

Optimum Basin Management Program

Staff Status Report 2016-1: January to June 2016



CHINO BASIN WATERMASTER

Optimum Basin Management Program

Highlighted Activities

- During this reporting period, Watermaster manually measured 395 water levels at 80 private wells throughout the Chino Basin, conducted two quarterly download events at about 130 wells containing pressure transducers, collected 46 groundwater-quality samples from private and dedicated monitoring wells, and collected four surface-water quality samples.
- Development and planning continues between the Chino Desalter Authority (CDA) and Watermaster to expand the Chino Desalters to an ultimate raw-water production capacity of 40,000 acre-feet per year, and to increase production at the CCWF wells to achieve hydraulic control in the western end of the Basin. In February 2016, groundwater production at CCWF Wells I-20 and I-21 commenced and total production from the CCWF well field is now at the level required to ensure de minimus outflow of groundwater from Chino North to the Prado Basin. With this accomplishment, the Watermaster has achieved full hydraulic control of the Chino Basin.
- As a requirement of Mitigation Measure 4.4-3 from the Peace II Subsequent Environmental Impact Report (SEIR), Watermaster, the Inland Empire Utilities Agency (IEUA) and the Orange County Water District (OCWD) continued to develop a Prado Basin Habitat Sustainability Program (PBHSP). During this reporting period, the Prado Basin Habitat Sustainability Committee (PBHSC) reviewed and revised the draft Adaptive Management Plan, and convened a PBHSC meeting in April 2016 to present the draft 2016 Adaptive Management Plan. Additionally, Watermaster conducted the first two rounds of quarterly groundwater-level and -quality monitoring at the eighteen PBHSP monitoring wells.
- Watermaster continued implementation of the Northwest MZ-1 Work Plan, including the completion of a technical memorandum titled *Initial Hydrogeologic Conceptual Model and the Monitoring and Testing Program for the Northwest MZ-1 Area*. The technical memorandum describes (1) the technical information that is required to develop a subsidence management plan for the Northwest MZ-1 Area, (2) the currently known technical information, and (3) a strategy to acquire the remaining necessary technical information through a monitoring and testing program.
- Watermaster and the IEUA are continuing to implement the 2013 Amendment to the 2010 Recharge Master Plan Update (2013 RMPU) pursuant to the October 2013 Court Order authorizing its implementation. During this reporting period, Watermaster and the IEUA continued developing agreements to construct the storm and supplemental water recharge projects listed in Table 8-2c of the 2013 RMPU report, prioritize the construction of these projects relative to the availability of grant funding, and to plan subsequent implementation.
- During this reporting period, stormwater recharge was approximately 5,229 acre-feet, recycled water recharge was approximately 7,225 acre-feet, and imported water recharge was zero acre-feet.
- Watermaster began its evaluation of the Safe Yield in 2013. In this reporting period, the Watermaster parties concluded the facilitated process and developed an agreement to implement the recalculated Safe Yield. This agreement was filed with the Court on October 23, 2015 with a motion recommending the Court to reset the Safe Yield of the Chino Basin at 135,000 acre-feet per year. The hearing on this motion was scheduled for December 18, 2015. The Court continued the hearing to September 23, 2016.

Important Court Hearings and Orders

- JANUARY 22, 2016 - HEARING AND ORDER RE-APPOINTING NINE-MEMBER BOARD FOR A FURTHER THREE-YEAR TERM
- FEBRUARY 4, 2016 - ORDER CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR FEBRUARY 26, 2016
- MARCH 22, 2016 - ORDER FOR ADDITIONAL BRIEFING AND CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR APRIL 8, 2016, TO MAY 6, 2016
- APRIL 25, 2016 - ORDER FOR ADDITIONAL BRIEFING AND CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR MAY 6, 2016, TO JUNE 10, 2016
- MAY 24, 2016 - ORDER CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR JUNE 10, 2016, TO JUNE 24, 2016
- JUNE 9, 2016 - ORDER CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR JUNE 24, 2016, TO JULY 29, 2016
- JUNE 27, 2016 - ORDER CONTINUING HEARING FOR ALL MATTERS CURRENTLY SCHEDULED FOR JULY 29, 2016 TO SEPTEMBER 23, 2016

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program

Groundwater Level Monitoring

Watermaster initiated a basin-wide groundwater-level monitoring program as part of the implementation of the Optimum Basin Management Program (OBMP). The monitoring program has been refined over time to satisfy the evolving needs of the Watermaster and the IEUA, such as new regulatory requirements and improved data coverage. The groundwater-level monitoring program supports many Watermaster functions, such as the periodic reassessment of Safe Yield, the monitoring and management of ground-level movement, the analysis of desalter pumping impacts at private wells, and the analysis of the implementation of the Peace II Agreement on groundwater levels and riparian vegetation in Prado Basin, the triennial re-computation of ambient water quality mandated by the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), and the assessment of hydraulic control—a maximum-benefit commitment in the Basin Plan. The data are also used to update and re-calibrate Watermaster's computer-simulation groundwater-flow model, to understand directions of groundwater flow, to compute storage changes, to interpret water quality data, and to identify areas of the basin where recharge and discharge are not in balance.

The current groundwater-level monitoring program is comprised of about 1,180 wells. At about 970 of these wells, water levels are measured by well owners, which include municipal water agencies, the California Department of Toxic Substances Control (DTSC), the Counties, and various private consulting firms. Watermaster collects these water level data at least semi-annually. At the remaining 210 wells, water levels are measured by Watermaster staff using manual methods once per month or by using pressure transducers that record data once every 15 minutes. These wells are mainly Agricultural Pool wells or dedicated monitoring wells located south of the 60 freeway.

All groundwater-level data are checked by Watermaster staff and uploaded to a centralized database management system that can be accessed online through HydroDaVESM. During this reporting period, Watermaster measured 395 manual water levels at 80 wells throughout the Chino Basin, and conducted two quarterly downloads at about 130 wells containing pressure transducers. Additionally, Watermaster compiled all available groundwater-level data from well owners in the basin for the October 2015 to March 2016 period.



