action is the development of adaptation measures once the climate change predictive modeling is completed. The long term action is to update the climate change analysis.

As part of Strategy 3, the Water Agency is funding ongoing USGS studies on the potential effects of climate change on the Water Agency's water supply. Potential changes in air temperature and precipitation due to changes in climate are likely to result in changes in hydrology in the Russian

River drainage basin. The Water Agency is interested in understanding how runoff and streamflow may change and hopes to obtain scientifically defensible information upon which to base infrastructure planning and approaches for resource management.

The objectives of the USGS study are to:

(1) Develop the downscaled future climate scenarios necessary for hydrologic modeling of the Russian River Water System,

(2) Develop and calibrate a regional-scale hydrologic model to provide daily inputs for future climate for the Water Agency's water management models of the Russian River water system,

(3) Prepare future climate inputs for groundwater models in Sonoma Valley and the Santa Rosa Plain.

The results of the USGS study may allow the Water Agency to assess the impact of climate changes in future years on the water demands of its Customers and the water supply available to the Water Agency. This new information will form the basis of future Urban Water Management Plans. In the interim, customers of the Water Agency, local planning agencies, and other persons relying on this Plan as a reference for analysis of water supply availability are encouraged to check with the Water Agency for updated information regarding the USGS study. In addition, the Water Agency, Scripps Institute for Western Weather Extremes and the USGS have partnered on research to evaluate how climate change may impact extreme weather events such as floods and droughts.

From: Drew McIntyre [mailto:dmcintyre@nmwd.com]
Sent: Friday, May 20, 2016 4:47 PM
To: Donald Seymour <Donald.Seymour@scwa.ca.gov>
Cc: Carrie Pollard <Carrie.Pollard@scwa.ca.gov>; Ryan Grisso <rgrisso@nmwd.com>
Subject: 2015 UWMP - Draft Climate Change Language

Hi Don,

Does SCWA also have discussion in Chapter 6.10 "Climate Change Impacts to Supply" ? If so, can you email it?

Thanks

Drew

From: Donald Seymour
To: Mary Grace Pawson
Subject: RP 2015 UWMP Projections.xlsx
Attachments: RP 2015 UWMP Projections.xlsx

Hi Mary Grace – Could you please review and edit (if necessary) the attached spreadsheet that summarizes the City of Rohnert Park's 2015 UWMP projections?

Don

Appendix B: Notice of Public Hearing and Adoption Resolution

SONOMA COUNTY WATER AGENCY

CF/40-0-1 Urban Water Management Plan - 2015 (ID 5551)

March 30, 2016

Gary Helfrich, Director
Camp Meeker Rec & Park District
5240 Bohemian Highway
Camp Meeker, CA 95419

RE: 2015 URBAN WATER MANAGEMENT PLAN PUBLIC HEARING NOTIFICATION

Dear Mr. Helfrich:

The Sonoma County Water Agency (Water Agency) is updating its Urban Water Management Plan and will hold a public hearing in June 2016 to discuss these efforts with our community as required by the Urban Water Management Planning Act. The hearing will take place at the Sonoma County Board of Supervisors Chambers, located at 575 Administration Drive, Room 102A, Santa Rosa, California. The exact date and time will be announced online at www.sonomacountywater.org/uwmp.

The Water Agency's updated Urban Water Management Plan will discuss and describe the following:

- Existing water supplies and transmission system facilities;
- Projected water demands in the Water Agency's service area over the next 25 years;
- Projected water supplies available to the Water Agency over the next 25 years, the reliability of that supply, and general schedules for water supply projects;
- Climate change impacts to water supply;
- Energy intensity;
- Current and planned Water Agency water conservation activities;
- A water shortage contingency analysis;
- And a comparison of water supply and water demand over the next 25 years under different hydrological assumptions (normal year, single dry year, multiple dry years).

Schedule for preparation and approval of the Plan:

- Coordinate with water retailers, city planners, other external stakeholders: Through May 2016
- Complete Draft Urban Water Management Plan: May 13, 2016
- Hold Public Hearing: June, 2016 (exact date and time to be announced)
- Board of Directors Adopt UWMP: June, 2016 (exact date and time to be announced)
- Submit Final Plan to DWR: By July 1, 2016

If you have any questions regarding the Urban Water Management update process, please contact Brad Sherwood at 707.547.1927 or learn more online at www.sonomacountywater.org/uwmp.
Thank you,

Don Seymour
W.A. Principal Engineer

RW S:\Clerical\Pinks\03-28-2016\UWMP 2016 Public hearing_letter djs.docx

SONOMA COUNTY WATER AGENCY

CF/40-0-1 Urban Water Management Plan - 2015 (ID 5551)

March 30, 2016

Lisa Van Atta
Assistant Regional Administrator California Coastal Office
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

RE: 2015 URBAN WATER MANAGEMENT PLAN PUBLIC HEARING NOTIFICATION

Dear Ms. Van Atta:

The Sonoma County Water Agency (Water Agency) is updating its Urban Water Management Plan and will hold a public hearing in June 2016 to discuss these efforts with our community as required by the Urban Water Management Planning Act. The hearing will take place at the Sonoma County Board of Supervisors Chambers, located at 575 Administration Drive, Room 102A, Santa Rosa, California. The exact date and time will be announced online at www.sonomacountywater.org/uwmp.

The Water Agency's updated Urban Water Management Plan will discuss and describe the following:

- Existing water supplies and transmission system facilities;
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- Projected water supplies available to the Water Agency over the next 25 years, the reliability of that supply, and general schedules for water supply projects;
- Climate change impacts to water supply;
- Energy intensity;
- Current and planned Water Agency water conservation activities;
- A water shortage contingency analysis;
- And a comparison of water supply and water demand over the next 25 years under different hydrological assumptions (normal year, single dry year, multiple dry years).

Schedule for preparation and approval of the Plan:

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If you have any questions regarding the Urban Water Management update process, please contact Brad Sherwood at 707.547.1927 or learn more online at www.sonomacountywater.org/uwmp.
Thank you,

Don Seymour

Don Seymour
W.A. Principal Engineer

RW S:\Clerical\Pinks\03-28-2016\UWMP 2016 Public hearing_letter djs.docx

404 Aviation Boulevard - Santa Rosa, CA 95403-9019 • (707) 526-5370 - Fax (707) 544-6123 - www.sonomacountywater.org/

Sonoma County Water Agency
2015 Urban Water Management Plan Update
Public Hearing Notice

The Sonoma County Water Agency will hold a public hearing to review its 2015 Urban Water Management Plan (UWMP) on June 21, 2016. The draft 2015 UWMP may be found online at www.sonomacountywater.org/uwmp or at the Water Agency's administration building located at 404 Aviation Blvd, Santa Rosa, CA.

Comments or questions regarding the UWMP may be addressed to:

Don Seymour, UWMP Project Manager
Sonoma County Water Agency
404 Aviation Blvd, Santa Rosa, CA 95403
Phone: 707-547-1900 or don.seymour@scwa.ca.gov

Public hearing details:

Date: June 21, 2016
Location: 575 Administration Drive, Room 102A, Santa Rosa, California
Time: 10 a.m.

The Water Agency is a wholesaler of potable water, serving nine primary municipal customers in Sonoma and Marin Counties. The Water Agency's UWMP discusses and describes:

- Existing water supplies and transmission system facilities;
- Projected water demands in the Water Agency's service area over the next 25 years;
- Projected water supplies available to the Water Agency over the next 25 years, the reliability of that supply, and general schedules for water supply projects;
- Climate change impacts to water supply;
- Energy intensity;
- Current and planned Water Agency water conservation activities;
- A water shortage contingency analysis;
- And a comparison of water supply and water demand over the next 25 years under different hydrological assumptions (normal year, single dry year, multiple dry years).

Urban Water Management Plans are important tools for reporting water agencies' long-term planning efforts to meet future demands and tracking progress toward achieving state-mandated water conservation targets. They also support state laws linking approval for large developments to water supply availability. In 1983, the California Legislature enacted the Urban Water Management Planning Act (Division 6 Part 2.6 of the Water Code §§10610 - 10656). It requires that every urban water supplier that provides water to 3,000 or more customers, or that provides more than 3,000 acre-feet of water annually ensure the appropriate level of reliability to meet the needs of its customers during normal, dry and multiple dry years. The act describes the contents of the UWMP as well as how urban water suppliers should adopt and implement the plans. Plan updates are required every five years, and updates maintain the Water Authority's eligibility for state grants.

