MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

2013-2014 ANNUAL REPORT
(July 1, 2013 - June 30, 2014)

for the

MPWMD MITIGATION PROGRAM

A report in compliance with the

MPWMD WATER ALLOCATION PROGRAM
FINAL ENVIRONMENTAL IMPACT REPORT
(originally certified in November 1990)

Prepared by MPWMD Staff
March 2015

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MPWMD MITIGATION PROGRAM
WATER ALLOCATION PROGRAM ENVIRONMENTAL IMPACT REPORT

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
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I. EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND:

In April 1990, the Water Allocation Program Final Environmental Impact Report (EIR) was prepared for the Monterey Peninsula Water Management District (MPWMD or District) by J.L. Mintier and Associates. The Final EIR analyzed the effects of five levels of annual California American Water (CAW or Cal-Am) production, ranging from 16,744 acre-feet per year (AFY) to 20,500 AFY. On November 5, 1990, the MPWMD Board certified the Final EIR, adopted findings, and passed a resolution that set Option V as the new water allocation limit. Option V resulted in an annual limit of 16,744 AFY for Cal-Am production, and 3,137 AFY for non-Cal-Am production, with a total allocation of 19,881 AFY for the Monterey Peninsula Water Resource System (MPWRS). The MPWRS is the integrated system of water resources from the Carmel River Alluvial Aquifer and Seaside Groundwater Basin that provide the Monterey Peninsula community's water supply via the Cal-Am water distribution network.

Even though Option V was the least damaging alternative of the five options analyzed in the Water Allocation Program EIR, production at this level still resulted in significant, adverse environmental impacts that must be mitigated. Thus, the findings adopted by the Board included a "Five-Year Mitigation Program for Option V" and associated mitigation measures.

In June 1993, Ordinance No. 70 was passed, which amended the annual Cal-Am production limit from 16,744 AF to 17,619 AF, and the non-Cal-Am limit from 3,137 AF to 3,054 AF; the total production limit was increased from 19,881 AF to 20,673 AF per year due to new supply from the Paralta Well in Seaside. In April 1996, Ordinance No. 83 slightly changed the Cal-Am and non-Cal-Am annual limits to 17,621 AF and 3,046 AF, respectively, resulting in a total limit of 20,667 AFY. In February 1997, Ordinance No. 87 was adopted to provide a special water allocation for the planned expansion of the Community Hospital of the Monterey Peninsula, resulting in a new Cal-Am production limit of 17,641 AFY; the non-Cal-Am limit of 3,046 AFY was not changed. These actions did not affect the implementation of mitigation measures adopted by the Board in 1990.

The Five-Year Mitigation Program formally began in July 1991 with the new fiscal year (FY) and was slated to run until June 30, 1996. Following public hearings in May 1996 and District Board review of draft reports through September 1996, the Five-Year Evaluation Report for the

1991-1996 comprehensive program, as well as an Implementation Plan for FY 1996-1997 through FY 2000-2001, were finalized in October 1996. In its July 1995 Order WR 95-10, the State Water Resources Control Board (SWRCB) directed Cal-Am to carry out any aspect of the Five-Year Mitigation Program that the District does not continue after June 1996. To date, as part of the annual budget approval process, the District Board has voted to continue the program. The Mitigation Program has accounted for a significant portion of the District's annual budgets in terms of revenue (derived primarily from a portion of the MPWMD user fee on the Cal-Am bill) and expenditures. It should be noted that this fee was removed from Cal-Am's bill in July 2009, resulting from actions subsequent to a California Public Utilities Commission ruling regarding a Cal-Am rate request. Cal-Am continued to pay the fee amount (8.325%) under a separate reinvestment agreement with MPWMD through June 2010. The District and Cal-Am have negotiated an annual funding agreement that funded part of the 2014 mitigation program. The District's other revenue sources were used to fund the remainder of the program.

The California Environmental Quality Act (CEQA) (Pub. Res. Code 21081.6) requires that the MPWMD adopt a reporting or monitoring program to insure compliance with mitigation measures when implementing the Water Allocation Program. Findings Nos. 387 through 404 adopted by the Board on November 5, 1990 describe mitigation measures associated with the Water Allocation Program; many entail preparation of annual monitoring reports. This 2013-2014 Annual Report for the MPWMD Mitigation Program responds to these requirements. It covers the fiscal year period of July 1 through June 30. It should be noted that hydrologic data and well reporting data in this report are tabulated using the water year, defined as October 1 through September 30, in order to be consistent with the accounting period used by the SWRCB.

This 2013-2014 Annual Report first addresses general mitigation measures relating to water supply and demand (Sections II through XI), followed by monitoring related to compliance with production limits, drought reserve and supply augmentation (Sections XII through XV), followed by mitigations relating to specific environmental resources (Sections XVI through XIX). Section XX provides a summary of costs for the biological mitigation programs as well as related hydrologic monitoring, water augmentation and administrative costs. Section XXI presents selected references.

Table I-1 summarizes the mitigation measures described in this report. In subsequent chapters, for each topic, the mitigation measure adopted as part of the Final EIR is briefly described, followed by a summary of activities relating to the topic in FY 2013-2014 (July 1, 2013 through June 30, 2014, unless otherwise noted). Monitoring results, where applicable, are also presented. Tables and figures that support the text are found at the end of each section in the order they are introduced in the text.

ACCOMPLISHMENTS:

Many activities are carried out as part of the MPWMD Mitigation Program to address the environmental effects that community water use has upon the Carmel River and Seaside Groundwater Basins. Highlights of the accomplishments in FY 2013-2014 for each major category are shown in **Table I-2**.

OBSERVED TRENDS, CONCLUSIONS AND/OR RECOMMENDATIONS:

The following paragraphs describe observed trends (primarily qualitative), conclusions and/or recommendations for the mitigation program. General conclusions are followed by a summary of selected Mitigation Program categories.

General Overview

Overall, the Carmel River environment is in better condition today than it was in 1990 when the Allocation Program EIR was prepared. This improvement is evidenced by biological/hydrologic indicators such as consistent steelhead adult spawner counts of several hundred fish in recent years as compared to zero to five fish per year when the Mitigation Program began in 1991; improved densities of juvenile steelhead in quantities that reflect a healthy seeded stream; consistently balanced bird diversity in MPWMD restoration project areas compared to control areas; fewer miles of dry river bed in summer and fall than in the past; and higher water tables in the Carmel Valley alluvial aquifer at the end of each water year.

The comprehensive MPWMD Mitigation Program is an important factor responsible for this improvement. Direct actions such as fish rescues and rearing, and riparian habitat restoration literally enable species to survive and reproduce. Indirect action such as conservation programs, water augmentation, ordinances/regulations and cooperative development of Cal-Am operation strategies result in less environmental impact from human water needs than would occur otherwise. The District's comprehensive monitoring program provides a solid scientific data baseline, and enables better understanding of the relationships between weather, hydrology, human activities and the environment. Better understanding of the MPWRS enables informed decision-making that achieves the District's mission of benefiting the community and the environment.

It is acknowledged that there are other important factors responsible for this improved situation. For example, since Water Year (WY) 1991, the Carmel River has received normal or better runoff in 16 out of 23 years. Actions by federal resource agencies under the Endangered Species Act (ESA) or the SWRCB under its Order WR 95-10 and follow-up orders have provided strong incentive for Cal-Am and other local water producers to examine and amend water production practices to the degree feasible, and for the community to reduce water use. Except for one year in 1997, the community has complied with the production limits imposed on Cal-Am by the SWRCB since Order 95-10 became effective in July 1995.

Despite these improvements, challenges still remain due to human influence on the river. The steelhead and red-legged frog remain listed as threatened species under the ESA. At least several miles of the river still dry up each year, harming habitat for listed fish and frog species. The presence of the two existing dams, flood-plain development and water diversions to meet community and local user needs continue to alter the natural dynamics of the river. Streambank restoration projects may be significantly damaged in large winter storm events, and some people

continue to illegally dump refuse into the river or alter their property without the proper permits. Thus, the Mitigation Program (or a comprehensive effort similar to it) will be needed as long as significant quantities of water are diverted from the Carmel River and people live in close proximity to it.

Water Resources Monitoring Program

Streamflow and precipitation data continue to provide a scientific basis for management of the water resources within the District. These data continue to be useful in Carmel River Basin planning studies, reservoir management operations, water supply forecast and budgeting, and defining the baseline hydrologic conditions of the Carmel River Basin. Also, the District's streamflow monitoring program continues to produce high quality and cost-effective data.

There is limited storage of surface water by dams on the Carmel River. Los Padres Reservoir, completed in 1948, holds 1,626 AF of usable storage (without flashboard), based on 2008 survey data. Usable storage in San Clemente Reservoir (SCR), completed in 1921, has been essentially eliminated by order of the Department of Water Resources (DWR) due to seismic safety concerns. As an interim safety measure, which remained in effect through WY 2014, DWR has seasonally required Cal-Am to lower the water level in SCR from 525 feet to 515 feet elevation, which is too low for water-supply use. Cal-Am had originally proposed a dam seismic strengthening program. State and federal environmental agencies subsequently urged Cal-Am to reconsider their position and support the dam removal and river reroute option. In July 2009, Cal-Am changed its position and endorsed the dam removal option, as memorialized in the January 2010 multi-agency collaboration statement. District staff continues to participate in technical advisory role. In 2011, Cal-Am circulated a request for bids to complete the removal of the Dam and a contractor was selected for this work in 2013. The first phase of this project began in 2013 with construction of a new access road and placement of the river diversion facilities. In 2014, activities associated with San Clemente Dam (SCD) removal continued and included creation of a subsurface cutoff wall at the upstream end of the reservoir's sediment field and construction of the re-route channel through the San Clemente Creek drainage.

Groundwater levels, and consequently groundwater storage conditions, in the Carmel Valley Alluvial Aquifer have maintained a relatively normal pattern in recent years, in contrast to the dramatic storage declines that were observed during the prolonged 1987-1991 drought period. The relatively stable storage in the Carmel Valley alluvial aquifer in recent years is attributable to a combination of a period of more favorable hydrologic conditions and the adoption of improved water management practices that have tended to preserve higher storage conditions in the aquifer. In WY 2014, Carmel Valley alluvial aquifer storage declined slightly compared with recent years as this year was classified as "critically dry" and marked the third consecutive dry or critically dry hydrologic year.