Maintaining Transducer Equipment in One of the Well Sites

Groundwater Quality Monitoring

Watermaster initiated a comprehensive groundwater-quality monitoring program as part of the implementation of the OBMP. The monitoring program has been refined over time to satisfy the evolving needs of the Watermaster and the IEUA, such as new regulatory requirements, improved data coverage. The groundwater-quality data are used by Watermaster for: the biennial State of the Basin report; the triennial ambient water quality update; the demonstration of hydraulic control, monitoring nonpoint-source groundwater contamination and plumes associated with point-source discharges, and to assess the overall health of the groundwater basin. Groundwater-quality data are also used in conjunction with numerical models to assist Watermaster and other parties in evaluating proposed groundwater remediation strategies. The groundwater-quality monitoring program currently consists of the following five components:

1. An annual Key-Well Water-Quality Monitoring Program consisting of about 110 wells, which are mostly privately-owned agricultural wells in the southern portion of Chino Basin that are otherwise not included in an established sampling program. Twenty of these wells are sampled every year, and the remaining wells are sampled once every three years. The wells sampled annually are for the continuous monitoring of areas of concern associated with the southern edge of the South Archibald Plume, the southern region of the Chino Airport Plume, and the Kaiser Steel Mill Plume, and also includes two multi-port MZ-3 monitoring wells.
2. Annual sampling at nine HCMP multi-port monitoring wells strategically placed between the Chino Desalter well fields and the Santa Ana River. Results of the annual sampling are used to analyze the effect of desalter pumping over time on hydraulic control, by comparing water quality of the native groundwater and the Santa Ana River.
3. Quarterly sampling at four near-river wells to characterize the interaction between the Santa Ana River and nearby groundwater. These shallow monitoring wells along the Santa Ana River consist of two former US Geological Survey (USGS) National Water Quality Assessment Program wells (Archibald 1 and Archibald 2), and two wells owned by the Santa Ana River Water Company (Well 9 and Well 11).

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

4. Quarterly sampling of eighteen PBHSP monitoring wells located in nine locations near the fringes of riparian vegetation in the Prado Basin. The data will be used to support the assessment of the impacts from the implementation of the Peace II Agreement on groundwater levels and riparian vegetation in Prado Basin.
5. A cooperative basin-wide data-collection effort known as the Chino Basin Data Collection program, which relies on municipal producers and other government agencies to supply groundwater-quality data on a cooperative basis. These sources include the Chino Basin Appropriators, the DTSC, the Regional Water Quality Control Board (Regional Board), the USGS, the Counties, and other cooperators.

All groundwater-quality data are checked by Watermaster staff and uploaded to a centralized database management system that can be accessed online through HydroDaVESM. During this reporting period, Watermaster collected 46 groundwater-quality samples from private and dedicated monitoring wells. Additionally, Watermaster compiled all available groundwater-quality data from other parties for the January to June 2015 period.

Groundwater Production Monitoring

All active agricultural production wells (except for minimum user wells) are now metered. Watermaster reads the production data from the meters on a quarterly basis and enters these data into Watermaster's relational database that can be accessed online through HydroDaVESM.

Surface Water Monitoring in the Santa Ana River

Surface Water Monitoring in the Santa Ana River. Watermaster measures selected water quality parameters at two sites along the Santa Ana River (Santa Ana River at River Road and Santa Ana River at Etiwanda) on a quarterly basis. Along with data collected at four near-river wells, these data are used to characterize the interaction between the Santa Ana River and nearby groundwater. During this reporting period, Watermaster collected four surface-water quality samples.

Hydraulic Control

In January 2004, the Regional Board amended the Basin Plan to incorporate an updated total dissolved solids (TDS) and nitrogen (N) management plan. The Basin Plan amendment includes both "antidegradation" and "maximum benefit" objectives for TDS and nitrate-N for the Chino-North and Cucamonga groundwater management zones (GMZs). The maximum benefit objectives allow for the reuse and recharge of recycled water and the recharge of imported water without mitigation; these activities are an integral part of the OBMP. The application of the maximum-benefit objectives is contingent on Watermaster and the IEUA's implementation of specific projects and requirements termed the maximum-benefit commitments.

One of the main maximum-benefit commitments is to achieve and maintain "hydraulic control" of the Chino Basin so that downstream beneficial uses of the Santa Ana River are protected. Hydraulic control is defined by the Basin Plan as the elimination of groundwater discharge from the Chino-North GMZ to the Santa Ana River or its reduction to a de minimus level. In October 2011, the Regional Board indicated that groundwater discharge from the Chino-North GMZ to the Prado Basin surface water management zone (Prado Basin) in an amount less than 1,000 acre-feet per year is considered de minimus.

Two of the maximum-benefit commitments are to implement surface and groundwater monitoring programs. On April 15, 2005, the Regional Board adopted resolution R8-2005-0064, approving Watermaster and the IEUA's surface and groundwater monitoring programs. These monitoring programs were conducted pursuant to the 2005 work plan until 2012, when the Basin Plan was amended to remove all references to the specific monitoring locations and sampling frequencies required for groundwater and surface water monitoring. The Basin Plan amendment allowed for the monitoring programs to be modified over time on a go-forward basis, subject to the approval of the Executive Officer of the Regional Board. The Basin Plan amendment was approved by the Regional Board on February 12, 2012 and by the State Office of Administrative Law on December 6, 2012. This amendment was adopted based on demonstrations made by Watermaster and the IEUA showing that the surface water monitoring program, as explicitly described in the Basin Plan, was not meaningfully adding to the body of evidence required to demonstrate hydraulic control. In the place of specific monitoring requirements, the Basin Plan required that Watermaster and the IEUA submit for approval by the Executive Officer a new surface water monitoring program work plan by February 25, 2012 and a new groundwater monitoring program work plan by December 31, 2013. In February 2012, Watermaster and the IEUA submitted, and the Regional Board approved, a new surface water monitoring program that reduced the 2005 monitoring program from bi-weekly surface water quality measurements at 17 sites and direct discharge measurements at six sites, to quarterly surface water quality sampling at two sites. The new work plan including these changes was adopted by the Regional Board in March 2012.

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

In December 2013, Watermaster and the IEUA submitted an updated *Maximum Benefit Monitoring Program Work Plan and Proposed Schedule for Achieving Hydraulic Control* to the Regional Board. The updated Work Plan states that Watermaster and the IEUA will recalibrate the Chino Basin groundwater model every five years and use the model to estimate groundwater discharge from the Chino-North GMZ to the Santa Ana River (i.e. annual underflow past the CCWF) and determine whether hydraulic control has been achieved. The new Maximum Benefit Monitoring Program Work Plan was adopted by the Regional Board in April 2014.