Learn more about the Water Agency's UWMP at www.sonomcountywater.org/uwmp.

PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Sonoma

I am a citizen of the United States and a resident of the county aforesaid: I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of The Press Democrat, a newspaper of general circulation, printed and published DAILY IN THE City of Santa Rosa, County of Sonoma; and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sonoma, State of California, under the date of November 29, 1951, Case number 34831, that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates to wit:

The Press Democrat - Legal Notices

6/2, 6/5, 6/6, 6/9, 6/16 - 6/16/16

I certify (or declare) under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Dated at Santa Rosa, California, on

Jun 28, 2016

Dennis M. Cordoni

SIGNATURE

This space for County clerk's Filing Stamp

Proof of Publication of

Sonoma County Water Agency
2015 Urban Water Management Plan Update
Public Hearing Notice

The Sonoma County Water Agency will hold a public hearing to review its 2015 Urban Water Management Plan (UWMP) on June 21, 2016. The draft 2015 UWMP may be found online at www.sonomacountywater.org/uwmp or at the Water Agency's administration building located at 404 Aviation Blvd, Santa Rosa, CA.

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Don Seymour, UWMP Project Manager
Sonoma County Water Agency
404 Aviation Blvd, Santa Rosa, CA 95403
Phone: 707-547-1900 or don.seymour@scwa.ca.gov

Public hearing details:

Date: June 21, 2016
Location: 575 Administration Drive, Room 102A, Santa Rosa, California
Time: 10 a.m.

The Water Agency is a wholesaler of potable water, serving nine primary municipal customers in Sonoma and Marin Counties. The Water Agency's UWMP discusses and describes:

- Existing water supplies and transmission system facilities;
- Projected water demands in the Water Agency's service area over the next 25 years;
- Projected water supplies available to the Water Agency over the next 25 years, the reliability of that supply, and general schedules for water supply projects;
- Climate change impacts to water supply;
- Energy intensity;
- Current and planned Water Agency water conservation activities;
- A water shortage contingency analysis;
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Learn more about the Water Agency's UWMP at www.sonomcountywater.org/uwmp.

2742095 – Pub. Jun 2, 5, 6, 9, 16, 2016 3ti

THE WITHIN INSTRUMENT IS A
CORRECT COPY OF THE ORIGINAL
ON FILE IN THIS OFFICE

ATTEST: JUN 2 2 2016

VERONICA A. FERGUSON, Clerk/Secretary
BY C Woodson
DEPUTY CLERK/ASST SECRETARY

Item Number: 42
Date: June 21, 2016 Resolution Number: 16-0256

☐ 4/5 Vote Required

Resolution of the Board of Directors of the Sonoma County Water Agency Adopting the Urban Water Management Plan 2015

Whereas, the Urban Water Management Planning Act, which is codified at California Water Code Section 10610 et seq., requires that every urban water supplier which provides 3,000 acre feet or more of water annually, or which directly or indirectly supplies water for municipal purposes to more than 3,000 customers, shall prepare an Urban Water Management Plan, the primary objective of which is to plan for the conservation and efficient use of water; and

Whereas, the Sonoma County Water Agency (Water Agency) has prepared a wholesale Urban Water Management Plan (UWMP 2015) covering the Water Agency to meet the requirements of Urban Water Management Planning Act (Act); and

Whereas, the UWMP 2015 must be adopted after public review and a public hearing by the Water Agency's Board of Directors and must be filed with the California Department of Water Resources by July 1, 2016; and

Whereas, the Water Agency coordinated preparation of the UWMP 2015 with other appropriate agencies in the area; provided notices to cities and counties within its service area; and encouraged the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan as more fully described in the UWMP 2015, in compliance with the requirements of the Act; and

Whereas, on June 1, 2016, the Water Agency circulated for public review a draft of the UWMP 2015, in compliance with the requirements of the Act; and

Whereas, a copy of the draft UWMP 2015 was made available for public inspection continuously since June 1, 2016, at the Water Agency's Administration building, the office of the Clerk of the Water Agency's Board of Directors, and the Water Agency's website; and

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Whereas, on June 21, 2016, this Board of Directors held a duly noticed public hearing on the UWMP 2015, notice of the time and place of which was published in the Press Democrat, a newspaper of general circulation, on June 2, 2016, June 5, 2016, June 6, 2016, and June 9, 2016; and

Whereas, the Water Agency reviewed and considered all comments received on the draft UWMP 2015.

Now, Therefore, Be It Resolved that the Board of Directors of the Sonoma County Water Agency hereby finds, determines, and declares as follows:

1. All of the above recitals are true and correct.
2. The Water Agency's UWMP 2015 is based upon substantial evidence, including reasonable assumptions about future conditions, and meets all requirements of the Urban Water Management Planning Act.
3. The Urban Water Management Plan 2015 is hereby approved and adopted.

Directors:

Gorin: Absent	Rabbitt: Aye	Zane: Aye	Gore: Aye	Carrillo: Aye

Ayes: 4	Noes: 0	Absent: 1	Abstain: 0

So Ordered.

Appendix C: AWWA Water Audit Tables

AWWA Water Loss Control Committee (WLCC) Free Water Audit Software v4.1

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WAS v4.1

PURPOSE: This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

USE: The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons on the left below. Descriptions of each sheet are also given below.

THE FOLLOWING KEY APPLIES THROUGHOUT:

	Value can be entered by user
	Value calculated based on input data
	These cells contain recommended default values

Please begin by providing the following information, then proceed through each sheet in the workbook:

NAME OF CITY OR UTILITY:	Sonoma County Water Agency			COUNTRY:	U.S.A
REPORTING YEAR:	2015	START DATE(MM/YYYY):	07/2014	END DATE(MM/YYYY):	06/2015
NAME OF CONTACT PERSON:	John Mendoza	E-MAIL:	john.mendoza@scwa.ca.gov	TELEPHONE:	707-547-1929
				Ext.	

PLEASE SELECT PREFERRED REPORTING UNITS FOR WATER VOLUME: Acre-feet

Click to advance to sheet… Click here: ? for help about units and conversions

Instructions	The current sheet
Reporting Worksheet	Enter the required data on this worksheet to calculate the water balance
Water Balance	The values entered in the Reporting Worksheet are used to populate the water balance
Grading Matrix	Depending on the confidence of audit inputs, a grading is assigned to the audit score
Service Connections	Diagrams depicting possible customer service connection configurations
Definitions	Use this sheet to understand terms used in the audit process
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators

Comments:

Add comments here to track additional supporting information, sources or names of participants

If you have questions or comments regarding the software please contact us at: wlc@awwa.org

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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Back to Instructions

? Click to access definition

Water Audit Report for: Sonoma County Water Agency
Reporting Year: 2015 | 7/2014 - 6/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	?	9	47,555.194	acre-ft/yr	
Master meter error adjustment (enter positive value):	?	10	237.776	under-registered	acre-ft/yr
Water imported:	?	n/a	0.000	acre-ft/yr	
Water exported:	?	n/a	0.000	acre-ft/yr	
WATER SUPPLIED:			47,792.970	acre-ft/yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

					Pcnt:	Value:
Billed metered:	?	10	45,868.171	acre-ft/yr		
Billed unmetered:	?	10	0.000	acre-ft/yr		
Unbilled metered:	?	10	0.000	acre-ft/yr		
Unbilled unmetered:	?		597.412	acre-ft/yr	1.25%	
AUTHORIZED CONSUMPTION:	?		46,465.583	acre-ft/yr		

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,327.387 acre-ft/yr

Apparent Losses

					Pcnt:	Value:
Unauthorized consumption:	?		119.482	acre-ft/yr	0.25%	
Customer metering inaccuracies:	?	10	750.562	acre-ft/yr	1.61%	
Systematic data handling errors:	?		0.000	acre-ft/yr		
Apparent Losses:	?		870.044			

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5

? Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?		457.343	acre-ft/yr
WATER LOSSES:			1,327.387	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?		1,924.799	acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	?	9	88.0	miles	
Number of active AND inactive service connections:	?	9	240		
Connection density:			3	conn./mile main	
Average length of customer service line:	?	9	5.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	?	8	97.3	psi	

COST DATA

Total annual cost of operating water system:	?	9	$34,114,417	$/Year
Customer retail unit cost (applied to Apparent Losses):	?	10	$2.26	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	?	10	$95.69	$/acre-ft/yr