In contrast, storage conditions in the coastal portion of the Seaside Groundwater Basin have not been stable in recent years, in particular with respect to the deeper Santa Margarita aquifer, from which over 80 percent of the Cal-Am production in the Seaside Basin is derived. This downward trend in water levels reflects the changed production operations in the Seaside Basin stemming primarily from changed practices after SWRCB Order 95-10. The increased annual

reliance on production from Cal-Am's major production wells in Seaside, along with significant increases in non-Cal-Am use, have dramatically lowered water levels in this aquifer, and seasonal recoveries have not been sufficient to reverse this trend.

To address this storage depletion trend, the District initiated efforts in the 2000-2001 timeframe to prepare a Seaside Basin Groundwater Management Plan in compliance with protocols set by the State of California (AB 3030, as amended by SB 1938). This process was superseded by litigation filed by Cal-Am in August 2003, requesting a court adjudication of water production and storage rights in the Seaside Basin. The District participated in all litigation proceedings as an intervening "interested party". The Superior Court held hearings in December 2005 and issued a final adjudication decision in March 2006, which was amended through an additional court filing in February 2007. The final decision established a new, lower "natural safe yield" for the Basin of 3,000 AFY, and an initial Basin "operating safe yield" of 5,600 AFY. Under the decision, the operating safe yield would be reduced by 10% every three years until the operating safe yield matches the natural safe yield of the Basin in 2021. The Court also created a nine-member Watermaster Board (of which the District is a member) to implement the Court's decision. With the triennial reductions in operational yield required by the Seaside Basin Adjudication Decision, water levels have not been declining as fast as previously observed.

One of the means that could potentially mitigate this observed storage depletion trend is a program that the District has been actively pursuing since 1996 -- the Seaside Basin groundwater injection program (also known as aquifer storage and recovery, or ASR). ASR entails diverting excess water flows (typically in Winter/Spring) from the Carmel Valley Alluvial Aquifer through existing Cal-Am facilities and injecting the water into the Seaside Groundwater Basin for later recovery in dry periods.

The primary goal of the MPWMD Phase 1 and 2 ASR Projects is better management of existing water resources and production facilities to help reduce impacts to the Carmel River, especially during the dry season. The projects are viewed as being complementary to other larger, long-term water augmentation projects that are currently being pursued for the Monterey Peninsula. These projects, also known as Water Projects 1 and 2, entail a maximum diversion of 2,426 AFY, and 2,900 AFY respectively from the Carmel River for injection. The combined average yield for both projects is estimated at about 2,000 AFY. The operation of the Phase 1 and 2 ASR Projects result in reduced unauthorized pumping of the Carmel River in Summer/Fall and increased storage in the Seaside Basin, which are both considered to be environmentally beneficial.

The ASR water supply efforts in 2013-2014 included: (1) continued work with regulatory and land use agencies on expansion of the Phase 1 Santa Margarita ASR site; (2) completion of the electrical facilities for the Phase 2 ASR Project at the Seaside Middle School site; (3) Completion and testing of the second ASR well at the Phase 2 ASR site; (4) coordination with Cal-Am, federal, and state agencies to construct the necessary infrastructure for the ASR project; (5) coordination with Cal-Am on necessary actions and delivery system facilities to enable expanded ASR; and (6) continued implementation of a Memorandum of Understanding (MOU) with Cal-Am to operate the ASR facilities.

Groundwater quality conditions in both the Carmel Valley Alluvial Aquifer and Seaside Basin have remained acceptable in terms of potential indicators of contamination from shallow sources such as septic systems. There have been no identifiable trends indicative of seawater intrusion into the principal supply sources the coastal areas of these two aquifer systems to date.

Steelhead Fishery Program

Annual monitoring conducted by the District shows that the Carmel River steelhead population has recovered somewhat from the remnant levels of the last drought (1987 to 1991) and from past water-supply practices. Though overall fish populations have improved since the inception of the Mitigation Program in 1990, there was a period of general decline in the adult run from 2001 to 2011. Between 1992 and 2001, the spawning population recovered from a handful of fish to levels approaching 900 adults per year as counted at SCD. Then the run experienced a six-year downward trend from 804 adults in 2001 to 222 adults in 2007, rebounding somewhat in 2008 to 412 adults. However, in 2009 and 2010, the population underwent a dramatic reduction to 95 and 157 adults, respectively. In 2011 and 2012, the population rebounded again with 452 and 470 adults passing over SCD, while in 2013 the number dropped again to 249, well below the 1994-2013 average of 421, likely due in part to the dry year. Drought conditions worsened in 2014 and the river failed to connect to the lagoon for the first time since 1990. Despite a lack of sea-run adults in 2014, some resident adults did spawn in the upper valley as evidenced by the appearance of fry during summer rescues. These adults may have been hold-over fish, resident adults or older juvenile fish reared and released from the SHSRF in the fall of 2013.

Previous redd surveys below SCD confirm that the spawning habitat in the lower river has improved considerably over the last 20 years and many adults are now spawning there instead of passing the SCD fish counting station. In addition, juvenile steelhead rescued by the District from the lower river that survive to adulthood are more likely to return to the lower river to spawn rather than migrate upstream past the SCD. In 2011-2012, The District deployed a DIDSON counting station, acquired from CDFW grant funding, in the lower river to help determine whether more adults are in fact spawning downstream of the dam. Staff downloaded and reviewed video data from the 2013 season and reported the preliminary results in 2014.

Variability of adult steelhead counts are likely the result of a combination of controlling and limiting factors including:

- improved spawning conditions in the lower Carmel River, encouraging fish to spawn before they reach the counter at the dam;

- variable lagoon conditions, caused by artificial manipulation of the sandbar and/or naturally occurring periods of low winter flows;

- impediments to adult and smolt migration routes, such as seasonal barriers, inadequate passage facilities, and intermittent periods of low flow creating critical riffles below the Narrows during the normal winter-spring migration season;

- low densities of juvenile fish in 2004, 2007, and 2009-2011 affecting subsequent adult

populations; and

- variable ocean conditions.

- **Juvenile Steelhead**

Monitoring of the juvenile steelhead population at eleven sites along the mainstem Carmel River below Los Padres Dam shows that fish density continues to be quite variable both year to year and site to site from below 0.40 fish per foot (fpf) of stream to levels frequently ranging above 1.00 fpf, values that are typical of well-stocked steelhead streams. In this 2013-2014 reporting period, the average population density was much less than the long-term average of 0.79 fpf for the Carmel River likely due to the ongoing drought and poor habitat conditions in the lower river.

District staff believes the variability of the juvenile steelhead population in the Carmel River Basin is directly related to the following factors:

Positive Factors:

- improvements in streamflow patterns, due to favorable natural fluctuations, exemplified by relatively high base-flow conditions since 1995;

- District and SWRCB rules to actively manage the rate and distribution of groundwater extractions and direct surface diversions within the basin, coupled with changes to CAW's operations at San Clemente and Los Padres Dams, providing increased streamflow below San Clemente Dam;

- restoration and stabilization of the lower Carmel River's stream banks, providing improved riparian habitat (tree cover/shade along the stream and an increase in woody debris) while preventing erosion of silt/sand from filling gravel beds and pools;

- extensive juvenile steelhead rescues by the District over the last 25 years, now totaling 417,837 fish through 2013;

- rearing and releases of rescued fish from the SHSRF of nearly 97,300 juveniles and smolts back into the river and lagoon over the past 18 years (15 years of operation), at sizes generally larger than the river-reared fish, which in theory should enhance their ocean survival;

Negative Factors:

- variable lagoon conditions, including highly variable water surface elevation changes caused by mechanical breaching, chronic poor water quality (especially in the fall), and predation by birds and striped bass;

- barriers or seasonal impediments to juvenile and smolt emigration, such as the lack of

juvenile passage facilities at Los Padres Dam and intermittent periods of low flow below the Narrows during the normal spring emigration season;

- spring flow variability such as low-flow conditions that could dewater redds prematurely or high flows that could either deposit sediment over redds or completely wash them out;

- chronic, and occasionally acute, fall temperature and hydrogen sulfide levels below LPD, and the increase in suspended sediment from the SCD summer draw-down;

- the potential for enhanced predation on smolts and YOY migrating through the sediment fields of LPD and SCD; and

- the recent drought conditions.

A recent challenge that may remain for some years is the potential effects of substantive physical and operational changes to San Clemente Dam required by the Department of Water Resources, Division of Safety of Dams (DWR/DSOD), including the process of removal of the dam. The most significant issues are the effect of released sediment from the reservoir on downstream river habitat, proper functioning of MPWMD's SHSRF, and downstream property owners (flood elevations). The three-year dam removal project began in 2013 with the removal of vegetation and rechanneling the river through the reservoir reach. Major changes include:

- lowering of the reservoir water level and changes to the release flows and water quality;

- potentially significant changes in the sediment regime in the Carmel River downstream of San Clemente as the dam removal project progresses; and

- loss of reservoir storage, which, in the past, has helped maintain adequate river flows and cooler water in the lower Carmel River.

District staff continues to provide technical expertise and scientific data to CAW engineers and environmental consultants, DWR/DSOD, CDFW, NMFS, U.S. Fish and Wildlife Service, and others involved in addressing the resource management issues associated with both San Clemente and Los Padres Dams. District staff also continues to provide technical expertise and scientific data to California Department Parks and Recreation, Monterey County Water Resources Agency, Monterey County Public Works Department, California Coastal Commission, U. S. Army Corps of Engineers, Carmel Area Wastewater District, and other regulatory agencies and stakeholders involved in the management of the Carmel River, the Carmel River Lagoon and the barrier beach.

Riparian Habitat Mitigation

The Carmel River continues to show many signs of recovery and stabilization after a combination of increased groundwater extraction, extreme drought and flood events occurred during the 1970s, 1980s and 1990s that impacted property owners, threatened species and degraded riparian habitat. In many reaches of the river, fine material (silt and sand) that entered

the main stem during periods of instability has been washed out of the system leaving behind a more complex channel with improved steelhead spawning substrate, diverse habitat, and a richer riparian community. Areas with perennial or near perennial flow (upstream of Schulte Bridge) or a high groundwater table, such as downstream of Highway 1, have experienced vigorous natural recruitment in the channel bottom, which has helped to stabilize streambanks and diversify aquatic habitat.