In January 2014, in a letter to Watermaster and the IEUA, the Regional Board confirmed that the model results indicated that hydraulic control would be achieved under the projected range of pumping at the CCWF. The Regional Board also requested that Watermaster and the IEUA submit a plan and schedule to increase desalter production capacity from 32,000 to 40,000 acre-feet per year by May 31, 2014. Watermaster and the IEUA submitted a plan and schedule to the Regional Board on May 30, 2014 to install three new desalter wells—with the location of one well being provisional. On June 30, 2015 Watermaster and the IEUA submitted a final plan and schedule for the construction and operation of the three new desalter wells including the final well locations.

During this reporting period, Watermaster continued implementing the surface and groundwater monitoring programs required by the maximum benefit commitments. As described in the Program Element 1 update herein, Watermaster measured 395 manual water levels at 80 wells throughout the Chino Basin, conducted two quarterly downloads at about 130 wells containing pressure transducers, collected 46 groundwater-quality samples at private and dedicated monitoring wells and collected four surface-water quality samples. And in February 2016, groundwater production at the CCWF commenced and reached a level of production that reduced groundwater discharge from Chino-North to the Prado Basin to a de minimus level and thus achieving full hydraulic control.

Prado Basin Habitat Sustainability Monitoring Program

A requirement of Mitigation Measure 4.4-3 from the Peace II SEIR is for Watermaster, the IEUA, and the OCWD to develop an Adaptive Management Plan for the PBHSP and to form the Prado Basin Habitat Sustainability Committee (PBHSC), convened by Watermaster and the IEUA, to implement the Adaptive Management Plan. The objective of this plan is to ensure that the riparian habitat in Prado Basin is not adversely impacted by drawdown associated with the implementation of the Peace II activities. Sixteen monitoring wells at nine sites were constructed in April and May 2015 as part of the monitoring program for the PBHSP. Two existing wells will also be monitored as part of the PBHSP. The PBHSC is developing the Adaptive Management Plan to describe an initial monitoring program and a process to modify the monitoring program and/or implement mitigation strategies, as necessary.

During this reporting period, the PBHSC reviewed and revised the draft Adaptive Management Plan, and convened a PBHSC meeting in April 2016 to present the draft 2016 Adaptive Management Plan. A final 2016 Adaptive Management Plan for the PBHSP will be completed later in the year. Additionally, Watermaster collected two rounds of quarterly groundwater-quality samples and conducted two quarterly downloads of pressure transducers that measure water levels at the eighteen PBHSP monitoring wells.

Chino Basin Groundwater Recharge Program

Watermaster, the IEUA, the Chino Basin Water Conservation District, and the San Bernardino County Flood Control District jointly sponsor the Chino Basin Groundwater Recharge Program. This is a comprehensive water supply program to enhance water supply reliability and improve the groundwater quality in local drinking water wells by increasing the recharge of storm, imported, and recycled waters. The recharge program is regulated under RWQCB Order No. R8-2007-0039 and Monitoring and Reporting Program No. R8-2007-0039.

Watermaster and the IEUA measure the quantity of storm and supplemental water that enters into recharge basins using pressure transducers or staff gauges that measure water levels during recharge operations. They also collect weekly water quality samples from recharge basins that are actively recharging recycled water and from lysimeters installed within those recharge basins. Additionally, imported water quality data for State Water Project water are obtained from the Metropolitan Water District of Southern California (MWDSC) and recycled water quality data for the RP-1 and RP-4 treatment plant effluents are obtained from the IEUA. Combining the measured flow data with the respective water qualities enables the calculation of the blended water quality of the recharge sources in each recharge basin and assess if there is adequate dilution of recycled water as required by the recycled water recharge permits held with the Department of Drinking Water (DDW). Additionally, the measurements of recharge are used to estimate the New Yield to the Chino Basin as a result of the recharge activities.



Brooks Basin After a Rain Storm Event

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

Recharge Activities. During this reporting period, ongoing recycled water recharge occurred in the Brooks, 7th Street, 8th Street, Turner, Ely, Hickory, DeClez, RP-3, and Banana Basins; stormwater was recharged at 16 recharge basins across all management zones of the Chino Basin; and no imported water was recharged.

Monitoring Activities. During this reporting period, the IEUA performed its on-going monitoring program to measure and record recharge volumes and collect stormwater quality samples pursuant to its permit requirements. Also, during this reporting period, approximately 286 recharge basin and lysimeter samples were collected and 26 recycled water samples were collected for alternative monitoring plans that include the application of a correction factor for soil-aquifer treatment determined from each recharge basin's start-up period. Monitoring wells located down-gradient of the recharge basins were sampled, at a minimum, on a quarterly basis; however, some monitoring wells were sampled more frequently during the reporting period for a total of 141 samples.

Reporting. Watermaster and the IEUA completed the following required reports concerning the recharge program during the reporting period:

- 4Q-2015 Quarterly Report, submitted to the RWQCB – February 2016
- 1Q-2015 Quarterly Report, submitted to the RWQCB – May 2016
- 2015 Annual Report, submitted to the RWQCB – May 2016

Ground-Level Monitoring

In response to the occurrence of land subsidence in the City of Chino, the Watermaster prepared and submitted a subsidence management plan (known as the MZ-1 Plan) to the Court for approval and, in November 2007, the Court ordered its implementation (see the update in this report under Program Element 4 for more on the MZ-1 Plan implementation). The MZ-1 Plan called for several monitoring and mitigation measures to minimize or abate the future occurrence of land subsidence and ground fissuring in the western Chino Basin. These measures and activities included:

- Continuing the scope and frequency of monitoring within the so-called Managed Area (southwest MZ-1) that was conducted during the period when the MZ-1 Plan was being developed.
- Expanding the monitoring of the aquifer system and ground-level movement into other areas of MZ-1 and Chino Basin where the data indicate concern for future subsidence and ground fissuring.
- Monitoring of horizontal strain across the historical zone of ground fissuring.
- Evaluating the potential contribution of groundwater production in northern MZ-1 on ground-level conditions in southern MZ-1.
- Conducting additional testing and monitoring to refine the MZ-1 Guidance Criteria.
- Developing alternative pumping plans for the MZ-1 producers that are impacted by the MZ-1 Plan.
- Constructing and testing a lower-cost cable extensometer facility at Ayala Park.
- Evaluating and comparing ground-level surveying and Interferometric Synthetic Aperture Radar (InSAR), and recommending future monitoring protocols for both techniques.
- Conducting an aquifer storage recovery (ASR) feasibility study at a City of Chino Hills production well within the MZ-1 Managed Area (Well 16).
- Providing for recovery of groundwater levels in the MZ-1 Managed Area.