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	4.0%
Non-revenue water as percent by cost of operating system:	2.2%
Annual cost of Apparent Losses:	$639,313
Annual cost of Real Losses:	$43,761

Operational Efficiency Indicators

Apparent Losses per service connection per day:	3236.36	gallons/connection/day
Real Losses per service connection per day*:	N/A	gallons/connection/day
Real Losses per length of main per day*:	4,639.65	gallons/mile/day
Real Losses per service connection per day per psi pressure:		gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	18.25	million gallons/year
From Above, Real Losses = Current Annual Real Losses (CARL):	457.34	million gallons/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	8.17	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 90 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unauthorized consumption
3: Systematic data handling errors

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Water Balance

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Water Audit Report For:	Report Yr:
Sonoma County Water Agency	2015

	Water Exported 0.000	Billed Water Exported			
Own Sources (Adjusted for known errors) 47,792.970	Water Supplied 47,792.970	Authorized Consumption 46,465.583	Billed Authorized Consumption 45,868.171	Billed Metered Consumption (inc. water exported) 45,868.171	Revenue Water 45,868.171
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 597.412	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 1,924.799
				Unbilled Unmetered Consumption 597.412	
		Water Losses 1,327.387	Apparent Losses 870.044	Unauthorized Consumption 119.482	
				Customer Metering Inaccuracies 750.562	
				Systematic Data Handling Errors 0.000	
Water Imported 0.000			Real Losses 457.343	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

AWWA WLCC Free Water Audit Software: Grading Matrix

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WASv 4.1

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In the Reporting Worksheet, grades were assigned to each component of the audit to describe the confidence and accuracy of the input data. The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading

	n/a	1	2	3	4	5	6	7	8	9	10
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Volume from own Sources" component:		to qualify for 2: Organize efforts to begin to collect data for determining volume from own sources	to qualify for 4: Locate all water production sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters		to qualify for 6: Formalize annual meter accuracy testing for all source meters. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		to qualify for 8: Conduct annual meter accuracy testing on all meters. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Master meter error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply, either its own source, and/or imported (purchased) water sources	Inventory information on meters and paper records of measured volumes in crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records. Tank/storage elevation changes are not employed in calculating "Volume from own sources" component. Data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data adjusted to correct gross error from equipment malfunction and error confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component.	Conditions between 6 and 8	Continuous production meter data logged automatically & reviewed daily. Data adjusted to correct gross error from equipment malfunction & results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results reviewed daily. Mass balance technique compares production meter data to raw (untreated) water and treatment volumes to detect anomalies. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter error adjustment" component:		to qualify for 2: Develop plan to restructure recordkeeping system to capture all flow data; set procedure to review data daily to detect input errors	to qualify for 4: Install automatic datalogging equipment on production meters. Identify tanks/storage facilities and include estimated daily volume of water added to, or subtracted from, "Water Supplied" volume based upon changes in storage		to qualify for 6: Review hourly production meter data for gross error on, at least, a weekly basis. Begin to install instrumentation on tanks/storage facilities to record elevation changes. Use daily net storage change to balance flows in calculating "Water Supplied" volume.		to qualify for 8: Complete installation of elevation instrumentation on all tanks/storage facilities. Continue to use daily net storage change in calculating balanced "Volume from own sources" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		to qualify for 10: Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters.		to maintain 10: Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component:		to qualify for 2: Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	To qualify for 4: Locate all imported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters		to qualify for 6: Formalize annual meter accuracy testing for all imported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.

Grading										
	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Water Exported Volume" component:		to qualify for 2: Review bulk water sales agreements with partner suppliers; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	To qualify for 4: Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		to qualify for 6: Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		to qualify for 8: Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all imported water meters. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		to maintain 10: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
AUTHORIZED CONSUMPTION											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billed for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billed for others. Manual meter reading, under 50% read success rate, remainder estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based billing from meter reads; flat or fixed rate billed for remainder. Manual meter reading used, at least 50% meter read success rate, failed reads are estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters replaced only upon complete failure. Computerized billing records, but only periodic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; remaining accounts are estimated. Manual customer meter reading gives at least 80% customer meter reading success rate, failed reads are estimated. Good customer meter records, limited meter accuracy testing, regular replacement of oldest meters. Computerized billing records with routine auditing of global statistics.	Conditions between 6 and 8	At least 97% of customers with volume-based billing from meter reads. At least 90% customer meter read success rate; or minimum 80% read success rate with planning and budgeting for trials of Automatic Metering Reading (AMR) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics; verified periodically by third party.	Conditions between 8 and 10	At least 99% of customers with volume-based billing from meter reads. At least 95% customer meter reading success rate; or minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) trials underway. Statistically significant customer meter testing and replacement program in place. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts. Annual audit verification by third party.
Improvements to attain higher data grading for "Billed Metered Consumption" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.	to qualify for 4: Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.		to qualify for 6: Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Conduct routine audit of global statistics.		to qualify for 8: Purchase and install meters on unmetered accounts. Assess cost-effectiveness of Automatic Meter Reading (AMR) system for portion or entire system; or achieve ongoing improvements in manual meter reading success rate. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Refine routine auditing procedures based upon third party guidance.		to qualify for 10: Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) system trials if manual meter reading success rate of at least 95% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue routine auditing and require annual third party review.		to maintain 10: Regular internal and third party auditing, and meter accuracy testing ensures that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management.
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billed. No data collected on customer consumption. Only estimates available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption recorded on portable dataloggers. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing but lacks written procedures and employs casual oversight, resulting in up to 20% of billed accounts believed to be unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but exemption exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy requires metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because because installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy requires metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		to qualify for 2: Investigate a new water utility policy to require metering of the customer population, and a reduction of unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and datalogging the water consumption.	to qualify for 4: Implement a new water utility policy requiring customer metering. Expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes.		to qualify for 6: Budget for staff resources to review billing records to identify unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts		to qualify for 8: Install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Implement procedures to obtain reliable consumption estimate for unmetered accounts awaiting meter installation.		to qualify for 10: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties to devise means to install water meters or otherwise measure water consumption.		to maintain 10: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed unmetered accounts as is economically feasible.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled metered Consumption" component:		to qualify for 2: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	to qualify for 4: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum.		to qualify for 6: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts.		to qualify for 8: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings.		to qualify for 10: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		to maintain 10: Reassess philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:		Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running x typical flowrate x number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex: unmetered fire connections registering consumption), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time x typical flow) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time x typical flow) or use of temporary meters.
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize accepted default value of 1.25% of system input volume as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushings).	to qualify for 5: Utilize accepted default value of 1.25% of system input volume as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: for fire hydrants - fire departments, contractors to ascertain their need for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of system input volume as expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy and do field checks. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures to ensure that fire hydrant permits are issued for use by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.
APPARENT LOSSES											
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running x typical flowrate x number of events).	Default value of 0.25% of system input volume is employed	Coherent policies exist for some forms of unauthorized consumption but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records. Unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for certain events (ex: tampering with water meters); other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is quantified via formulae (time x typical flow) or similar methods.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of system input volume. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of system input volume as expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy and do field checks. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to quality for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for use and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program. Workflow is driven chaotically by customer complaints with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters. Limited number of oldest meters replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. Population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters at varying lifespans to determine optimum replacement time for various types of meters.	Conditions between 8 and 10	Good records of number, type and size of customer meters; ongoing meter replacement occurs. Regular meter accuracy testing gives reliable measure of composite inaccuracy volume for the system. New metering technology is embraced to keep overall accuracy improving.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize procedures for meter recordkeeping with the electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.		to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new technology in Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering and customer consumption data.
Systematic Data Handling Error:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Vague policy for permitting (creating new customer accounts) and billing. Billing data maintained on paper records which are in disarray. No audits conducted to confirm billing data handling efficiency. Unknown number of customers escape routine billing due to lack of billing process oversight.	Policy for permitting and billing exists but needs refinement. Billing data maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work conducted to confirm billing data handling efficiency. Volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for permitting and billing exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy for permitting and billing is adequate and reviewed periodically. Computerized billing system in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	Permitting and billing policy reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Annual internal checks conducted with periodic third party audit. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound policy exists for permitting of all customer billing accounts. Robust computerized billing system gives high functionality and reporting capabilities. Assessment of policy and data handling errors conducted internally and audited by third party annually, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		to qualify for 2: Draft written policy for permitting and billing. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	to qualify for 4: Finalize written policy for permitting and billing. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		to qualify for 6: Refine permitting and billing procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		to qualify for 8: Formalize regular review of permitting and billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error.		to qualify for 10: Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that internal and third party audits are conducted annually.		to maintain 10: Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
SYSTEM DATA											