In these areas, natural recruitment has led to vegetation encroachment that, in some areas, may constrict high flows and threaten bank stability. MPWMD continues to monitor these areas closely and to develop a management strategy to balance protection of native habitat with the need to reduce erosion potential. Environmental review of proposed projects and the process of securing permits is quite complex and requires an exhaustive review of potential impacts.

In contrast to areas with perennial flow, the recovery of streamside areas subjected to annual dewatering requires monitoring. Plant stress in the late summer and fall is evident in portions of the river that go dry. In these areas, streambanks exhibit unstable characteristics during high flows, such as sudden bank collapse, because of the lack of healthy vegetation that would ordinarily provide stability. In addition, due to the presence of main stem reservoirs, there is a lack of sediment delivery from the upper watershed that continues to result in channel degradation (incision of the stream into the valley floor). Thus, pools become deeper and when combined with scour along the outside of streambanks this creates "cut" banks. Although this leads to a more complex and dynamic channel, which is a desirable condition, continued degradation can result in bank collapses and trigger an episode of erosion along the river. District staff continues to document degradation in the river bed including at the Carmel Area Wastewater District pipe across the river downstream of Highway 1 and at bridge infrastructure in the active channel.

Restoration project areas sponsored by MPWMD since 1984 continue to mature and exhibit more features of relatively undisturbed reaches, such as plant diversity and vigor, complex floodplain topography, and a variety of in-channel features such as large wood, extensive vegetative cover, pools, riffles, and cut banks.

As cited in previous reports, the most significant trends continue to include the following:

- increased encroachment of vegetation into the active channel bottom,
- effects to areas with groundwater extraction downstream of Schulte Road,
- channel scour due to a lack of sediment from upstream and from bank erosion,
- healthy avian species diversity, and
- maturing of previous restoration projects.

Carmel River Erosion Protection and Restoration

With the exception of the channel area between the Via Mallorca Road bridge and the Rancho San Carlos Road bridge, streambanks in the mainstem appear to be relatively stable during average water years with "frequent flow" storm events (flows with a return magnitude of less than five years). The program begun by MPWMD in 1984 (and later subsumed into the

Mitigation Program) to stabilize streambanks appears to be achieving the goals that were initially set out, i.e., to reduce bank erosion during high flow events up to a 10-year return flow, restore vegetation along the streamside, and improve fisheries habitat.

Consistent with previous reports, it is likely that the following trends will continue:

- State and Federal agencies consider the Carmel River watershed to be a high priority area for restoration, as evidenced by the interest in addressing water supply issues, the removal of San Clemente Dam, impacts to the Carmel Bay Area of Special Biological Significance, and management of threatened species. Stringent avoidance and mitigation requirements will continue to be placed on activities that could have negative impacts on sensitive aquatic species or their habitats.
- Activities that interrupt or curtail natural stream functions, such as lining streambanks with riprap, have come under increasing scrutiny and now require significant mitigation offsets. Approximately 35% to 40% of the streambanks downstream of Carmel Valley Village have been altered or hardened since the late 1950s. Activities that increase the amount of habitat or restore natural stream functions are more likely to be approved or funded through State and Federal grant programs.
- Additional work to add instream features (such as large logs for steelhead refuge or backwater channel areas for frogs) can restore and diversify aquatic habitat.
- Major restoration projects completed between 1987 and 1999 have had extensive and successful work to diversify plantings. However, maintenance of irrigation systems is ongoing and requires extensive work in water years classified as below normal, dry and critically dry.
- Downstream of the Robinson Canyon Road bridge, the river continues to cut into the channel bottom and form a more complex system of pools, riffles and gravel bars.

Between the mouth of the river and Robinson Canyon Road bridge, many areas of the river appear to be deeper than at any previous time since measurements have been recorded (i.e., beginning in 1978), with many reaches showing several feet of downcutting. This trend, which was identified as a concern in the 1984 Carmel River Management Program EIR, appears to have accelerated in the period from 1998 to 2014. This was a period of exceptional stability (for the Carmel River) as streambanks hardened with structural protection over the past several decades resisted erosion and the force of the river during high flows was directed into the channel bottom. This condition has resulted in the undermining of rip-rap protection and bridge infrastructure in some reaches. To assess the impact of scour and degradation in the bottom of the channel, the District budgeted funds in Fiscal Year 2014-15 to carry out a thalweg survey (survey along the bottom of the channel), which will be compared to similar surveys dating back to 1984.

In the spring of 2010, the Carmel Area Wastewater District's concrete-encased pipe across the bottom of the river was exposed for the first time since it was constructed in 1973. When the pipe encasement was installed, the top was buried two feet below the riverbed. In 2012, District staff measured a maximum of 4.5 feet of scour from the top of the encasement, which is approximately five feet wide and five feet high (see **Figure XVII-3**). In September 2013, District staff measured between 4.0 and 4.25 feet of scour. It is possible that high flows are

passing under the pipe encasement. In addition, the pipe encasement appears to be causing the river to create a large deep pool on the downstream side, while on the upstream side the encasement causes the river bottom to be flat and wide for an extended length. At certain low-flow periods with the lagoon open, the encasement may be creating a temporary barrier to steelhead migration.

In the spring of 2011, the river migrated into the north streambank at the Rancho San Carlos Road Bridge (see **Figure XVII-4**). If no work to stabilize the streambank is carried out, it is likely that the river will continue to migrate toward homes along the north streambank.

Eventually, without corrective measures to balance the sediment load with the flow of water or to mitigate for the effect of the downcutting, streambanks will begin to collapse and the integrity of bridges and other infrastructure in the active channel of the river may be threatened.

Vegetation Restoration and Irrigation

To the maximum extent possible, MPWMD-sponsored river restoration projects incorporate a functional floodplain that is intended to be inundated in relatively frequent storm events (those expected every 1-2 years). For example, low benches at the Red Rock and All Saints Projects have served as natural recruitment areas and are currently being colonized by black cottonwoods, sycamores and willows. In addition, willow and cottonwood pole plantings in these areas were installed with a backhoe, which allows them to tap into the water table. These techniques have been successful and have reduced the need for supplemental irrigation.

Channel Vegetation Management

Another notable trend relating to the District's vegetation management program was the widening of the channel after floods in 1995 and 1998. With relatively normal years following these floods, the channel has narrowed as vegetation recruits on the channel bottom and gravel bars. Current Federal regulations such as the Endangered Species Act (ESA) "Section 4(d)" rules promulgated by NOAA Fisheries to protect steelhead significantly restrict vegetation management activities. Because of these restrictions, the District can carry out activities only on the most critical channel restrictions and erosion hazards in the lower 15 miles of the river. In the absence of high winter flows capable of scouring vegetation out of the channel bottom, encroaching vegetation may significantly restrict the channel. As vegetation in the river channel recovers from the high flows of 1995 and 1998 and matures in the channel bottom, more conflicts are likely to arise between preserving habitat and reducing the potential for property damage during high flows. MPWMD will continue to balance the need to treat erosion hazards in the river yet maintain features that contribute to aquatic habitat quality.

Permits for Channel Restoration and Vegetation Management

In 2012, MPWMD renewed its long-term permits with the U.S. Army Corps of Engineers and the California Regional Water Quality Control Board for routine maintenance and restoration work. In 2014, the District also renewed a long-term Routine Maintenance Agreement (RMA)

with the California Department of Fish and Wildlife to conduct regular maintenance and restoration activities in the Carmel River.

Monitoring Program

Vegetative moisture stress fluctuates depending on the rainfall, proximate stream flow, depth to groundwater, and average daily temperatures, and tends to be much lower in above-normal rainfall years. Typical trends for a single season start with little to no vegetative moisture stress in the spring, when the soil is moist and the river is flowing. As the river begins to dry up in lower Carmel Valley (normally around June) and temperatures begin to increase, an overall increase in vegetative moisture stress occurs. For much of the riparian corridor in the lower seven miles of the Carmel River, this stress has been mitigated by supplemental irrigation, thereby preventing the die off of large areas of riparian habitat. However, many recruiting trees experience high levels of stress or mortality in areas difficult to irrigate. Riparian vegetation exposed to rapid or substantial lowering of groundwater levels (i.e., below the root zones of the plants) will continue to require monitoring and irrigation during the dry season.

With respect to riparian songbird diversity, populations dropped after major floods in 1995 and 1998 because of the loss of streamside habitat. Since 1998, species diversity recovered and now fluctuates depending on habitat conditions. Values indicate that the District mitigation program is preserving and improving riparian habitat.

Strategies for the future

A comprehensive long-term solution to overall environmental degradation requires a significant increase in dry-season water flows in the lower river, a reversal of the incision process, and reestablishment of a natural meander pattern. Of these, MPWMD has made progress on increasing summer low flows and groundwater levels by aggressively pursuing a water conservation program, implementing the first and second phases of the Seaside Groundwater Basin Aquifer Storage and Recovery Project, and recommending an increase in summer releases from Los Padres Reservoir.

Reversal, or at least a slowing, of channel incision may be possible if the supply of sediment is brought into better balance with the sediment transport forces. Additional sediment from the tributary watersheds between San Clemente Dam and Los Padres Dam may pass into the lower river in the foreseeable future with the removal of San Clemente Dam in 2015. However, any increase in the sediment supply may not reach the lowest portion of the river for many years.

In January 2009, CAW agreed to proceed with the removal of San Clemente Dam and reroute of the Carmel River main stem around the sediment field. MPWMD supported this dam removal and re-route project proposed by the California Coastal Conservancy. The project began in the summer of 2013 and is scheduled to be completed in late 2015. In addition to a significant improvement in fish passage, removal of San Clemente Dam would likely reduce the time it takes for sand and gravel from the upper watershed to move through the river bottom and replenish the Carmel River State Beach at the mouth of the river.

Over the long term, an increase in sediment supply could help reduce streambank instability and erosion threats to public and private infrastructure. However, reestablishing a natural supply of sediment and restoring the natural river meander pattern through the lower 15.5 miles of the Carmel Valley presents significant political, environmental, and fiscal challenges, and is not currently being considered as part of the Mitigation Program.