Since the initial MZ-1 Plan was adopted by the Watermaster in 2007, Watermaster has conducted the annual Ground-Level Monitoring Program (GLMP) to implement the monitoring and reporting program. The main results and recommendations of the GLMP were that very little permanent land subsidence has occurred in the MZ-1 Managed Area, which indicates that subsidence is being successfully managed in this area; and that land subsidence has been occurring in the Northwest MZ-1 Area. Of particular concern is that subsidence in Northwest MZ-1 has occurred differentially across the San Jose Fault—the same pattern of differential subsidence that occurred in the MZ-1 Managed Area during the time of ground fissuring.

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

Based on these results, Watermaster determined that the subsidence management plan needed to be updated to include a *Subsidence Management Plan for the Northwest MZ-1 Area* with the long-term objective to minimize or abate the occurrence of the differential land subsidence. Thus, the Watermaster expanded the GLMP into the Northwest MZ-1 Area and prepared a draft *2015 Chino Basin Subsidence Management Plan (SMP)*, which included the *Work Plan to Develop a Subsidence-Management Plan for the Northwest MZ-1 Area (Work Plan)* as an appendix.

During this reporting period, Watermaster undertook the following activities called for in the SMP:

- Continued high-resolution water-level monitoring at wells within the Managed Area and within the Areas of Subsidence Concern. All monitoring equipment is inspected at least quarterly and is repaired and/or replaced as necessary. The data collected were checked and analyzed to assess the functionality of the monitoring equipment and for compliance with the MZ-1 Plan.
- Continued monitoring and maintenance at the extensometer facilities at the Ayala Park, Chino Creek, and Daniels sites. Specifically, decommissioned and completely removed the Daniels Horizontal Extensometer facility. A new planned development at the site necessitated the removal of the facility.
- Collected InSAR data scenes across the western Chino Basin from the German Aerospace Center's TerraSAR-X satellite. Worked with the City of Chino to preserve a ground-level survey benchmark on Kimball Avenue that will be destroyed in the widening of the intersection of Kimball Avenue and Rincon Meadows.
- Conducted ground-level surveys and electronic distance measurements (EDMs) at benchmarks in the Southeast Area, the MZ-1 Managed Area, and the San Jose Fault Zone.
- Continued the Long-Term Pumping Test in the MZ-1 Managed Area. Specifically, the City of Chino Hills modified and tested the wellhead-treatment facility at CH-15B. No significant pumping at the well occurred that resulted in declining water levels at PA-7 to below the Guidance Level.
- Continued implementation of the Northwest MZ-1 Work Plan, including:
 - Installed transducers within wells in the Study Area to measure and record piezometric levels. Collected, processed and checked groundwater level data and production data from wells in the Study Area monthly.
 - Developed a one-dimensional aquifer-system compaction model that will be used to estimate past and future land subsidence in the Northwest MZ-1 Area.
 - Conducted research and discussions with insurance agencies to determine the feasibility and methodology to insure against damages related to land subsidence.
 - Developed multiple groundwater production and wet-water recharge scenarios for the Northwest MZ-1 Area in support of developing an Initial Subsidence-Management Alternative (ISMA). These scenarios were incorporated into the most recent Chino Basin Groundwater Model and evaluated to assess the groundwater-level response to each scenario.

Program Element 2: Develop and Implement a Comprehensive Recharge Program

The objectives of the comprehensive recharge program include enhancing the yield of the Chino Basin through the development and implementation of a Recharge Master Plan to improve, expand, and construct recharge facilities that enable the recharge of storm, recycled, and imported waters; ensuring a balance of recharge and discharge in the Chino Basin management zones, and ensuring that sufficient storm and imported waters are recharged to comply with recycled water dilution requirements in Watermaster and the IEUA's recycled water recharge permits.

Pursuant to PE2 of the OBMP, Watermaster and the IEUA partnered with the San Bernardino County Flood Control District and the Chino Basin Water Conservation District to construct and/or improve eighteen recharge sites. This project was known as the Chino Basin Facilities Improvement Project (CBFIP). The average annual stormwater recharge of the CBFIP facilities is approximately 13,000 acre-feet per year, the supplemental "wet"¹ water recharge capacity is approximately 59,100 acre-feet per year, and the in-lieu supplemental water recharge capacity ranges from 25,000 to 40,000 acre-feet per year. In addition to the CBFIP facilities, the Monte Vista Water District has five ASR wells with a demonstrated well injection capacity of 5,600 acre-feet per year. The current total supplemental water recharge capacity ranges from 91,200 to 106,200 acre-feet per year which is greater than the projected supplemental water recharge capacity required by Watermaster.

¹The modifier "wet" means actual physical water is being recharged in spreading basins as opposed to the dedication of water from storage or in-lieu recharge.