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound policy and procedures for permitting and documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases.
Improvements to attain higher data grading for "Length of Water Mains" component:		to qualify for 2: Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedure that result in poor documentation.	to qualify for 4: Complete inventory of paper records of water main installations & abandonments for a number of years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation and abandonments.		to qualify for 6: Finalize updates/improvements to policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		to qualify for 8: Launch random field checks of limited number of locations. Convert to electronic databases with backup as justified.		to qualify for 10: Link Geographic Information System (GIS) and asset management databases, conduct field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Permitting policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Permitting policy and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more that 3%.	Conditions between 6 and 8	Permitting policy and procedures reviewed at least biannually. Well-managed computerized information management system and routine, periodic field checks and internal system audits allows counts of connections that is no more than 2% in error.	Conditions between 8 and 10	Sound permitting policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections believed to be in error by less than 1%.
Improvements to attain higher data grading for "Number of Active and Inactive customer service connections" component:		to qualify for 2: Draft new policy and procedures for permitting and billing. Research and collect paper records of installations & abandonments for several years prior to audit year.	to qualify for 4: Refine policy and procedures for permitting and billing. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		to qualify for 6: Refine procedures to ensure consistency with permitting policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		to qualify for 8: Formalize regular review of permitting policy and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		to qualify for 10: Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	Note: if customer water meters are located outside of the customer building next to the curbstop or boundary separating utility/customer responsibility, follow the grading description for 10(a). Also see the Service Connection Diagram worksheet.	Gradings 1-9 apply if customer properties are **unmetered**, if customer meters exist and are located **inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building**. In any of these cases the average distance between the curbstop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gradings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet) Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curbstops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curbstops.	Policy requires that the curbstop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curbstop is the property of the water utility; and the piping from the curbstop to the customer building is owned by the customer. Curbstop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curbstop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curbstops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records.	Conditions between 4 and 6	Clear policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curbstops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curbstops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: a) The customer water meter is located outside of the customer building adjacent to the curbstop or boundary separating utility/customer responsibility for the service connection piping. In this case enter a value of zero in the Reporting Worksheet with a grading of 10. b). Customer water meters are located inside customer buildings, or the properties are unmetered. In either case the distance is highly reliable since data is drawn from a Geographic Information System (GIS) and confirmed by routine field checks.
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		to qualify for 2: Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curbstops. Obtain the length of this small sample of connections in this manner.	to qualify for 4: Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		to qualify for 6: Establish coherent procedures to ensure that policy for curbstop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		to qualify for 8: Implement an electronic means of recordkeeping, typically via a customer information system or customer billing system. Standardize the process to conduct field checks of limited number of locations.		to qualify for 10: Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones, moderate pressure variation across the system, occasional open boundary valves are discovered that breech pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breech pressure zones. Well-covered telemetry monitoring of the distribution system logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable SCADA System data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data.
Improvements to attain higher data grading for "Average Operating Pressure" component:		to qualify for 2: Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	to qualify for 4: Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		to qualify for 6: Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		to qualify for 8: Install a Supervisory Control and Data Acquisition (SCADA) System to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		to qualify for 10: Obtain average pressure data from hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		to maintain 10: Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for real-time pressure data calibration, and averaging.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
COST DATA											
Total annual cost of operating water system:		Incomplete paper records and lack of documentation on many operating functions making calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Gaps in data known to exist, periodic internal reviews conducted but not a structured audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and periodically by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		<u>to qualify for 2</u>: Gather available records, institute new procedures to regularly collect and audit basic cost data of most important operations functions.	<u>to qualify for 4</u>: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6</u>: Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		<u>to qualify for 8</u>: Standardize the process to conduct routine financial audit on an annual basis.		<u>to qualify for 10</u>: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10</u>: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):		Antiquated, cumbersome water rate structure is use, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Customer population unmetered. Fixed fee charged; single composite number derived from multiple customer classes.	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, including residential, commercial, industrial and any other customer classes within the water rate structure.	Conditions between 8 and 10	Third party reviewed weighted average composite consumption rate (includes residential, commercial, industrial, etc.)
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		<u>to qualify for 2</u>: Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	<u>to qualify for 4</u>: Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		<u>to qualify for 6</u>: Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	<u>Meter customers and charge rates based upon water volumes</u>	<u>to qualify for 8</u>: Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to qualify for 10</u>: Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to maintain 10</u>: Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate calculation of unit variable production costs based on these two inputs only. All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power and treatment (ex: liability, residuals management, etc.) are included in the unit variable production cost. Data audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent variable production costs tracked. Data audited at least annually by utility personnel, and periodically by third-party.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all primary and secondary cost components on an annual basis. <u>or</u>: 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost.
Improvements to attain higher data grading for "Variable Production Cost" component:		<u>to qualify for 2</u>: Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	<u>to qualify for 4</u>: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6</u>: Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, etc.) should be included to calculate a more accurate variable production cost.		<u>to qualify for 8</u>: Formalize the accounting process to include primary cost components (power, treatment) as well as secondary components (liability, residuals management, etc.) Conduct periodic third-party audits.		<u>to qualify for 10</u>: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10</u>: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively

AWWA WLCC Free Water Audit Software: Customer Service Line Diagrams

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Return to Reporting Worksheet

Average Length of Customer Service Line

The three figures shown on this worksheet display the assignment of the Average Length of Customer Service Line, Lp, for the three most common piping configurations.

Figure 1 shows the configuration of the water meter outside of the customer building next to the curbstop valve. In this configuration Lp = 0 since the distance between the curbstop and the customer metering point is essentially zero.

Figure 2 shows the configuration of the customer water meter located inside the customer building, where Lp is the distance from the curbstop to the water meter.

Figure 3 shows the configuration of an unmetered customer building , where Lp is the distance from the curbstop to the first point of customer water consumption, or, more simply, the building line.

In any water system the Lp will vary notably in a community of different structures, therefore the average Lp value is used and this should be approximated or calculated if a sample of service line measurements has been gathered.