Integrated Regional Water Management (IRWM) Grant Program

The IRWM program promoted by the DWR encourages planning and management of water resources on a regional scale and promotes projects that incorporate multiple objectives and strategies. In addition, the IRWM process brings stakeholders together and encourages cooperation among agencies in developing mutually beneficial solutions to resource problems.

In November 2007, the District adopted the final IRWM plan for a region encompassing Monterey Peninsula areas within the District boundary, the area in the Carmel River watershed outside of the MPWMD boundary, Carmel Bay and the Southern Monterey Bay. The plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation.

Subsequently, MPWMD was successful in 2011 in obtaining a $995,000 grant from the DWR to update the IRWM Plan to Proposition 84 standards. The plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation. In FY 2011-2012, MPWMD entered into a grant agreement with DWR and initiated work on 10 planning projects, including an update to the 2007 plan and several planning projects to benefit local jurisdictions. During FY 2012-2013, additional agreements were signed to work on all 10 planning projects. During FY 2013-14, the IRWM Plan was updated and adopted by the MWPMD Board and the other nine planning projects were completed. The total cost of the project, including local agency match, was about $1.6 million. A final report on the grant is scheduled for completion in 2015.

Funding from the IRWM grant program and other programs requiring an adopted IRWM Plan could provide the incentive to undertake a set of projects that would continue to improve the Carmel River environment and engage a larger number of organizations in helping to develop and implement a comprehensive solution to water resource problems in the planning region.

Carmel River Lagoon Habitat

The District continues to support and encourage the ongoing habitat-restoration efforts in the wetlands and riparian areas surrounding the Carmel River Lagoon. These efforts are consistent with goals that were identified in the Carmel River Lagoon Enhancement Plan, which was partially funded by the District. The District continues to work with various agencies and landowners to implement ongoing restoration of the Odello West property and future restoration of the Odello East property across the highway. Because of the restoration activities on the south

side of the lagoon, the District has concentrated its monitoring efforts on the relatively undisturbed north side. Staff have also continue to meet and discuss with other agencies the ongoing use of an existing CDPR agricultural well and potential future use of treated water from the Carmel Area Wastewater District to augment the lagoon during periods of low water.

The District expanded its long-term monitoring around the lagoon in 1995 in an attempt to determine if the reduction in freshwater flows due to groundwater pumping upstream might change the size or ecological character of the wetlands. Demonstrable changes have not been identified. Because of the complexity of the estuarine system, a variety of parameters are monitored, including vegetative cover in transects and quadrats, water conductivity, and hydrology. It is notable that due to the number of factors affecting this system, it would be premature to attribute any observed changes solely to groundwater pumping. During the 20-year period to date, for example, there have been two Extremely Wet (1995 and 1998), two Wet (2005, 2006), five Above Normal (1996, 1997, 2000, 2010 and 2011), and five Normal (1999, 2001, 2003, 2008 and 2009), two Below Normal (2002 and 2004), two Dry (2012 and 2013), and two Critically Dry (2007 and 2014) Water Year types in terms of total annual runoff. Thus, the hydrology of the watershed has been wetter than average 45% of the time, and at least normal or better 70% of the time during that period. However, monitoring in 2014 occurred during a Critically Dry Water Year that followed two consecutive Dry Water Years. Other natural factors that affect the wetlands include introduction of salt water into the system as waves overtop the sandbar in autumn and winter, tidal fluctuations, and long-term global climatic change. When the District initiated the long-term lagoon monitoring component of the Mitigation Program, it was with the understanding that it would be necessary to gather data for an extended period in order to draw conclusions about well production drawdown effects on wetland dynamics. It is recommended that the current vegetation, conductivity, topographical and wildlife monitoring be continued in order to provide a robust data set for continued analysis of potential changes around the lagoon.

Lagoon bathymetric cross sectional surveys, initially conducted in 1988, have been completed annually during the dry season since 1994. These data are useful in assessing changes in the sand supply within the main body of the lagoon and are necessary to answer to questions concerning whether or not the lagoon is filling up with sand, thus losing valuable habitat. As indicated in the survey plots, the sandy bed of the lagoon can vary significantly from year to year. In general, no major trends indicating sand accumulation or depletion at the lagoon cross sections have been identified based on available data, with the exception of the upstream-most cross section number 4, which exhibits an overall loss in sand volume over the 1994-2013 period. The sand loss or down-cutting observed at cross section 4 is consistent with the pervasive down-cutting that has occurred along the thalweg of the Lower Carmel River (LCR) upstream of the Highway 1 Bridge for several miles. The trend of LCR streambed scour appears to have begun in Water Year 2006. In addition, now that annual cross sectional data have been collected in two “critically dry” years (WY 2007 and 2014) and two “dry” years (2012 and 2013), it is concluded that substrate elevations at the cross sections generally do not change in these low-flow years, despite the regular occurrence of major lagoon mouth breaches in all of these years, except WY 2014. Accordingly, the multi-year cross-sectional data set (21 years) indicates quantity of streamflow as the primary factor that controls substrate changes at the key cross sections.

Program Costs

Mitigation Program costs for FY 2013-2014 totaled approximately $2.41 million including direct personnel expenses, operating costs, project expenditures, capital equipment, and fixed asset purchases. The annual cost of mitigation efforts varies because several mitigation measures are weather dependent. Expenditures in FY 2013-2014 were $0.19 million more than the prior fiscal year due to increases in Mitigation Program costs. However, the overall costs have remained fairly constant (average of $3 million per year) for last five years. In the past, expenditures had trended upward due to expenditures for the Aquifer Storage Recovery (ASR) Project. ASR Project costs are no longer captured under Mitigation Program Costs. FY 2011-2012 expenditures were $4.59 million; and FY 2012-2013 expenditures were $2.22 million.

During FY 2013-2014, revenues totaled $2.72 million including mitigation program revenues, tax revenues, investment income and miscellaneous revenues. The Mitigation Program Fund Balance as of June 30, 2014 was $331,973.

Table I-1

SUMMARY OF COMPONENTS OF MPWMD MITIGATION PROGRAM
July 1, 2013 - June 30, 2014

WATER MANAGEMENT

- Monitor Water Resources
- Manage Water Production
- Manage Water Demand
- Monitor Water Usage
- Augment Water Supply
- Allocation of New Supply
- Determine Drought Reserve

STEELHEAD FISHERY

- Capture/Transport Emigrating Smolts in Spring
  -- Smolt rescues
  -- Build acclimation facility/tagging study
- Prevent Stranding of Fall/Winter Juvenile Migrants
  -- Juvenile rescues
  -- Build mid-Valley holding facility
- Rescue Juveniles Downstream of Robles del Rio in Summer
- Operate Sleepy Hollow holding/rearing facility
- Modify Spillway/Transport Smolts Around Los Padres Dam
- Monitoring Activities for Mitigation Plan
  -- Adult counts at San Clemente Dam
  -- Juvenile population surveys
- Other Activities not required by Mitigation Plan
  -- Spawning habitat restoration
  -- Fish planting (steelhead broodstock program)
  -- Coastal Salmon Recovery Program grant (began mid-2001)
  -- Modify critical riffles

RIPARIAN VEGETATION AND WILDLIFE

- Conservation and Water Distribution Management
- Prepare/Oversee Riparian Corridor Management Plan
- Implement Riparian Corridor Management Program
  -- Cal-Am well irrigation (4 wells)
  -- Channel clearing
  -- Vegetation monitoring
  -- Track and pursue violations
  -- River Care Guide booklet
  -- CRMP Erosion Protection Program

LAGOON VEGETATION AND WILDLIFE

- Assist with Lagoon Enhancement Plan Investigations (See Note 1)
- Expand Long-Term Lagoon Monitoring Program
  -- Water quality/quantity
  -- Vegetation/soils
- Identify Alternatives to Maintain Lagoon Volume

AESTHETICS

- Restore Riparian Vegetation (see above)

Note 1: Mitigation measures are dependent on implementation of the Lagoon Enhancement Plan by the California Department of Parks and Recreation, the land owner and CEQA lead agency. Portions of the Enhancement Plan have been implemented by CalTrans as part of a "mitigation banking" project.

Table I-2
Summary of MPWMD Mitigation Program Accomplishments in 2013-2014

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS IN FY 2013-2014
Monitor Water Resources	Regularly tracked precipitation, streamflow, surface and groundwater levels and quality, and lagoon characteristics between Los Padres Dam and the Carmel River Lagoon, using real-time methods at numerous data collection stations. Maintained extensive monitoring network, and continuous streamflow recorders below San Clemente Dam and other sites.
Manage Water Production	Developed and implemented multi-agency Memorandum of Agreement and quarterly water supply strategies based on normal-year conditions; worked cooperatively with resource agencies implementing the federal Endangered Species Act. Implemented ordinances that regulate wells and water distribution systems.
Manage Water Demand	From July 1, 2013, through June 30, 2014, a total of 852 Water Permits were issued. 30 new residences and 679 residential Remodels/additions were permitted in the CAW system. There were 80 Non-Residential Water Permits issued for Remodels/Additions and Changes of Use in the CAW system. As of June 30, 2014, a total of 91.724 AF of water remained available in the areas served CAW, as described in Section IX. This includes water from pre- and post-Paralta Allocations and water added to a Jurisdiction's Allocation from Water Use Credit transfers and public retrofits.
Monitor Water Usage	Complied with SWRCB Order 95-10 for Water Year 2014.
Augment Water Supply	Long-term efforts to augment supply included: (1) Continued participation in the CPUC rate hearing process to review elements of the Monterey Peninsula Water Supply Project (MPWSP); (2) Participated in meetings intended to resolve concerns about MPWSP construction, operations, financing, management and oversight; (3) Participated on Technical Advisory Committee to the Monterey Peninsula Regional Water Authority; (4) Operated Aquifer Storage and Recovery (ASR) Phase 1 and 2 projects in WY 2014; (5) performed pump test on second ASR Phase 2 injection well Seaside Middle School site; (6) Held regular coordination meetings with Cal-Am regarding needed infrastructure upgrades to deliver water supply to the ASR project wells at full capacity; (7) Conducted additional work related to alternative desalination plant sites; (9) Provided