Optimum Basin Management Program

Program Element 2: Develop and Implement a Comprehensive Recharge Program (Continued)

In 2008, Watermaster began preparing the *2010 Recharge Master Plan Update* (2010 RMPU) pursuant to the December 21, 2007 Court Order (the Peace II Agreement) to complete a Recharge Master Plan Update by July 1, 2010. In October 2010, the Court accepted the 2010 RMPU as satisfying the condition and ordered that certain recommendations of the 2010 RMPU be implemented. In November 2011, Watermaster reported its progress to the Court pursuant to the October 2010 Court Order; after which, in December 2011, the Court issued an order directing Watermaster to continue with its implementation of the 2010 RMPU per its October 2010 order but with a revised schedule. And, on December 15, 2011, the Watermaster Board moved to:

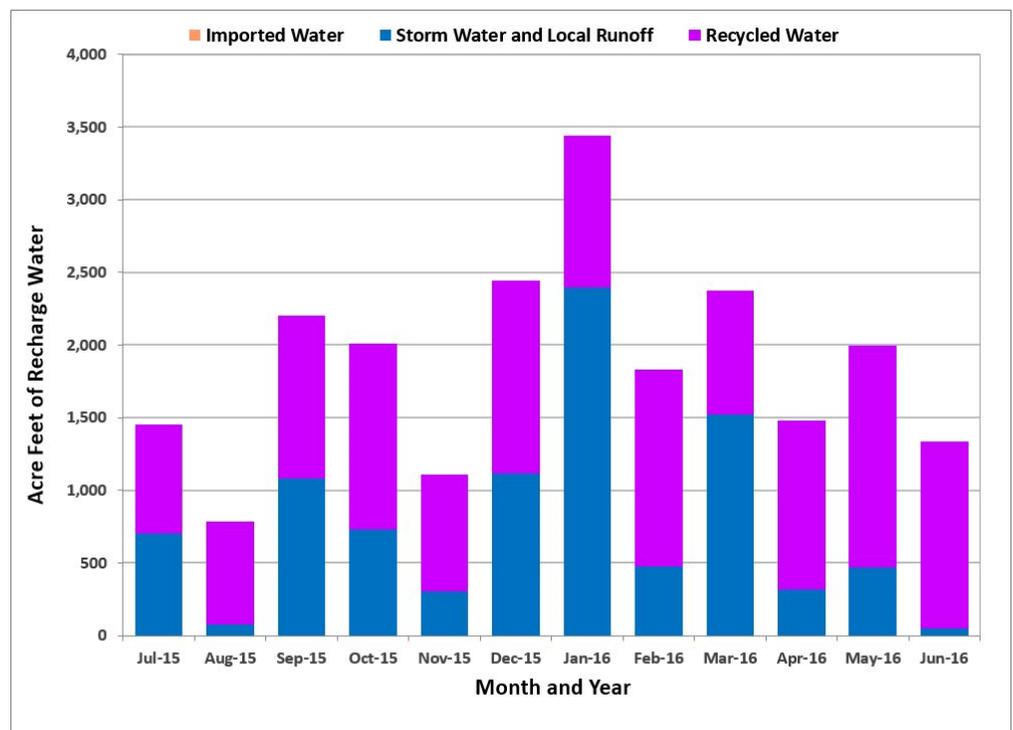
“approve that within the next year there will be the completion of [a] Recharge Master Plan Update, there will be the development of an Implementation Plan to address balance issues within the Chino Basin subzones, and the development of a Funding Plan, as presented.”

This motion led to the development of an update to the 2010 RMPU and in 2012, Watermaster staff sent out a “call for projects” to the Watermaster parties, seeking their recommendations for recharge improvement projects that should be considered in the update. The *2013 Update to the 2010 Recharge Master Plan Update* (2013 RMPU) outlines the recommended projects to be implemented by Watermaster, and lays out the implementation plan and financing plan. The 2013 RMPU report was approved by the Watermaster Board in September 2013 and filed with the Court in October 2013. In December 2013, the Court approved the 2013 RMPU with the exception of Section 5 that dealt with the accounting for new recharge from Municipal Separate Stormwater Sewer Systems which was later approved by the Court in April 2014.

2013 RMPU Implementation. Watermaster and the IEUA are continuing the process to carry out the October 2013 Court Order authorizing Watermaster and the IEUA to implement the 2013 RMPU. During the reporting period, Watermaster and the IEUA continued developing agreements to construct the storm and supplemental water recharge projects listed in Table 8-2c of the 2013 RMPU report, prioritizing the construction of these projects relative to the availability of grant funding.

Additionally, Watermaster and the IEUA continued to develop a series of projects outside of the 2013 RMPU effort that will increase and/or facilitate stormwater and supplemental water recharge and have jointly agreed to fund these projects. These projects include monitoring upgrades, habitat conservation, and a potential new recharge basin. Watermaster’s share of the cost of these projects was included in the budget adopted by Watermaster for fiscal 2015/16.

The Recharge Improvements Project Committee met monthly on the progress of implementing the 2013 RMPU Projects and other recharge-related projects.



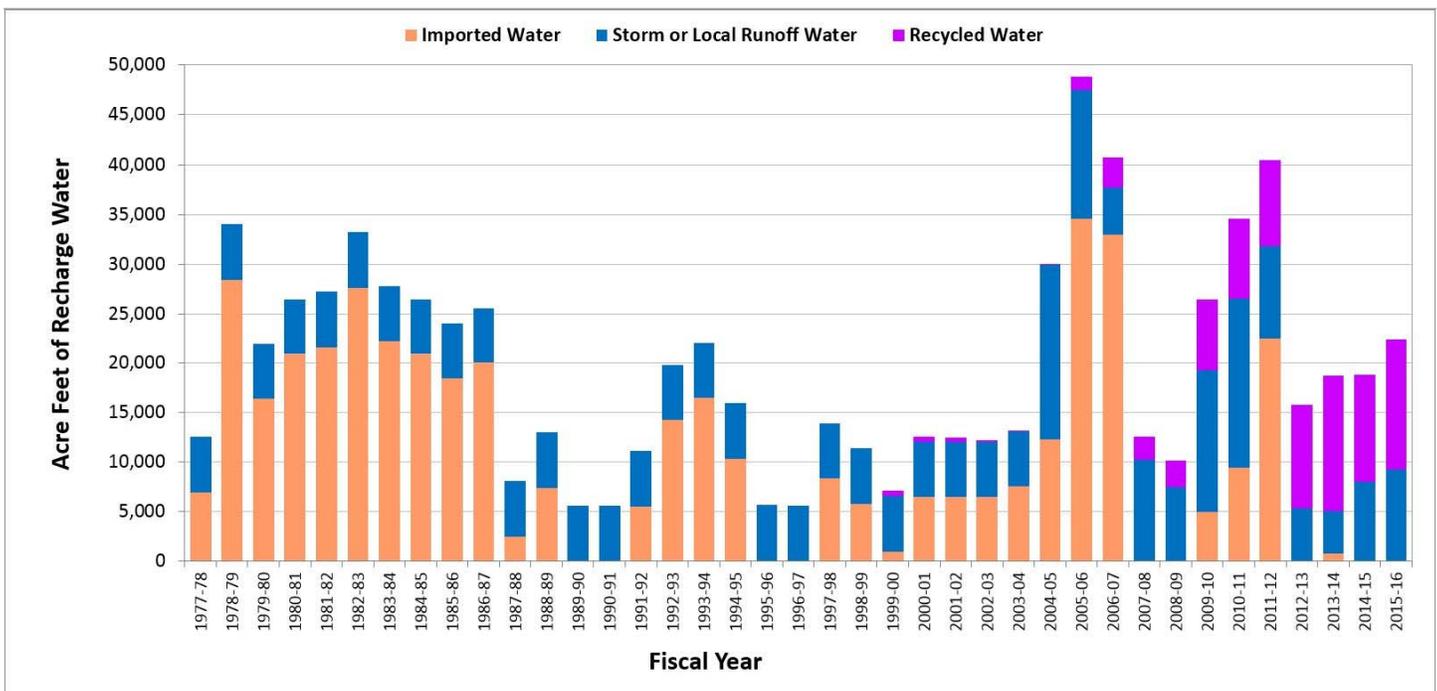
Recharge for Dilution of Recycled Water. In fiscal year 2009/10, Watermaster and the IEUA’s recharge permit was amended to allow for existing underflow dilution and extended the period for calculating dilution from a running 60-month to a running 120-month period. Additionally, the IEUA has worked with the DDW to obtain approval to increase the allowable recycled water contribution (RWC) at wells to 50 percent. These permit amendments allow for increased recycled water recharge without having to increase the amount of imported and storm waters required for dilution. The IEUA projects its dilution requirements as part of its annual reporting to the DDW. Based on the latest Annual Report (May 2016), the IEUA projects that dilution requirements will be met through 2020, even if no imported water were available for dilution.