Click for more information

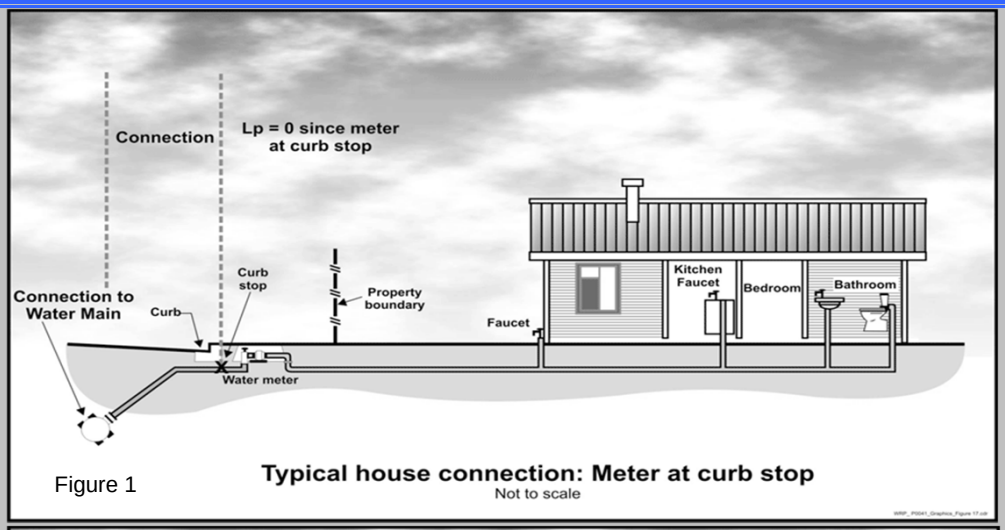

Figure 1 **Typical house connection: Meter at curb stop**
Not to scale

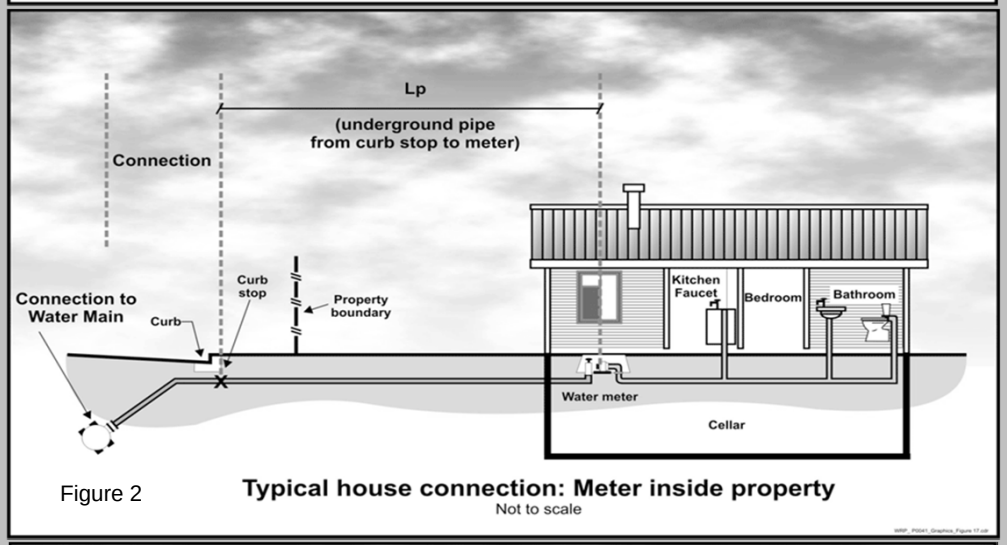

Figure 2 **Typical house connection: Meter inside property**
Not to scale

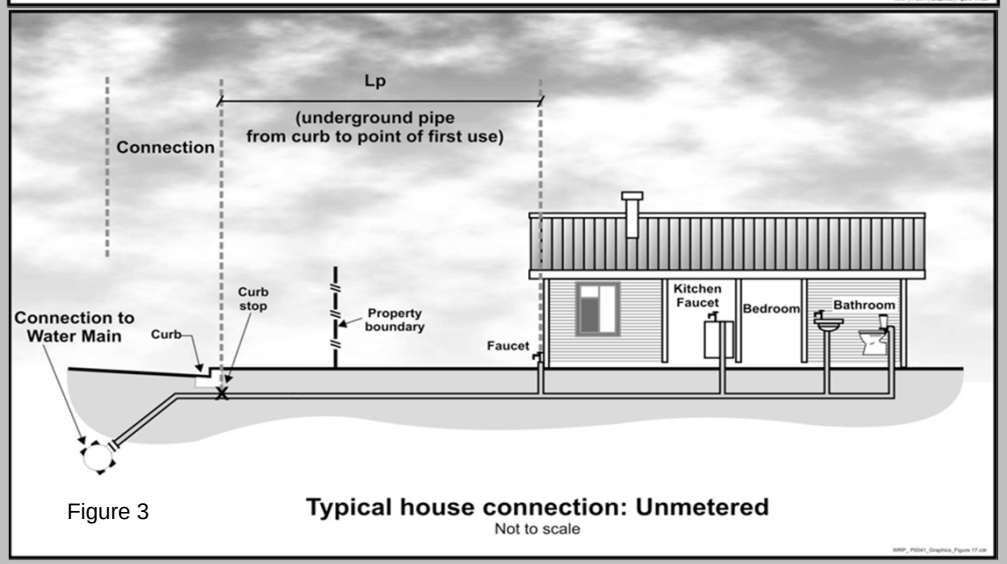

Figure 3 **Typical house connection: Unmetered**
Not to scale

AWWA WLCC Free Water Audit Software: Definitions

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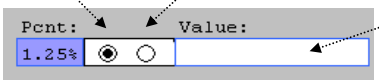
Item Name		Description
Apparent Losses	Find	= unauthorized consumption + meter under-registration + data handling errors Includes all types of inaccuracies associated with customer metering as well as data handling errors (meter reading and billing), plus unauthorized consumption (theft or illegal use). NOTE: Over-registration of customer meters, leads to under-estimation of Real Losses. Under-registration of customer meters, leads to over-estimation of Real Losses.
AUTHORIZED CONSUMPTION	Find	= billed metered + billed unmetered + unbilled metered + unbilled unmetered The volume of metered and/or unmetered water taken by registered customers, the water supplier and others who are implicitly or explicitly authorized to do so by the water supplier, for residential, commercial and industrial purposes. This does NOT include water sold to neighboring utilities (water exported). Authorized consumption may include items such as fire fighting and training, flushing of mains and sewers, street cleaning, watering of municipal gardens, public fountains, frost protection, building water, etc. These may be billed or unbilled, metered or unmetered.
Average length of customer service line	Find	This is entered for unmetered services and in cold or other areas where meters are installed inside homes and buildings. It is the length of customer service line either between the utility's service connection (often at the curbstop) and the meter, or to the building line (first point of customer consumption) if customers are unmetered. Note that the length of service connection between the main and customer service line is owned by the utility and its length and potential leakage is accounted for in the UARL formula by the number of service connections. **What role does the "Average Length of Customer Service Line" parameter serve in the Water Audit?** In many water distribution systems the water utility has maintenance responsibility for a portion of the customer service piping from its connection point at the water main to the curbstop valve located midway to the customer building. The customer is responsible to maintain the customer service piping from the curbstop to the building premises. When leaks arise on customer service piping, water utilities respond faster to repair leaks than customers when the leak is on piping under their responsibility. Leak durations are longer on the customer-maintained piping than the utility-maintained piping. The total length of pipe maintained by customers is one of the components of the Unavoidable Annual Real Loss (UARL) equation and is determined by multiplying the average length of customer maintained pipe, Lp by the number of customer service connections. Therefore this parameter is important to the calculation of the UARL and the Infrastructure leakage Index (ILI). Click to see Service Connection Diagram
Average operating pressure	Find	The average pressure may be approximated when compiling the preliminary water audit. Once routine water auditing has been established, a more accurate assessment of average pressure should be pursued. If the water utility infrastructure is recorded in a Geographical Information System (GIS) the average pressure at many locations in the distribution system can be readily obtained. If a GIS does not exist, a weighted average of pressure data can be calculated from water pressure measured at various fire hydrants scattered across the water distribution system.
Billed Authorized Consumption		All consumption that is billed and authorized by the utility. This may include both metered and unmetered consumption. See "Authorized Consumption" for more information.
Billed metered consumption	Find	All metered consumption which is billed. This includes all groups of customers such as domestic, commercial, industrial or institutional. It does NOT include water sold to neighboring utilities (water exported) which is metered and billed. The metered consumption data can be taken directly from billing records for the water audit period. The accuracy of yearly metered consumption data can be refined by including an adjustment to account for customer meter reading lagtime, however additional analysis is necessary to determine the adjustment value, which may or may not be significant.
Billed unmetered consumption	Find	All billed consumption which is calculated based on estimates or norms but is not metered. This might be a very small component in fully metered systems (for example billing based on estimates for the period a customer meter is out of order) but can be the key consumption component in systems without universal metering. It does NOT include water sold to neighboring utilities (water exported) which is unmetered but billed.
Connection density		=number of connections / length of mains