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS IN FY 2013-2014
	technical support to the Monterey Regional Water Pollution Control Agency (MRWPCA) for the Groundwater Replenishment Project (GRP) and received presentations by MRWPCA; (10) Participated in CPUC hearing process on Cal-Am related rate requests. Other ongoing activities included: (1) Served as member of both the Seaside Basin Watermaster Board and as the Technical Advisory Committee; (2) Delivered several database products to the Watermaster and its consultants under the District's contract for the required Seaside Basin Monitoring and Management Plan; (3) Continued participation on technical committee regarding removal of San Clemente Dam and associated sediment management.
Allocate New Supply	Remained within Water Allocation Program limits.
Determine Drought Reserve	Rationing was not required due to maintenance of adequate storage reserve.
Steelhead Fishery Program	The surface flow of the Carmel River dropped to 10 cfs at the Highway 1 Bridge on April 16, 2013. In response to this decline, District staff began full-scale rescues on April 19. Rescues were conducted over a five-month period, April 19 – September 12, 2013 between Highway 1 Bridge (RM 1.0) and Robinson Canyon Road Bridge (RM 8.5). An additional one-mile reach between Boronda Road Bridge and DeDampierre Park in Carmel Valley Village (RM 12.6-13.6) was also rescued in September as the drought worsened. During this period staff completed 82 rescue days, yielding a total of 42,805 steelhead . Compared to previous rescue seasons, the rescue total in the 2013 dry season was two and a half times greater than the 1989-2013 average of 16,713 fish rescued.
Riparian Habitat Program	Continued revegetation efforts at exposed banks with little or no vegetation located between Via Mallorca and Esquiline Roads; Contracted to collect channel profile data and limited cross section data from the Carmel River for use in maintaining a long-term record and comparing to the past and future data; Made public presentations showing MPWMD-sponsored restoration work over the past 24 years; Continued long-term monitoring of physical and biological processes along the river in order to evaluate the District's river management activities; Continued the annual inspections of the Carmel River from the upstream end of the lagoon to Camp Steffani; Walked the entire river to observe and record erosion damage, conditions that

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS IN FY 2013-2014
	could cause erosion, riparian ordinance infractions, and the overall condition of the riparian corridor; Continued enforcement actions to address serious violations of District riparian ordinances; Carried out vegetation management activities; Developed an Integrated Regional Water Management Plan; Operated under Routine Maintenance Agreement with CDFW for MPWMD vegetation maintenance activities.
Lagoon Habitat Program	Provided technical expertise and data to multi-agency sponsors of lagoon restoration program; assisted Carmel Area Wastewater District to evaluate possible Lagoon augmentation with recycled water; facilitated Carmel River Lagoon Technical Advisory Committee meetings; pursued funding for the April 2007 *Final Study Plan for the Long-Term Adaptive Management of the Carmel River State Beach and Lagoon*; continued vegetation habitat monitoring; surveyed and analyzed four bathymetric transects; participated in interagency meetings regarding management of lagoon in winter storm events (see also steelhead efforts that benefit lagoon); conducted topographic, hydrology and wildlife surveys.
Aesthetic Measures	See Riparian Habitat Program measures.

II. HYDROLOGIC MONITORING

The Water Allocation Program EIR concluded that Water Supply Option V would have less-than-significant impacts on the water resources in the Monterey Peninsula area, and that no mitigation measures were required. This conclusion was based solely on changes to the hydrologic regime and not on changes to water-dependent resources. Impacts on water-dependent resources (e.g., riparian vegetation and wildlife and steelhead fishery) due to changes in the hydrologic regime were identified as significant in the EIR. Implementation of the mitigation measures proposed for the impacts on these water-dependent resources are described in subsequent sections. It was suggested in the EIR that the District continue and expand its current monitoring programs to establish baseline conditions for assessment of long-term changes (Finding No. 381). Accordingly, the District currently maintains ongoing precipitation, streamflow, storage, water-level and water-quality monitoring programs. These programs and the activities to implement them for Water Year 2014 (October 1, 2013 through September 30, 2014), are summarized below.

A. Precipitation Monitoring

Description and Purpose

During the period from October 1, 2013 through September 30, 2014, the District continued to process long-term precipitation records at Los Padres and San Clemente Dams collected by California American Water (CAW). District staff also records precipitation at its Monterey office located at Ryan Ranch, and receives daily rainfall reports from the National Weather Service climate station at Monterey. In addition, real-time and historical rainfall data for the Monterey Peninsula area can be accessed via the Internet. These data support a variety of District programs, including erosion control, riparian vegetation management and identifying long-term precipitation trends and hydrologic-year conditions.

Implementation and Activities During 2013-2014

Work during this period involved continuing maintenance of the existing precipitation monitoring network. A summary of daily precipitation at San Clemente Dam (SCD) during Water Year (WY) 2014 is shown in **Figure II-1**. The average annual recorded precipitation at this site for the period from 1922 through 2014 is 21.18 inches. In WY 2014, 10.61 inches of precipitation were recorded at SCD, which is 50 percent of average.

Figure II-2 shows a comparison of WY 2014 rainfall at SCD and the average monthly rainfall at this site. As indicated in **Figure II-2,** rainfall over the October through January period was extremely low at 1.21 inches for the four-month period that normally receives 11.19 inches (11% of average). This was the lowest October through January total since 1922 when record keeping began at SCD. The following February through April period received 9.34 inches of rainfall for the three-month period which was 97

percent of average. It should be noted that approximately one half (49%) of the total WY 2014 rainfall occurred during a four-day storm series from February 26 through March 1, 2014 that totaled 5.24 inches of rain as shown in **Figure II-1.** The highest daily rainfall total was 1.90 inches on February 28, 2014.

B. Streamflow Monitoring

Description and Purpose

Since its inception, the District has historically collected streamflow measurements at approximately 15 mainstem sites on the Carmel River and on 16 tributaries to the Carmel River. The District's current principal streamflow measuring sites within the Carmel River Basin (CRB) are shown on **Figure II-3**. Prior to 1991, the streamflow measurements were instantaneous measurements made by the current-meter method. In 1991, a concerted effort was made to upgrade the streamflow monitoring network as staff installed continuous recorders[1] at six selected tributary sites. Since that time, the District has continued to expand its streamflow monitoring network, which currently consists of 19 continuous-recording gaging stations.

Data collected at the District streamflow monitoring sites are analyzed for use in water-supply planning, fishery, riparian and erosion control programs. More specific uses of streamflow data include, but are not limited, to the items listed below:

- Defining the general hydrologic conditions in the basin
- Setting flow requirements for meeting aquatic life goals
- Monitoring compliance with minimum-flow requirements
- Forecasting water-supply availability
- Assessing and scheduling fish rescue activities
- Assessing effectiveness of riparian mitigations
- Evaluating surface and groundwater interaction
- Developing and calibrating hydrologic models
- Delineating and managing flood plains
- Evaluating and designing water-supply projects
- Providing data for forecasting floods and defining flood-recurrence intervals
- Assessing hydrologic impacts from water-development projects
- Supporting Aquifer Storage and Recovery (ASR) operations

Implementation and Activities During 2013-2014

During the 2013-2014 period, the District operated and maintained (O&M) 16 streamflow gaging stations within the CRB/District Boundary. In addition, continuous water-level data were collected at both Los Padres and San Clemente Reservoirs, and at

[1] The District utilizes both float gages and data recorders with pressure transducers to monitor stream stage.

the Carmel River Lagoon. The District continuous recording gaging stations are listed below:

Tributary/other
Finch Creek
Cachagua Creek
Pine Creek
San Clemente Creek
Tularcitos Creek
Hitchcock Creek
Garzas Creek near Lower Garzas Canyon
Garzas Creek at Garzas Road
Potrero Creek
Robinson Canyon Creek
San Jose Creek
Arroyo del Rey at Del Rey Oaks

Mainstem
Carmel River below Los Padres Reservoir
Carmel River at Sleepy Hollow Weir
Carmel River at Don Juan Bridge
Carmel River at Highway 1 Bridge
Carmel River above Los Padres Reservoir (non-recording)

Continuous Water Level
Los Padres Reservoir
San Clemente Reservoir
Carmel River Lagoon

Streamflow gaging station O&M at each of the above sites involves obtaining monthly discharge measurements, maintaining recording equipment, obtaining staff gage readings and occasional surveying. Subsequently, river/creek stage and discharge data are processed in-house to produce mean daily streamflow records for the sites. **Table II-1** summarizes the computed annual flows in acre-feet (AF) for the District sites for the WY 1992-2014 period. In addition, **Table II-1** includes annual flow values for the two mainstem sites operated by the U.S. Geological Survey (USGS) for the 1992-2014 period.

During the 2013-2014 period, District staff continued to maintain the existing streamflow monitoring network. Streamflow within the Carmel River Basin during WY 2014 was classified as "critically dry", as further described below. Work within this period involved collecting numerous, routine streamflow measurements by the current meter method, in order to refine the stage/discharge relation at the gaging stations. In addition, several low-flow measurements were obtained at the sites utilizing a three-inch modified Parshall Flume.

In WY 2014, staff continued to access seven of the 19 gage sites listed above via telecommunications hardware in order to post current surface-water data on the District's website. Current streamflow data are downloaded, processed and posted to the District's web site to improve data dissemination to public agencies and private groups. These streamflow data can be accessed via the "Carmel River Flows" section of the District's web site and include the following Carmel River (CR) mainstem gage locations:

CR below Los Padres Reservoir
CR at Sleepy Hollow Weir
CR at Don Juan Bridge
CR at Highway 1 Bridge

In addition, the "CR Lagoon Water Levels" section of the District's web site provides access to continuous Lagoon water-level data which are updated daily or weekly.

- **Summary of Streamflow Conditions --** Streamflow during WY 2014 within the CRB was classified as "critically dry". The highest peak streamflow event of the year along the CR occurred on March 1, 2014, and reached 520 cfs at the CR at Don Juan Bridge site. Due to the cumulative effects of WY 2012-2013 drought conditions and associated low Carmel Valley Alluvial Aquifer storage levels, this peak flow decreased to 25 cfs at the USGS CR near Carmel gaging station on March 2, 2014, and did not reach the District's CR at Highway 1 Bridge site which recorded zero CR mainstem flow in WY 2014.