Optimum Basin Management Program

Program Element 2: Develop and Implement a Comprehensive Recharge Program (Continued)

Recharge Activities. During this reporting period, stormwater recharge was approximately 5,229 acre-feet, recycled water recharge was approximately 7,225 acre-feet, and imported water recharge was zero acre-feet.

Balance of Recharge and Discharge in MZ-1. The total amount of supplemental water recharged in MZ-1 since the Peace II Agreement through June 30, 2016 was approximately 47,781 acre-feet, which is almost 11,000 acre-feet less than the 58,500 acre-feet that was required to be recharged by June 30, 2016 (annual requirement of 6,500 acre-feet): the shortfall of 6,390 acre-feet will be recharged in MZ-1 in subsequent years as supplemental water becomes available. The amount of supplemental water recharged into MZ-1 during the reporting period was approximately 2,171 acre-feet.



Program Element 3: Develop and Implement Water Supply Plan for the Impaired Areas of the Basin; and

Program Element 5: Develop and Implement Regional Supplemental Water Program

The Chino I Desalter Expansion and the Chino II Desalter facilities were completed in February 2006. As currently configured, the Chino I Desalter produces about 13,500 acre-feet per year (12.1 million gallons per day [MGD]) of groundwater at 15 wells (I-1 through I-15) that is treated through air stripping (volatile organic compound [VOC] removal), ion exchange (nitrate removal), and/or reverse osmosis (for nitrate and TDS removal). The Chino II Desalter produces about 15,800 acre-feet per year (14.1 MGD) of groundwater at eight wells (II-1 through II-4 and II-6 through II-9) that is treated through ion exchange and/or reverse osmosis. Development and planning continues between the CDA and Watermaster to expand the production and treatment capacity of the Chino Desalters by about 10,500 acre-feet per year (9.5 MGD). More than \$77 million in grant funds have been secured toward this expansion.

The most recent expansion project completed includes the construction of five wells for the new CCWF (wells I-16, I-17, I-18, I-20 and I-21), which were required to meet the hydraulic control commitment associated with maximum benefit, and will provide additional raw water to the Chino I Desalter. Production at wells I-16 and I-17 began in mid-2014, production at wells I-20 and I-21 began in early 2016, and well I-18 is currently not planned for operation by the CDA due to high concentrations of VOCs.

Optimum Basin Management Program

Program Element 3: Develop and Implement Water Supply Plan for the Impaired Areas of the Basin; and Program Element 5: Develop and Implement Regional Supplemental Water Program (Continued)

Three additional wells are planned for construction to provide additional raw water to the Chino II Desalter and are required to meet the maximum-benefit commitment to produce a total of 40,000 acre-feet per year from the combined desalter well fields. This amount was determined in the OBMP Phase I report as the production necessary to maintain hydraulic control. Watermaster and the IEUA coordinated with the CDA to develop a plan to achieve the 40,000 acre-feet per year of desalter production and submitted a preliminary plan to the Regional Board on May 30, 2014. A final plan was submitted to the Regional Board on June 30, 2015 and includes the construction and operation of three new wells for the Chino II Desalter (II-10, II-11, and II-12). The construction of wells II-10 and II-11 was completed in late-2015. The location of the third well, II-12, is in the land acquisition process and construction is anticipated to begin in late-2016.

During this reporting period, production at CCWF wells I-20 and I-21 began in February 2016 and total production from the CCWF well field is now at the level required to ensure de minimus outflow of groundwater from Chino North to the Prado Basin. With this accomplishment, the Watermaster has achieved full hydraulic control of the Chino Basin..

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1

MZ-1 Management Plan

Because of the historical occurrence of pumping-induced land subsidence and ground fissuring in southwestern Chino Basin (southern MZ-1), the OBMP called for the development and implementation of an Interim Management Plan (IMP) for MZ-1 that would:

- minimize subsidence and fissuring in the short-term,
- collect information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring, and
- formulate a management plan to reduce to tolerable levels or abate future subsidence and fissuring.

From 2001-2005, Watermaster developed, coordinated, and conducted an IMP under the guidance of the MZ-1 Technical Committee. The investigation provided enough information for Watermaster to develop Guidance Criteria for the MZ-1 producers in the investigation area that, if followed, would minimize the potential for subsidence and fissuring during the completion of the MZ-1 Plan. The Guidance Criteria included a listing of Managed Wells and their owners subject to the criteria, a map of the so-called Managed Area, and an initial threshold water level (Guidance Level) of 245 feet below the top of the PA-7 well casing. The MZ-1 Summary Report and the Guidance Criteria were adopted by the Watermaster Board in May 2006. The Guidance Criteria formed the basis for the MZ-1 Plan, which was approved by Watermaster in October 2007. The Court approved the MZ-1 Plan in November 2007 and ordered its implementation. Watermaster has implemented the MZ-1 Plan since this time, including the ongoing Ground-Level Monitoring Program (GLMP) called for by the MZ-1 Plan (refer to the update in this report under Program Element 1).