Item Name		Description
Customer metering inaccuracies	Find	Apparent water losses caused by the collective under-registration of customer water meters. Many customer water meters will wear as large cumulative volumes of water are passed through them over time. This causes the meters to under-register. The auditor has two options for entering data for this component of the audit. The auditor can enter a percentage under-registration (typically an estimated value), this will apply the selected percentage to the two categories of metered consumption to determine the volume of water not recorded due to customer meter inaccuracy. Alternatively, if the auditor has substantial data from meter testing to arrive at their own volumes of such losses, this volume may be entered directly. Note that a value of zero will be accepted but an alert will appear asking if the customer population is unmetered. Since all metered systems have some degree of inaccuracy, then a positive value should be entered. A value of zero in this component is valid only if the water utility does not meter its customer population.
Customer retail unit cost	Find	The Customer Retail Unit Cost represents the charge that customers pay for water service. This unit cost is applied to the components of apparent loss, since these losses represent water reaching customers but not (fully) paid for. It is important to compile these costs per the same unit cost basis as the volume measure included in the water audit. For example, if all water volumes are measured in million gallons, then the unit cost should be dollars per million gallon ($/mil gal). The software allows the user to select the units that are charged to customers (either $/1,000 gallons, $/hundred cubic feet or $/1,000 litres) and automatically converts these units to the units that appear in the "WATER SUPPLIED" box. Since most water utilities have a rate structure that includes a variety of different costs based upon class of customer, a weighted average of individual costs and number of customer accounts in each class can be calculated to determine a single composite cost that should be entered into this cell. Finally, the weighted average cost should also include additional charges for sewer, stormwater or biosolids processing, if these charges are based upon the volume of potable water consumed.
Infrastructure Leakage Index (ILI)	Find	The ratio of the Current Annual Real Losses (Real Losses) to the Unavoidable Annual Real Losses (UARL). The ILI is a highly effective performance indicator for comparing (benchmarking) the performance of utilities in operational management of real losses.
Length of mains	Find	Length of all pipelines (except service connections) in the system starting from the point of system input metering (for example at the outlet of the treatment plant). It is also recommended to include in this measure the total length of fire hydrant lead pipe. Hydrant lead pipe is the pipe branching from the water main to the fire hydrant. Fire hydrant leads are typically of a sufficiently large size that is more representative of a pipeline than a service connection. The average length of hydrant leads across the entire system can be assumed if not known, and multiplied by the number of fire hydrants in the system, which can also be assumed if not known. This value can then be added to the total pipeline length. Total length of mains can therefore be calculated as: Length of Mains, miles = (total pipeline length, miles) + [{(average fire hydrant lead length, ft) x (number of fire hydrants)} / 5,280 ft/mile] or Length of Mains, kilometres = (total pipeline length, kilometres) + [{(average fire hydrant lead length, metres) x (number of fire hydrants)} / 1,000 metres/kilometre]
Master meter error adjustment	Find	An estimate or measure of the degree of any inaccuracy that exists in the master meters measuring the Volume from own sources. Please also indicate if this adjustment is because the master meters under-registered (did not capture all the flow) or over-registered (overstated the actual flow). All systems encounter some degree of error in their Master Meter data. Please enter a positive value.
NON-REVENUE WATER	Find	= Apparent Losses + Real Losses + Unbilled Metered + Unbilled Unmetered Water which does not provide any revenue to the utility
Number of active AND inactive service connections	Find	Number of service connections, main to curb stop. Please note that this includes the actual number of distinct piping connections including fire connections whether active or inactive. This may differ substantially from the number of Customers (or number of accounts)
Real Losses	Find	Physical water losses from the pressurized system and the utility's storage tanks, up to the point of customer consumption. In metered systems this is the customer meter, in unmetered situations this is the first point of consumption (stop tap/tap) within the property. The annual volume lost through all types of leaks, breaks and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks and overflows.
Revenue Water		Water which is charged to customers to provide revenue to the utility.
Systematic data handling errors	Find	Apparent water losses caused by systematic data handling errors in the meter reading and billing system.
Total annual cost of operating the water system	Find	These costs include those for operations, maintenance and any annually incurred costs for long-term upkeep of the system, such as repayment of capital bonds for infrastructure expansion or improvement. Typical costs include employee salaries and benefits, materials, equipment, insurance, fees, administrative costs and all other costs that exist to sustain the drinking water supply. These costs should not include any costs to operate wastewater, biosolids or other systems outside of drinking water.

Item Name		Description
Unauthorized consumption	Find	Includes water illegally withdrawn from hydrants, illegal connections, bypasses to consumption meter or meter reading equipment tampering. While this component has a direct impact on revenue, in most water utilities the volume is low and it is recommended that the auditor apply a default value of 0.25% of the volume from own sources. If the auditor has well validated data that indicates the volume from unauthorized consumption is substantially higher or lower than that generated by the default value then this value can be entered. However, for most water utilities it is recommended to apply the default value. Note that a value of zero will not be accepted since all water utilities have some volume of unauthorized consumption occurring in their system.
Unavoidable Annual Real Losses (UARL)	Find	UARL (gallons/day)=(5.41Lm + 0.15Nc + 7.5Lc) xP, or UARL (litres/day)=(18.0Lm + 0.8Nc + 25.0Lc) xP where: Lm = length of mains (miles or kilometres) Nc = number of service connections Lc = total length of customer service lines (miles or km) = Nc multiplied by the average distance of customer service line, Lp (miles or km) P = Pressure (psi or metres) Click to see Service Connection Diagram The UARL is a theoretical reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a key variable in the calculation of the Infrastructure Leakage Index (ILI). It is not necessary that water utilities set this level as the target level of leakage, unless water is unusually expensive, scarce or both. NOTE: The UARL calculation has not yet been fully proven as effective for very small, or low pressure water distribution systems. If, in gallons per day: (Lm x 32) + Nc < 3000 or P <35psi in litres per day: (Lm x 20) + Nc < 3000 or P < 25m then the calculated UARL value may not be valid. The software does not display a value of UARL or ILI if either of these conditions is true.
Unbilled Authorized Consumption		All consumption that is unbilled, but still authorized by the utility. See "Authorized Consumption" for more information.
Unbilled metered consumption	Find	Metered Consumption which is for any reason unbilled. This might for example include metered consumption of the utility itself or water provided to institutions free of charge. It does NOT include water sold to neighboring utilities (water exported) which is metered but unbilled.
Unbilled unmetered consumption	Find	Any kind of Authorized Consumption which is neither billed nor metered. This component typically includes items such as fire fighting, flushing of mains and sewers, street cleaning, frost protection, etc. In most water utilities it is a small component which is very often substantially overestimated. It does NOT include water sold to neighboring utilities (water exported) which is unmetered and unbilled – an unlikely case. This component has many sub-components of water use which are often tedious to identify and quantify. Because of this, and the fact that it is usually a small portion of the water supplied, it is recommended that the auditor apply the default value of 1.25% of the volume from own sources. Select the default percentage to enter this value. If the water utility already has well validated data that gives a value substantially higher or lower than the default volume, then the auditor should enter their own volume. However the default approach is recommended for most water utilities. Note that a value of zero is not permitted, since all water utilities have some volume of water in this component occurring in their system.
Units and Conversions	Find	The user may develop an audit based on one of three unit selections: 1) Million Gallons (US) 2) Megalitres (Thousand Cubic Metres) 3) Acre-feet Once this selection has been made in the instructions sheet, all calculations are made on the basis of the chosen units. Should the user wish to make additional conversions, a unit converter is provided below (use drop down menus to select units from the yellow unit boxes): Enter Units: Convert From… **Converts to…..** 1 | Million Gallons (US) = 1 | Million Gallons (US) (conversion factor = 1)

Item Name		Description
Use of Option Buttons	Find	To use the percent value choose this button To enter a value choose this button and enter the value in the cell to the right  **NOTE:** For unbilled unmetered consumption and unauthorized consumption, a recommended default value can be applied by selecting the Percent option. The default values are based on fixed percentages of water supplied and are recommended for use in this audit unless the auditor has well validated data for their system. Default values are shown by purple cells, as shown in the example above. If a default value is selected, the user does not need to grade the item; a grading value of 3 is automatically applied (however, this grade will not be displayed).
Variable production cost (applied to Real Losses)	Find	The cost to produce and supply the next unit of water. (E.g., $/million gallons) This cost is determined by calculating the summed unit costs for ground and surface water treatment and all power used for pumping from the source to the customer. It should also include the unit cost of bulk water purchased as an import if applicable.
Volume from own sources	Find	The volume of treated water input to system from own production facilities
Water exported	Find	Bulk water sold and conveyed out of the water distribution system. Typically this is water sold to a neighboring water utility. Be sure to account for any export meter inaccuracy in reporting this volume
Water imported	Find	Bulk water purchased to become part of the water supplied. Typically this is water purchased from a neighboring water utility or regional water authority. Be sure to account for any import meter inaccuracy in reporting this volume
WATER LOSSES	Find	= apparent losses + real losses The difference between System Input and Authorized Consumption. Water losses can be considered as a total volume for the whole system, or for partial systems such as transmission or distribution systems, or individual zones. Water Losses consist of Real Losses and Apparent Losses.