During WY 2014, 6,970 acre-feet (AF) of unimpaired runoff were estimated at San Clemente Dam. This total represents 10% of the average annual runoff (67,800 AF) expected at San Clemente Dam. As indicated above, CR streamflow did not reach the CR Lagoon in WY 2014. Accordingly, the CR Lagoon remained closed to the ocean with no lagoon breaching events throughout WY 2014.

C. Carmel River Lagoon Water-Level Monitoring

Description and Purpose

Since 1987, the District has monitored the level of surface water in the CR Lagoon. The water level is monitored with a continuous recorder located in the South Arm of the Lagoon that utilizes pressure transducer technology. The water-level data have been used, in part, to support technical studies for use by the Carmel River Steelhead Association, California Department of Parks and Recreation, California Coastal Conservancy, California Department of Fish and Wildlife, Monterey County Water Resources Agency (MCWRA), Monterey County Public Works Department (MCPWD) and MPWMD. In addition, the water-level data are monitored by the MCWRA via their ALERT system to enhance flood warning for residents located along the northern margin of the Lagoon and wetland.

Implementation and Activities During 2013-2014

During the 2013-2014 period, District staff continued to maintain the continuous water-level recorder located in the South Arm of the Lagoon, and a complete record of water-level readings (i.e., 15-minute intervals) was obtained. Staff continued to utilize the telecommunications capability established at the Lagoon gage in September 2007 to post Lagoon water-level data on to the District's website. These continuous water-level data are plotted and posted on the District website under the "Carmel River Lagoon Water Levels" section approximately weekly. This allows interested parties to access the data to view recent water-level trends.

Water Year (WY) 2014 was the first year since WY 1990 that the Lagoon remained closed to the ocean for the entire year. The annual Lagoon water-surface elevation plot shown in **Figure II-4** illustrates the relatively static water levels that occurred during WY 2014. In WY 2014, the Lagoon water level ranged between approximately 2.5 and 5.5 feet, as the CR did not flow to the Lagoon and therefore, did not fill significantly or breach. In general, rising levels in **Figure II-4** (generally one foot or less) were caused by occasional episodes of ocean wave over-topping of the beach berm at the mouth or local rainfall runoff, with declining levels primarily associated with ocean-ward seepage through the sandy beach berm.

U:\mpwmd\Allocation\Annual Mit. Report RY 2014\RY 14 - Place your Files in This folder\II Precipitation, Streamflow, Lagoon Water Level Monitoring\GJSection II hydrologic monitoring_JOedit.docx

Figure II-1
San Clemente Reservoir Daily Rainfall: Water Year 2014

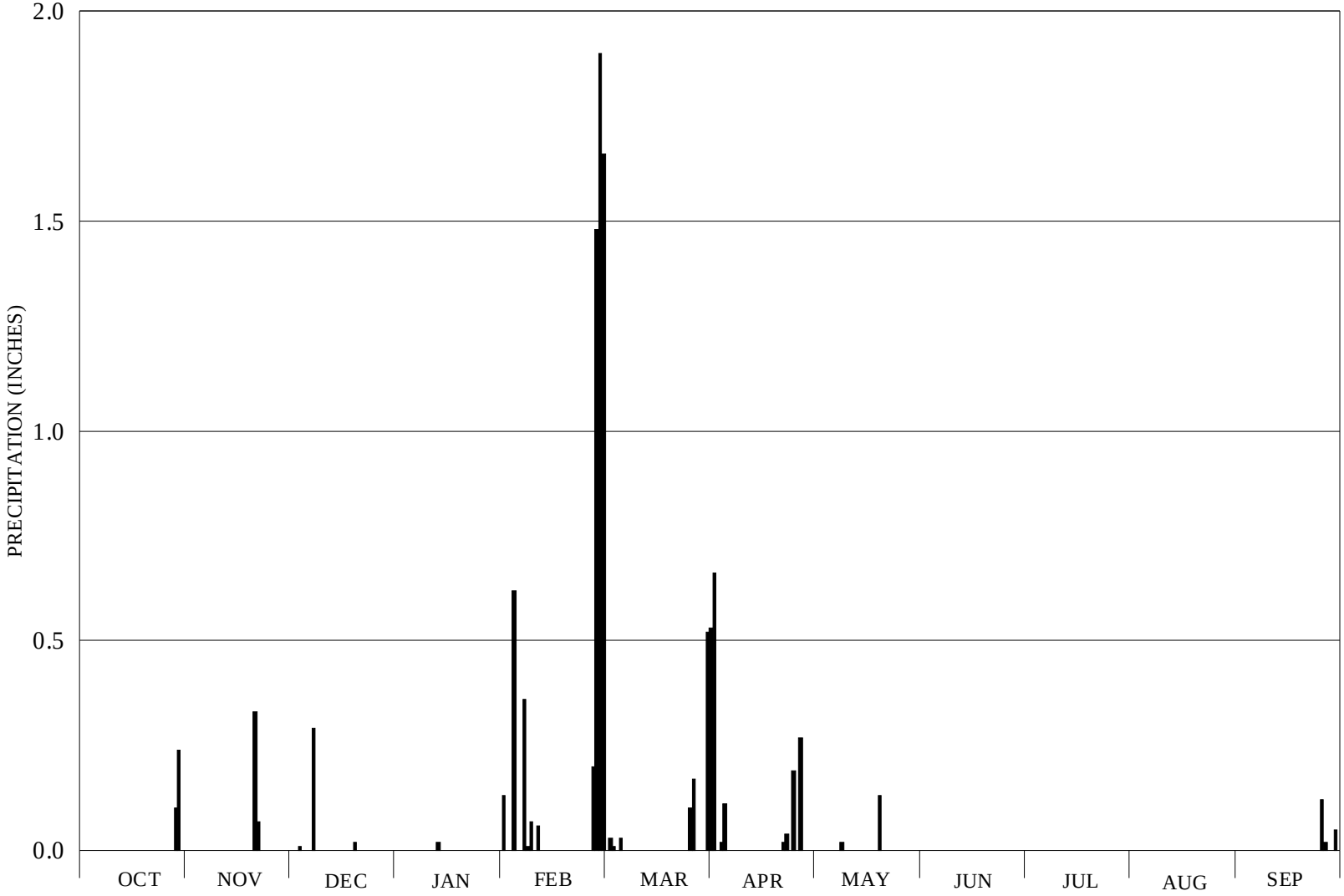


Figure II-2
Monthly Distribution of Rainfall at San Clemente Reservoir
Water Year 2014 Compared to 1922-2014 Long-Term Average