The MZ-1 Plan states that if data from existing monitoring efforts in the so-called Areas of Subsidence Concern indicate the potential for adverse impacts due to subsidence, Watermaster will revise the MZ-1 Plan pursuant to the process outlined in Section 3 of the MZ-1 Plan. In early 2015, Watermaster prepared an update to the MZ-1 Plan, which included a name change to the *2015 Chino Basin Subsidence Management Plan (SMP)* and a *Work Plan to Develop the Subsidence Management Plan for the Northwest MZ-1 Area (Work Plan)* as an appendix. The SMP and the Work Plan were adopted through the Watermaster Pool process during July 2015.

The Watermaster continues to implement the MZ-1 Plan, and now the SMP and Work Plan. The data, analysis, and reports generated through the implementation of the plans are reviewed and discussed by the Ground-Level Monitoring Committee (GLMC), which meets on a periodic basis throughout the year. The GLMC is open to all interested participants, including the Watermaster Parties and their consultants. During this reporting period, Watermaster undertook the following data analysis and reporting tasks:

- Reviewed water levels at the PA-7 piezometer and determined that levels remained above the Guidance Level during the reporting period, and very little, if any, permanent compaction was recorded at the Ayala Park Extensometer.
- The data, results, and conclusions of the information generated from the GLMP were incorporated into the draft *2015 Annual Report of the Ground-Level Monitoring Committee*.

Optimum Basin Management Program

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1 (Continued)

- Completed a technical memorandum titled *Initial Hydrogeologic Conceptual Model and the Monitoring and Testing Program for the Northwest MZ-1 Area*. The technical memorandum describes (1) the technical information that is required to develop a subsidence management plan for the Northwest MZ-1 Area, (2) the currently known technical information, and (3) a strategy to acquire the remaining necessary technical information through a monitoring and testing program.
- The GLMC met in March, April, and May 2016. The meeting on April 4, 2016 was conducted via conference call. The following was discussed at these meetings:
 - The status of and data collected for the GLMP.
 - The removal of the Daniels Horizontal Extensometer and construction of a new horizontal extensometer in the Managed Area.
 - The initial conceptual model for the Northwest MZ-1 Area.
 - The proposed scope and budget for the GLMP for fiscal year 2016-17.



Removal of the Daniels Horizontal Extensometer

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region and Other Agencies to Improve Basin Management; and

Program Element 7: Develop and Implement a Salt Management Program

South Archibald Plume

In July 2005, the Regional Board prepared draft Cleanup and Abatement Orders (CAOs) for six parties who were tenants on the Ontario Airport with regard to the South Archibald TCE Plume. The draft CAOs required the parties to “submit a work plan and time schedule to further define the lateral and vertical extent of the TCE and related VOCs that are discharging, have been discharged, or threaten to be discharged from the site” and to “submit a detailed remedial action plan, including an implementation schedule, to cleanup or abate the effects of the TCE and related VOCs.” Four of the six parties (Aerojet-General Corporation, The Boeing Company, General Electric, and Lockheed Martin) voluntarily formed a group known as ABGL to work jointly on a remedial investigation. Northrop Grumman declined to participate in the group. The US Air Force, in cooperation with the US Army Corps of Engineers, funded the installation of one of the four clusters of monitoring wells installed by the ABGL parties.

In 2008, the Regional Board staff conducted research pertaining to the likely source of the TCE contamination, and identified discharges of wastewater that may have contained TCE to the RP-1 treatment plant and associated disposal areas to be a potential source. The Regional Board identified several industries, including some previously identified tenants of the Ontario Airport property, that likely used TCE solvents before and during the early-1970s, and discharged wastes to the Cities of Ontario and Upland’s sewage systems and subsequently to the RP-1 treatment plant and disposal areas. In 2012, an additional Draft CAO was issued by the Regional Board jointly to the City of Ontario, City of Upland, and the IEUA as the previous and current operators of the RP-1 treatment plant and disposal area (collectively, the RP-1 parties). In part, the draft CAOs requires the RP-1 parties to “supply uninterrupted replacement water service...to all residences south of Riverside Drive that are served by private domestic wells at which TCE has been detected at concentrations at or exceeding 5 µg/L...” and to report this information to the Regional Board. In addition, the RP-1 parties are to “prepare and submit [a] ...feasibility study” and “prepare, submit and implement the Remedial Action Plan” to mitigate the “effects of the TCE groundwater plume.”

In 2016, the Regional Board issued final language for the Stipulated Settlement and CAO No. R8-2016-0016 to the parties issued draft CAOs, with the exception of Northrop Grumman Corporation. The final CAO will become effective pending all identified parties’ signatures.

Under the Regional Board’s oversight, sampling at private residential wells and taps has been conducted approximately every two years (2007-2008, 2009, 2011, 2013-2014) by multiple parties in the region where groundwater is potentially contaminated with TCE. As of 2014, all private residences in the area of the plume have been sampled at least once. Alternative water systems (tanks) have been installed at residences in the area where well water contains TCE at or above 80% of the MCL for TCE. Residents who declined tank system are being provided bottled water. Watermaster also routinely samples for water quality at private wells in the area, and uses data obtained from this monitoring to delineate the spatial extent of the plume.

Optimum Basin Management Program

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region and Other Agencies to Improve Basin Management; and Program Element 7: Develop and Implement a Salt Management Program (Continued)

Many of the parties are pursuing various grant funding opportunities to help finance the remediation strategy. This includes applications submitted to the United States Bureau of Reclamation, which resulted in a \$3 million award to the parties. The RP-1 Parties have entered into a Cost Sharing Agreement to fund the South Archibald Plume Cleanup Project. In July 2015, they completed the *Draft Feasibility Study Report for the South Archibald Plume* (Feasibility Study). The Feasibility Study establishes clean-up objectives for both domestic water supply and plume remediation, and evaluates alternatives to accomplish these objectives. A *Draft Remedial Action Plan* (RAP) was concurrently prepared and published in August 2015. Two community meetings were convened in September 2015 to educate the public about the plume, the Feasibility Study and the RAP, and to solicit comments on these reports. In November 2015, a revised Draft Feasibility Study, RAP, and Responses to Comments were completed to address input from the public, ABGL, and others.