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Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Once data has been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.
Note: **this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.**

General Guidelines for Setting a Target ILI (without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning.
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

AWWA WLCC Free Water Audit Software: Acknowledgements

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AWWA Water Audit Software Version 4.1 Developed by the Water Loss Control Committee of the American Water Works Association January 2010

This software is intended to serve as a basic tool to compile a preliminary, or "top-down", water audit. It is recommended that users also refer to the 3rd Edition AWWA M36 Publication, Water Audits and Loss Control Programs, for detailed guidance on compiling a comprehensive, or "bottom-up", water audit using the same water audit methodology.

DEVELOPED BY: *ANDREW CHASTAIN-HOWLEY, Miya Water*
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GEORGE KUNKEL, P.E. Philadelphia Water Department
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REFERENCES:

- Alegre, H., Hirner, W., Baptista, J. and Parena, R. Performance Indicators for Water Supply Services. IWA Publishing 'Manual of Best Practice' Series, 2000. ISBN 1 900222 272

- Kunkel, G. et al, 2003. Water Loss Control Committee Report: Applying Worldwide Best Management Practices in Water Loss Control. Journal AWWA, 95:8:65

- AWWA Water Audits and Loss Control Programs, M36 Publication, 3rd Edition, 2009

- Service Connection Diagrams courtesy of Ronnie McKenzie, WRP Pty Ltd.

Appendix D: Water Shortage Contingency Resolution No. 06-034

THE WITHIN INSTRUMENT IS A CORRECT COPY OF THE ORIGINAL ON FILE IN THIS OFFICE.

ATTEST: APR 2 0 2006

EEVE T. LEWIS, County Clerk & ex-officio Clerk of the Board of Directors of the SONOMA COUNTY WATER AGENCY
BY _____ DEPUTY CLERK

#45
Resolution No. 06-0342
County Administration Bldg.
Santa Rosa, CA

Date: April 18, 2006

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SONOMA COUNTY WATER AGENCY APPROVING WATER SHORTAGE ALLOCATION METHODOLOGY.

WHEREAS, the General Manager/Chief Engineer has negotiated the proposed Restructured Agreement for Water Supply; and

WHEREAS, the proposed Restructured Agreement for Water Supply requires the Sonoma County Water Agency to have an adopted water shortage allocation methodology available at all times to inform each of its customers of the water that would be available in the event of reasonably anticipated shortages; and

WHEREAS, the proposed Restructured Agreement for Water Supply requires the adopted water shortage allocation methodology be consistent with Section 3.5 of the Restructured Agreement for Water Supply; and

WHEREAS, the City of Santa Rosa developed an allocation methodology regarding implementation Section 3.5 of the Restructured Agreement for Water Supply; and

WHEREAS, the Water Advisory Committee's consultant, in conjunction with the water contractors, amended and documented the allocation methodology developed by the City of Santa Rosa; and

WHEREAS, the General Manager/Chief Engineer staff plans to return to the Board with a revised version of the allocation methodology when the Urban Water Management Plan is considered for approval, and to continually improve the allocation methodology over time as additional information and better modeling tools become available.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Sonoma County Water Agency hereby finds, determines, and declares as follows:

1. All of the above recitals are true and correct.

2. The water shortage allocation methodology is approved.

DIRECTORS:

BROWN _____ KERNS _____ SMITH _____ REILLY _____ KELLEY _____

Ayes 5 Noes _____ Absent _____ Abstain _____

SO ORDERED.

c Jeane Reason, Acct 2, resfile, mic

Appendix E: 2013 and 2014 Best Management Practices Annual Reports to the Caifornia Urban Water Consercation Council

CUWCC BMP Wholesale Coverage Report 2013

Foundational Best Managemant Practices for Urban Water Efficiency

BMP 1.1 Wholesale Agency Assistance Programs

ON TRACK

208 **Sonoma County Water Agency**

Name: Carrie Pollard Email: carriep@scwa.ca.gov

a) Financial Investments and Building Partnerships

BMP Section	Monetary Amount for Financial Incentives	Monetary Amount for Equivalent Resources	
BMP 2.1 Public Outreach	165000		
BMP 2.2 School Education Program	280000		

b) Technical Support

c) Retail Agency

d) Water Shortage Allocation

Adoption Date:

File Name:

e) Non signatory Reporting of BMP implementation by non-signatory Agencies

f) Encourage CUWCC Membership List Efforts to Recuit Retailers

SCWA supports and promotes the benefits of the Council. Maintaining membership in good standing is a requirement of our water supply agreements.

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2013

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.2 Water Loss Control **ON TRACK**

208 Sonoma County Water Agency

Completed Standard Water Audit Using AWWA Software?	Yes
AWWA File provided to CUWCC?	Yes
2013 SCWA Water Audit.xls	
AWWA Water Audit Validity Score?	90
Complete Training in AWWA Audit Method	Yes
Complete Training in Component Analysis Process?	Yes
Component Analysis?	Yes
Repaired all leaks and breaks to the extent cost effective?	Yes
Locate and Repar unreported leaks to the extent cost effective?	Yes
Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair.	Yes

Provided 7 Types of Water Loss Control Info

Leaks Repairs	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost Of Interventions	Water Saved (AF)
0	0	0	109	False	0	0

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2013

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.3 Metering With Commodity

ON TRACK

208 Sonoma County Water Agency

Numbered Unmetered Accounts	No
Metered Accounts billed by volume of use	Yes
Number of CII Accounts with Mixed Use Meters	
Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	No
Feasibility Study provided to CUWCC?	No
Date:	
Uploaded file name:	
Completed a written plan, policy or program to test, repair and replace meters	Yes

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2013

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.1 Public Outreach

ON TRACK

208 **Sonoma County Water Agency** **Wholesale**

Does your agency perform Public Outreach programs? Yes

The list of retail agencies your agency assists with public outreach

City of Cotati,City of Petaluma,City of Rohnert Park,City of Santa Rosa,City of Sonoma,Marin Municipal Water District,North Marin Water District,Sweetwater Springs Water District,Town of Windsor,Valley of the Moon Water District

Agency Name	ID number
City of Cotati	6015
City of Petaluma	6269
City of Rohnert Park	6290
City of Santa Rosa	90
City of Sonoma	6271
Marin Municipal Water District	158
North Marin Water District	6274
Sweetwater Springs Water District	826
Town of Windsor	224
Valley of the Moon Water District	6277

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? No

Public Outreach Program List	**Number**
General water conservation information	2000
Website	5000
Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	10000
Landscape water conservation media campaigns	5000
Newsletter articles on conservation	2000
Total	**24000**

Did at least one contact take place during each quater of the reporting year? Yes

Number Media Contacts	**Number**
News releases	8
Radio contacts	150
Articles or stories resulting from outreach	5
Newspaper contacts	50
Total	**213**

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BMP 2.1 Public Outreach

ON TRACK

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

Annual Budget Category	Annual Budget Amount
Partnership Outreach	165000
SCWA outreach	165000
Total Amount:	**330000**

Description of all other Public Outreach programs

Comments:

At Least As effective As No

Exemption No 0

CUWCC BMP Coverage Report 2013

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.2 School Education Programs

ON TRACK

208 Sonoma County Water Agency **Wholesale**

Does your agency implement School Education programs? Yes

The list of retail agencies your agency assists with public outreach

City of Cotati,City of Petaluma,City of Rohnert Park,City of Santa Rosa,City of Sonoma,North Marin Water District,Sweetwater Springs Water District,Town of Windsor,Valley of the Moon Water District

Agencies Name	ID number
City of Cotati	6015
City of Petaluma	6269
City of Rohnert Park	6290
City of Santa Rosa	90
City of Sonoma	6271
North Marin Water District	6274
Sweetwater Springs Water District	826
Town of Windsor	224
Valley of the Moon Water District	6277

Materials meet state education framework requirements? Yes

SCWA's water education program is designed to meet statewide standards for math and science.

Materials distributed to K-6? Yes

Materials are available to all schools in our service area.

Materials distributed to 7-12 students? Yes (Info Only)

Annual budget for school education program: 280000.00

Description of all other water supplier education programs

The water education program includes all aspects of SCWA's core functions: flood control, water supply, sustainability, recycled water, etc.