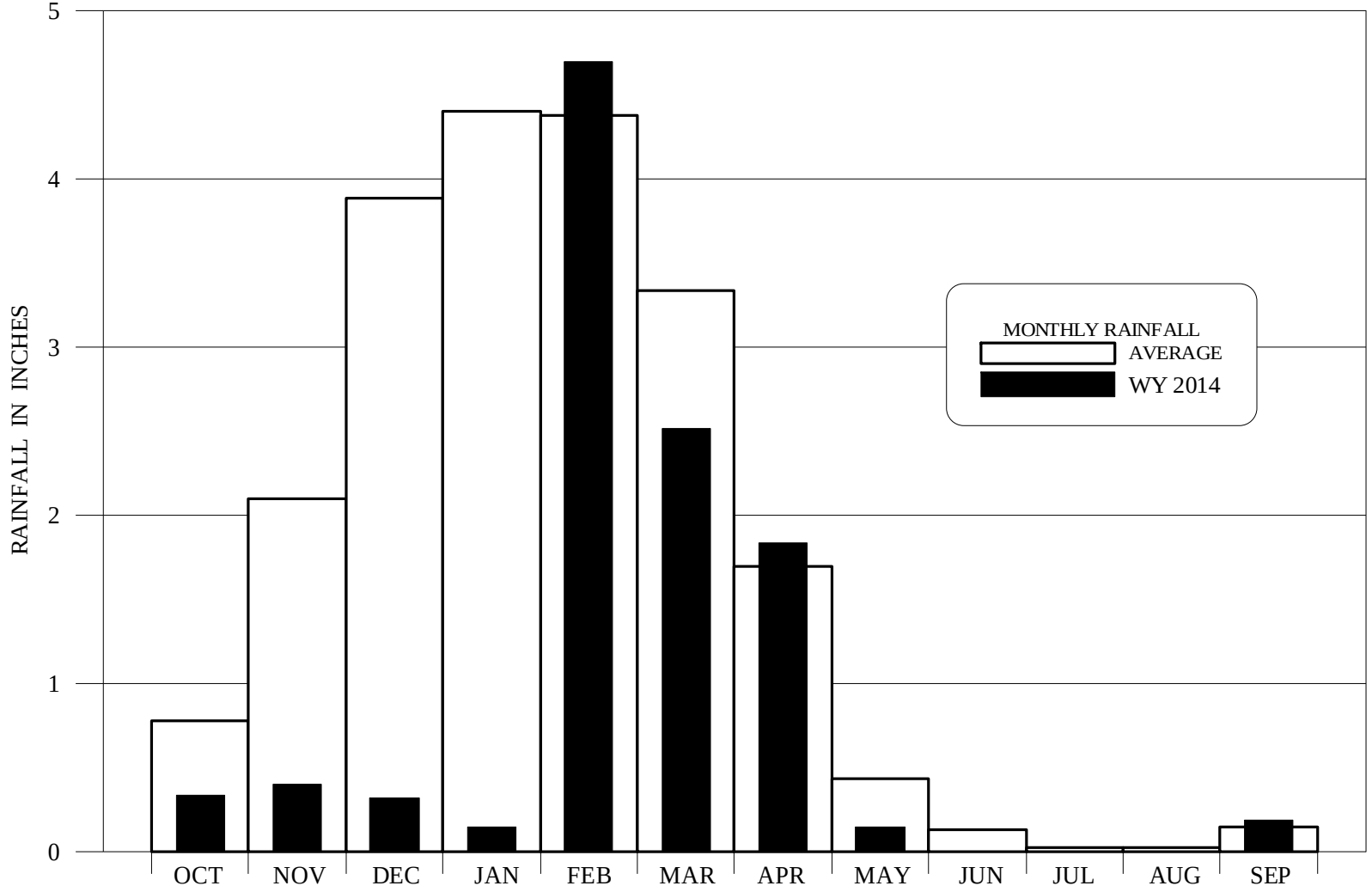


Figure II-3
Carmel River Basin Principal Streamflow Gaging Stations

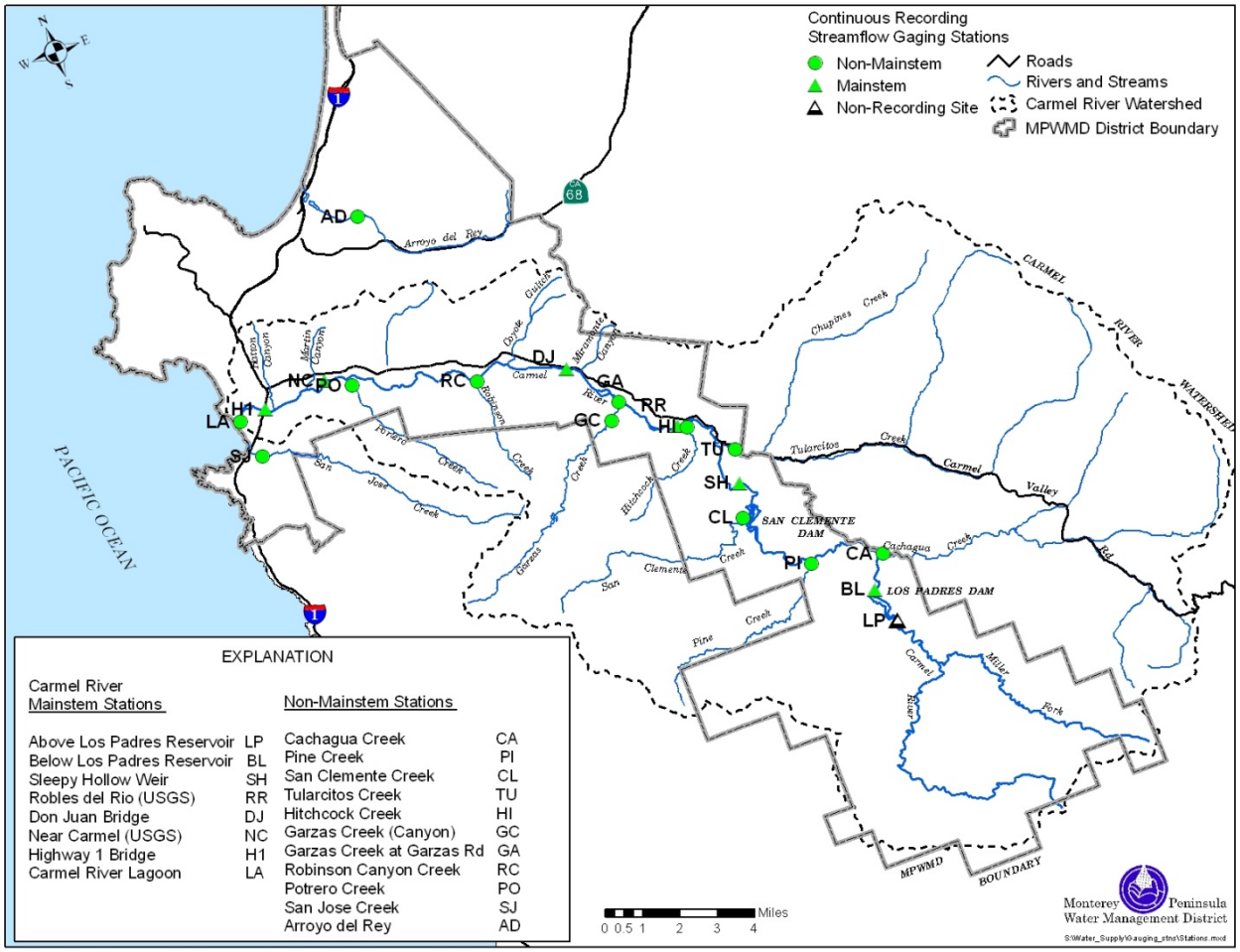


Figure II-4
Carmel River Lagoon Water Level

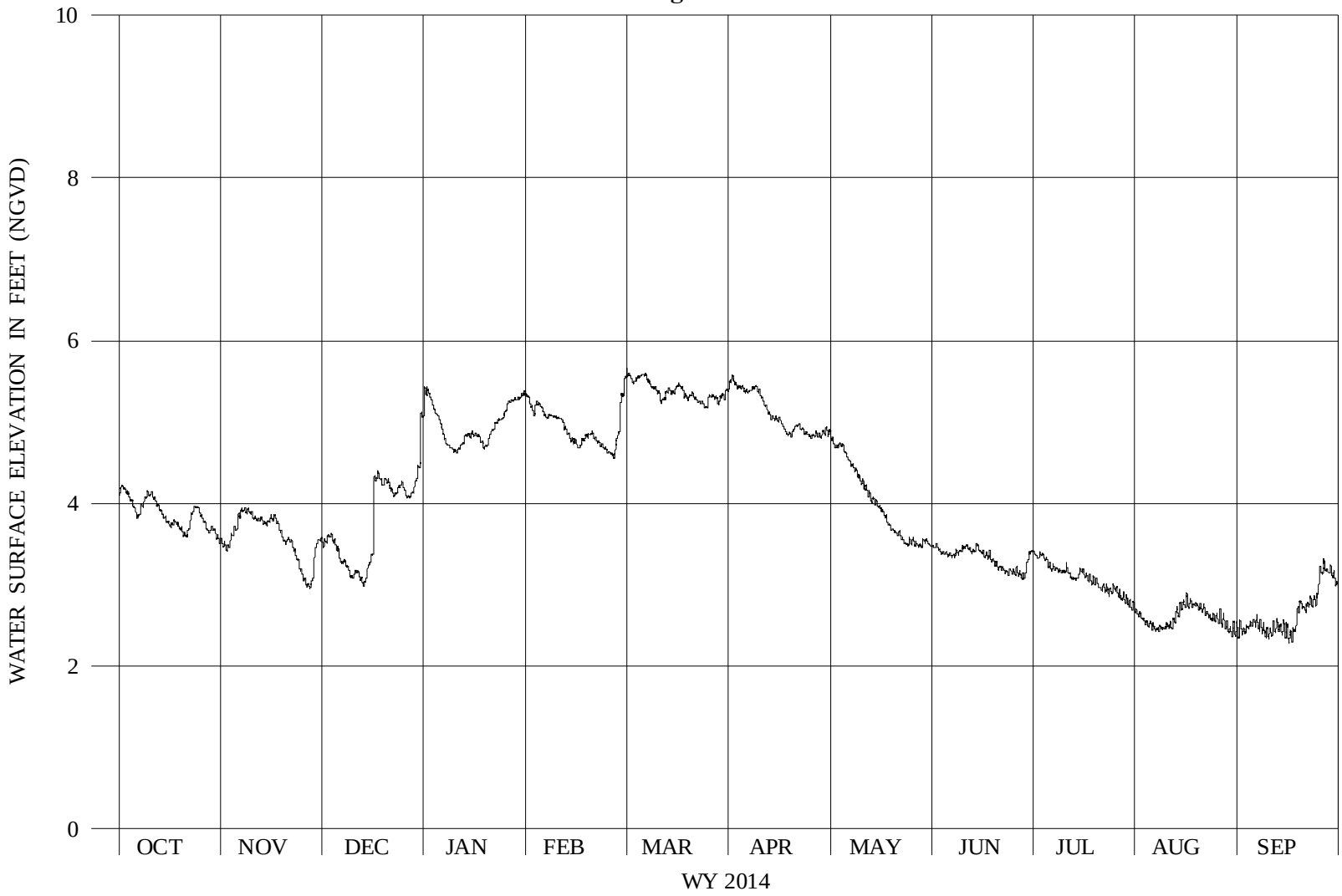


Table II-1
CARMEL RIVER BASIN - ANNUAL STREAMFLOW SUMMARY
WATER YEARS 1992 - 2014
(Values in Acre-Feet)

TRIBUTARY SITES	Drainage Area (Sq.Mi.)	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CACHAGUA CREEK	46.3	1,780	7,340	560	16,320	3,840	4,990	23,800	2,590	1,730	1,500	245	1,270	1,250	4,340	5,210	261	2,200	*1,020*	*5,030*	*5,320*	*695*	*237*	0
PINE CREEK	7.8	3,750	9,800	1,230	11,110	6,550	8,300	15,610	4,540	5,300	3,270	2,300	4,250	2,350	8,910	8,020	849	3,840	2,830	6,130	6,960	1,310	1,870	406
SAN CLEMENTE CREEK	15.6	5,450	17,070	1,820	20,580	9,310	14,100	33,380	7,130	9,830	5,340	3,270	5,850	3,720	16,330	13,720	1,360	5,520	4,270	9,950	12,950	1,960	2,570	469
TULARCITOS CREEK	56.3	635	3,220	444	5,100	1,650	2,450	22,610	3,810	2,450	1,490	630	552	503	1,000	2,480	503	917	405	1,140	1,430	452	327	n/a
HITCHCOCK CREEK	4.6	*	*	52	1,820	451	716	2,970	169	482	214	18	274	234	863	691	2	383	151	549	629	6	57	0
GARZAS CREEK	13.2	3,700	11,170	746	12,140	4,890	8,570	24,610	5,050	4,980	3,070	1,200	2,760	1,810	8,590	7,420	381	3,010	2,500	5,720	7,620	641	1,320	n/a
ROBINSON CANYON CR.	5.4	619	2,360	89	2,230	619	1,430	6,890	545	823	433	82	448	354	1,710	1,010	25	455	451	1,120	1,150	40	153	n/a
POTRERO CREEK	5.2	*	*	30	1,790	506	1,210	5,970	855	1,020	310	43	210	164	1,470	1,050	13	308	354	983	1,170	14	50	0
SAN JOSE CREEK	14.2	*	*	*	*	*	*	*	6,400	6,260	2,890	1,100	1,880	1,480	7,640	6,870	862	1,740	2,330	5,220	5,760	*1,200*	*1,540*	n/a
MAINSTEM SITES																								
CR AT ROBLES DEL RIO	193	38,240	109,000	11,800	155,000	75,210	99,340	250,300	54,640	76,750	47,180	31,850	60,560	38,060	114,400	110,100	12,220	49,080	45,930	104,540	110,300	20,750	*31,970*	*6,410*
CR AT DON JUAN BRIDGE	216	*	122,000	12,760	173,600	83,090	111,800	252,200	53,570	73,960	49,360	31,330	60,420	38,330	121,800	118,300	12,150	52,510	*47,410*	*106,300*	*116,500*	*20,820*	*28,340*	*5,600*
CR NEAR CARMEL	246	35,570	123,400	8,200	177,400	74,500	104,100	261,100	55,000	76,190	47,790	28,340	55,400	35,220	119,200	119,200	7,440	43,960	43,960	105,840	115,800	17,120	*24,390*	*517*
CR AT HIGHWAY 1 BRIDGE	252	*	123,000	7,410	179,500	83,430	112,000	280,900	50,810	72,660	42,860	24,860	52,000	30,300	115,200	115,000	6,470	42,520	*39,170*	*102,700*	*111,200*	*16,410*	*24,520*	*26*

Notes: 1. Carmel River (CR) at Robles del Rio and near Carmel sites are maintained by the USGS.
2. (*) No continuous stage data collected.
3. Streamflow sites listed in downstream order.
4. San Jose Creek is outside the Carmel River Basin, but is shown for comparison.
5. WY 1992-2008 values are FINAL. WY 2009-2014 DRAFT values shown in italic.