The preferred plume remediation alternative identified in the Draft Feasibility Study and RAP involves the use of existing and proposed CDA production wells and facilities. The RP-1 Parties reached a Joint Facility Development Agreement with the CDA for implementation of a project designed to remediate the South Archibald Plume. The proposed project includes the operation of three new CDA desalter wells (II-10, II-11, and II-12), and a dedicated pipeline to convey produced groundwater from the three new wells and existing CDA well I-11 to the Desalter II treatment facility. The Draft Feasibility Study and RAP will be finalized based on regulatory input from the Regional Board, and comments from the public and other stakeholders.

Chino Airport

In 1990, the Regional Board issued CAO No. 90-134 to the County of San Bernardino, Department of Airports (County) to address groundwater contamination originating from the Chino Airport. During 1991 to 1992, ten underground storage tanks and 310 containers of hazardous waste were removed, and 81 soil borings were drilled and sampled on the airport property. During 2003 to 2005, nine onsite monitoring wells were installed and used to collect groundwater quality samples. In 2007, the County conducted its first offsite monitoring effort, and in 2008, the Regional Board issued CAO No. R8-2008-0064, which requires the County to define the lateral and vertical extent of the plume and prepare a remedial action plan. From 2009 to 2012, Tetra Tech, the consultant to the County, conducted several off-site plume characterization studies to delineate the areal and vertical extent of the plume, and constructed 33 offsite monitoring wells. From 2013 to early-2015 Tetra Tech conducted an extensive investigation of several areas identified for additional characterization of soil and groundwater contamination; and at the conclusion of the work constructed an additional 33 groundwater monitoring wells on and adjacent to the Airport property. The County conducts quarterly and/or annual monitoring events at all 75 of their monitoring wells constructed to date. Conclusions from this monitoring program can be found in reports posted on the Regional Board's GeoTracker website. In February 2016, Tetra Tech submitted the *Semiannual Groundwater Monitoring Report, Summer and Fall 2015, Chino Airport Groundwater Assessment, San Bernardino County, California*.

In July 2015, Tetra Tech and the County presented an overview to the Regional Board on the results of the aforementioned comprehensive groundwater investigation that occurred from 2013 through early 2015, the construction of 33 new monitoring wells, and the proposed interim remedial action plan. For the interim remedial action plan, the County has proposed to design and construct a wellhead treatment system at existing CCWF well I-18 located in the center of the plume. Preliminary design is underway and negotiations have been initiated with the CDA to implement this remedy. The County is developing a site-specific groundwater model to evaluate remedial alternatives to assist in the preparation a feasibility study of the remedial alternatives for cleanup of plume contamination.

Watermaster periodically collects groundwater-quality samples from dedicated monitoring wells and private wells in and around the Chino Airport plume area. And, Watermaster has also used its calibrated groundwater model to estimate cleanup times and contaminant concentrations in the vicinity of the CCWF. This work will be updated, given new information about the extent of contamination, subsurface hydrogeology, well performance, and the need for habitat sustainability in the Prado Basin.

Other Water Quality Issues

Watermaster continues to track monitoring programs and mitigation measures associated with other point sources in the Chino Basin, including: Alumax Aluminum Recycling, Alger Manufacturing Facility, the Former Crown Coach Facility, General Electric Test Cell and Flatiron, Former Kaiser Steel Mill, Milliken Landfill, Upland Landfill, and the Stringfellow National Priorities List sites.

Optimum Basin Management Program

Program Element 8: Develop and Implement a Groundwater Storage Management Program; and Program Element 9: Develop and Implement a Storage and Recovery Program

Groundwater storage is important to the Chino Basin. Watermaster has committed to investigate the technical and management implications of Local Storage Agreements, improve related policies and procedures, and then revisit all pending Local Storage Agreement applications.

The existing Watermaster/IEUA/MWDSC/Three Valleys Municipal Water District Dry-Year Yield (DYY) program continues to be implemented. By April 30, 2011, all DYY program construction projects and a full “put” and “take” cycle had been completed, leaving the DYY storage account with a zero balance. During the reporting period no water was stored or withdrawn from storage in the DYY Program.

Safe Yield Redetermination

The Basin’s Safe Yield was initially set by the Judgment at 140,000 acre-feet per year. The Safe Yield was based in part on the hydrology of the period 1965 through 1974. Pursuant to the Judgment, the Chino Basin Safe Yield is to be re-determined periodically, but provides that the Safe Yield would not be reexamined for at least ten years from 1978. Pursuant to the OBMP Implementation Plan and Watermaster’s Rules and Regulations, in year 2010/11 and every ten years thereafter, Watermaster is to compute the Safe Yield based in part on the information obtained in the prior ten-year period and reset the Safe Yield for the next ten-year period.

In 2011, Watermaster authorized Watermaster staff to compile the data necessary to recalculate Safe Yield and update its computer model of the Basin and based on the information developed from the data and the model to recalculate the Safe Yield. The model calibration was completed in 2012, and evaluation of the Safe Yield began in 2013. During fiscal year 2014/15, the Watermaster parties, pursuant to Watermaster Board direction, met intensively in a facilitated process to develop an agreement regarding the implementation of the recalculated Safe Yield. In the prior reporting period, the Watermaster parties concluded the facilitated process and developed an agreement to implement the recalculated Safe Yield. At its September 24, 2015 meeting, the Board adopted Resolution 2015-06, endorsing the 2015 Safe Yield Reset Agreement and directed Watermaster legal counsel to file the Agreement with the Court. Resolution 2015-06 was adopted by majority vote, with two of the nine Board members opposing the action. The agreement was filed with the Court on October 23, 2015 with a motion recommending the Court to reset the Safe Yield of the Chino Basin at 135,000 acre-feet per year. The hearing on this motion was originally scheduled for December 18, 2015. During this reporting period, the Court continued the hearing to September 23, 2016.