Comments:

At Least As effective As No

Exemption No 0

CUWCC BMP Wholesale Coverage Report 2014

Foundational Best Managemant Practices for Urban Water Efficiency

BMP 1.1 Wholesale Agency Assistance Programs

ON TRACK

208 **Sonoma County Water Agency**

Name: Carrie Pollard Email: carriep@scwa.ca.gov

a) Financial Investments and Building Partnerships

BMP Section	Monetary Amount for Financial Incentives	Monetary Amount for Equivalent Resources	
BMP 2.1 Public Outreach	330000		
BMP 2.2 School Education Program	280000		

b) Technical Support

c) Retail Agency

d) Water Shortage Allocation

Adoption Date:

File Name:

e) Non signatory Reporting of BMP implementation by non-signatory Agencies

f) Encourage CUWCC Membership List Efforts to Recuit Retailers

SCWA supports and promotes the benefits of the Council. Maintaining membership in good standing is a requirement of our water supply agreements.

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.2 Water Loss Control **ON TRACK**

208 Sonoma County Water Agency

Completed Standard Water Audit Using AWWA Software?	Yes
AWWA File provided to CUWCC?	Yes
2014 SCWA Water Audit.xls	
AWWA Water Audit Validity Score?	
Complete Training in AWWA Audit Method	Yes
Complete Training in Component Analysis Process?	Yes
Component Analysis?	Yes
Repaired all leaks and breaks to the extent cost effective?	Yes
Locate and Repar unreported leaks to the extent cost effective?	Yes
Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair.	Yes

Provided 7 Types of Water Loss Control Info

Leaks Repairs	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost Of Interventions	Water Saved (AF)
2	1200		109	False		2

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 1.3 Metering With Commodity

ON TRACK

208 Sonoma County Water Agency

Numbered Unmetered Accounts	No
Metered Accounts billed by volume of use	Yes
Number of CII Accounts with Mixed Use Meters	
Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	No
Feasibility Study provided to CUWCC?	No
Date:	
Uploaded file name:	
Completed a written plan, policy or program to test, repair and replace meters	Yes

At Least As effective As No

Exemption No

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.1 Public Outreach

ON TRACK

208 **Sonoma County Water Agency** **Wholesale**

Does your agency perform Public Outreach programs? Yes

The list of retail agencies your agency assists with public outreach

City of Cotati,City of Petaluma,City of Rohnert Park,City of Santa Rosa,City of Sonoma,Marin Municipal Water District,North Marin Water District,Sweetwater Springs Water District,Town of Windsor,Valley of the Moon Water District

The name of agency, contact name and email address if not CUWCC Group 1 members

Did at least one contact take place during each quater of the reporting year? Yes

Public Outreach Program List	Number
General water conservation information	5000
Website	5000
Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	10000
Landscape water conservation media campaigns	5000
Newsletter articles on conservation	2000
Total	**27000**

Did at least one contact take place during each quater of the reporting year? Yes

Number Media Contacts	Number
News releases	8
Radio contacts	500
Articles or stories resulting from outreach	5
Newspaper contacts	175
Total	**688**

Did at least one website update take place during each quater of the reporting year? Yes

Public Information Program Annual Budget

Annual Budget Category	Annual Budget Amount
Partnership Outreach	165000
Total Amount:	**165000**

Description of all other Public Outreach programs

Comments:

At Least As effective As No

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.1 Public Outreach

ON TRACK

Exemption	No	0

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

BMP 2.2 School Education Programs

ON TRACK

208 Sonoma County Water Agency **Wholesale**

Does your agency implement School Education programs? Yes

The list of retail agencies your agency assists with public outreach

City of Cotati,City of Petaluma,City of Rohnert Park,City of Santa Rosa,City of Sonoma,North Marin Water District,Sweetwater Springs Water District,Town of Windsor,Valley of the Moon Water District

Materials meet state education framework requirements? Yes

SCWA's water education program is designed to meet statewide standards for math and science.

Materials distributed to K-6? Yes

Materials are available to all schools in our service area.

Materials distributed to 7-12 students? Yes (Info Only)

Annual budget for school education program: 280000.00

Description of all other water supplier education programs

The water education program includes all aspects of SCWA's core functions: flood control, water supply, sustainability, recycled water, etc.

Comments:

At Least As effective As No

Exemption No 0

Appendix F: DWR Urban Water Management Plan Checklist

Checklist Arranged by Subject

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location *(Optional Column for Agency Use)*
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	**Section 1.1**
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	**Sections 2.2.1 and 2.2.2**
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	Plan Preparation	Section 2.5.2	**Section 2.2.2 and Appendix A**
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	**Section 3.1**
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	**Section 3.2**
10631(a)	Provide population projections for 2020, 2025, 2030, and 2035.	System Description	Section 3.4	**Section 3.3**
10631(a)	Describe other demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	**Section 3.3.1**
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	**Section 3.3**
10631(e)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	**Section 4.2**
10631(e)(3)(A)	Report the distribution system water loss for the most recent 12-month period available.	System Water Use	Section 4.3	**Section 4.3**
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	**Not applicable**
10608.20(b)	Retail suppliers shall adopt a 2020 water use target using one of four methods.	Baselines and Targets	Section 5.7 and App E	**Not applicable**
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and	Baselines and Targets	Chapter 5 and App E	**Not applicable**

	compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.			
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	**Not applicable**
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	**Not applicable**
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	**Not applicable**
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	**Section 8.5**
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	**Not applicable**
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	**Section 5**
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	**Section 5.2**
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	**Sections 5.2.1 and 5.2.2**
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	**Section 5.2.1**
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	**5.2.1**
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	**5.2.1**
10631(b)(3)	Provide a detailed description and analysis of the location, amount, and sufficiency of	System Supplies	Section 6.2.4	**5.2.1**

	groundwater pumped by the urban water supplier for the past five years			
10631(b)(4)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Sections 6.2 and 6.9	**Sections 5.2.1 and 5.8**
10631(d)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	**Section 5.6**
10631(g)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years.	System Supplies	Section 6.8	**Section 5.7**
10631(h)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	**Section 5.5**
10631(j)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) – if any - with water use projections from that source.	System Supplies	Section 2.5.1	**Not applicable**
10631(j)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	**Section 2.2.2**
10633	For wastewater and recycled water, coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.1	**Section 5.4.1**
10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area. Include quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	System Supplies (Recycled Water)	Section 6.5.2	**Section 5.4.2. Wholesale agencies are not required to estimate quantities**
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.2	**Section 5.4.2. Wholesale agencies are not required to estimate quantities**
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and 6.5.4	**Section 5.4.3**
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4	**Section 5.4.3**

10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.5.4	**Not applicable**
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	**Not applicable**
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	**Not applicable**
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	**Section 6.4**
10631(c)(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	**Section 6.2**
10631(c)(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	**Section 6.2**
10631(c)(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	**Section 6.1**
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	**Section 6.1**
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	**Section 6.3**
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	**Section 7.1**
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	Section 7.7
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	**Section 7.6**
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	**Section 7.2**
10632(a)(5)	Specify consumption reduction methods in	Water Shortage	Section 8.4	**Section 7.2**

	the most restrictive stages.	Contingency Planning		
10632(a)(6)	Indicated penalties or charges for excessive use, where applicable.	Water Shortage Contingency Planning	Section 8.3	**Section 7.2**
10632(a)(7)	Provide an analysis of the impacts of each of the actions and conditions in the water shortage contingency analysis on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts.	Water Shortage Contingency Planning	Section 8.6	**Section 7.4**
10632(a)(8)	Provide a draft water shortage contingency resolution or ordinance.	Water Shortage Contingency Planning	Section 8.7	**Section 7.5, Appendic C**
10632(a)(9)	Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.	Water Shortage Contingency Planning	Section 8.5	**Section 7.3**
10631(f)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	**Not applicable**
10631(f)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	**Section 8.1**
10631(i)	CUWCC members may submit their 2013-2014 CUWCC BMP annual reports in lieu of, or in addition to, describing the DMM implementation in their UWMPs. This option is only allowable if the supplier has been found to be in full compliance with the CUWCC MOU.	Demand Management Measures	Section 9.5	**Section 8.1**
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Section 10.3	**Not applicable**
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	**Section 2.2.3**
10621(d)	Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	**Section 2.3**
10635(b)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to	Plan Adoption, Submittal, and Implementation	Section 10.4.4	**Section 2.3**

	DWR.			
10642	Provide supporting documentation that the urban water supplier made the plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	**Sections 2.2 and 2.3, Appendix A**
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Sections 10.2.1	**Section 2.2.3**
10642	Provide supporting documentation that the plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	**Section 2.2.3 and Appendix A**
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3	**Section 2.3**
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	**Section 2.3, Appendix A**
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	**Section 2.3**
10645	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	**Section 2.3**

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