III. Carmel River Surface Water-Quality Monitoring

Description and Purpose

This monitoring is used to help assess whether or not water-quality criteria for aquatic life are being met in various reaches of the Carmel River, and whether habitats for resources such as Carmel River steelhead (*Oncorhynchus mykiss*) and red-legged frogs (*Rana aurora draytonii*) are being sustained or impaired. Monitoring also provides District staff with the ability to measure trends over extended time periods. These data are used for recommending appropriate reservoir release schedules, determining timing of fish rescues and as an indicator of habitat quality.

Since 1991, surface-water quality data have been collected at three sampling stations along the Carmel River on a semi-monthly basis. The locations of the sampling stations are as follows: (1) below Los Padres Reservoir (BLP) at River Mile (RM) 25.4, (2) below San Clemente Reservoir at the Sleepy Hollow Weir (SHW) at RM 17.1, and (3) at the Carmel River Lagoon (CRL) at RM 0.1. River miles are measured from the mouth of the Carmel River. Monitoring at these specific stations gives District staff information on the quality of water released from each reservoir and in the surface layer of the lagoon.

District staff also monitors river temperatures continuously at six locations within the Carmel River Basin (**Figure III-1**). The objective is to document the temperature regime in different stream reaches and to determine whether water-quality criteria for maximum stream temperatures are exceeded. In addition, these data allow District staff to monitor changes in the thermal regime of the river over time.

Implementation and Activities During 2013-2014

District staff carried out a semi-monthly surface water quality sampling program for the Reporting Year (RY) 2013 (July 1, 2013 to June 30, 2014); data were collected for the following chemical and physical parameters (units in parentheses): temperature (°F), dissolved oxygen (mg/L), carbon dioxide (mg/L), pH, specific conductance (µS/cm), salinity (ppt), and turbidity (NTU). The emphasis for this suite of parameters is on the suitability for rearing juvenile steelhead. In addition, continuous recording temperature data loggers (Optic StowAway temperature data loggers from the Onset Computer Corporation) were deployed at six locations on the Carmel River (**Figure III-1**), as follows:

1.	ALP	Above Los Padres Reservoir	(RM 27.0)
2.	BLP	Below Los Padres Reservoir	(RM 25.4)
3.	ASC	Above San Clemente Reservoir	(RM 18.5)
4.	SHW	Sleepy Hollow Weir	(RM 17.1)
5.	GAR	Garland Park	(RM 10.8)
6.	SAL	South Arm Lagoon	(RM 0.1)

The District continued its vertical profiling program on the Carmel River Lagoon, on a monthly basis during RY 2014 (see plots in **Appendix III-1**). Vertical profiling helps better understand seasonal changes in the limnological cycles, such as stratification, internal mixing, community respiration, and how that relates to available habitat for steelhead. Monthly water-quality reports were distributed to the Carmel River Lagoon Technical Advisory Committee to aid in the Carmel River Lagoon management.

The following paragraphs describe the results of the semi-monthly data collection and the continuous temperature recorders at specific sampling stations.

- **Carmel River Lagoon--** The water-temperature monitoring station for the Carmel River Lagoon is located in the south arm of the lagoon on the Carmel Area Wastewater District (CAWD) effluent discharge pipe. This station had operational difficulties associated with it during RY 2014. Staff continues to apply adaptive strategies to correct these difficulties. During RY 2014, the only reliable data collected at the water-temperature station ranged from May 5, 2014 to June 30, 2014, and are shown in **Figure III-2**. The maximum annual water temperature during this period was 77.0°F, occurring on June 29, 2014. The overall average water temperature was 70.8°F and the maximum daily average temperature was 74.6°F. Constant water temperatures over 68°F are considered stressful for steelhead (Brungs and Jones, 1977). Average daily water temperatures over 68°F occurred 45 times. This represents 94% of the time during the sampling period (May 5 to June 30, 2014). Surface water-quality data collected at the CRL station, which is located on the south side of the main body of the lagoon, are listed in **Table III-1**. Data was not collected during April, May and June 2014, because staff was fully occupied with fish rescues and trapping. Although vertical profiling did occur during May and June 2014, data is graphically shown in **Appendix III-1**. The vertical profiling data is summarized below in the conclusions/and or recommendations section. The minimum dissolved-oxygen measurement recorded during surface water-quality sampling was 8.5 mg/L. The pH measurements ranged from 7.5 to 8. Carbon dioxide measurements ranged from 10 to 35 mg/L. Variability in carbon dioxide is usually caused by an increase of marine organic debris entering the lagoon during high surf events. Carbon dioxide is a byproduct of decomposition of this material. Fish located in waters with free carbon dioxide concentrations above 20 mg/L can show signs of distress (Wedemeyer, 1996). The conductivity measurements ranged from 1,739 to 15,285 µS/cm. The surface salinity ranged from 0.8 to 12.4 ppt. The conductivity and salinity are highly variable at the lagoon due to tidal influences and river inflows. The turbidity measurements ranged from 0.8 to 4.9 NTU during the sampling period.

- **Garland Park--** Water temperature for the Garland Park (GAR) station is shown in **Figure III-3**. This station had a corrupt data logger resulting in a loss of data during the reporting year. The sampling period with reliable data for this station was July 1, 2013 to November 11, 2013. The maximum annual water temperature was 65.2°F, occurring on July 4, 2013. The overall average water temperature during the reporting year at this station was 59.6°F. Maximum daily average water

temperature was 62.9°F, occurring on September 2, 2013. Daily average water temperatures were within adequate range for steelhead rearing during the entire sampling period.

- **Sleepy Hollow Weir--** Water temperature for the Sleepy Hollow Weir (SHW) station is shown in **Figure III-4**. The data recorder malfunctioned at this site during the period of November 20, 2013 to June 30, 2014 and data are not included in the summary statistics provided below. The sampling period that is included is July 1, 2013 to November 19, 2013. The maximum annual water temperature was 71.0°F, occurring on July 2, 2013. The overall average water temperature during the sampling period at this station was 61.0°F. The maximum daily average water temperature was 68.9°F, occurring on July 1, 2013. Constant water temperatures over 68°F are considered stressful for steelhead (Brungs and Jones, 1977). Average daily water temperatures over 68°F occurred 4 times, all in July 2013. This represents 2.8% of the time during the sampling period. The Water-quality data collected at this station are listed in **Table III-2**. Data was not collected during April, May and June 2014, because staff was fully occupied with fish rescues and trapping. The dissolved-oxygen measurements recorded ranged from 8.8 to 11.7 mg/L. Carbon-dioxide measurements ranged from 5 to 25 mg/L. The pH measurements ranged from 7.0 to 8.0. The conductivity measurements ranged from 158 to 384 µS/cm and the turbidity measurements recorded were between 0.5 to 7.9 NTU.

- **Above San Clemente Reservoir--** Water temperature for the Above San Clemente (ASC) station is shown in **Figure III-5**. This station had a corrupt data logger resulting in a loss of data during the reporting year. The sampling period with reliable data for this station was July 1, 2013 to November 5, 2013. The maximum annual water temperature was 69.2°F, occurring on July 4, 2013. The overall average water temperature during the reporting period at this station was 59.9°F. Maximum daily average water temperature at this station was 66.3°F, occurring on July 4, 2013. Daily average water temperatures were within adequate range for steelhead rearing during the entire sampling period.

- **Below Los Padres Reservoir--** Water temperature for the Below Los Padres (BLP) station is shown in **Figure III-6**. This station had a corrupt data logger resulting in a loss of data during the reporting year. The sampling period with reliable data for this station was July 1, 2013 to November 5, 2013. The maximum annual water temperature observed was 72.3°F, occurring on September 9, 2013. The overall average water temperature observed at this station during the sampling period was 63.6°F. The maximum daily average water temperature at this station was 70.8°F, occurring on September 9, 2013. Average daily water temperatures over 68°F occurred 33 times. This represents 26% of the time during the sampling period and is directly related to reservoir water levels and releases. Water quality data collected at this station are listed in **Table III-3**. . Data was not collected during April, May and June 2014, because staff was fully

occupied with fish rescues and trapping. Water quality at this station is highly influenced by reservoir water quality and release location. The dissolved oxygen measurements recorded ranged from 6.0 to 11.1 mg/L. Carbon dioxide measurements ranged from 10 to 35 mg/L. The pH measurements ranged from 7.0 to 7.5. The conductivity measurements ranged from 190 to 394 µS/cm and the turbidity measured at this station ranged from 0.6 to 20.2 NTU.

- **Above Los Padres Reservoir--** Water temperature for the Above Los Padres (ALP) station is shown in **Figure III-7**. This station had a corrupt data logger resulting in a loss of data during the reporting year. The sampling period with reliable data for this station was July 1, 2013 to November 14, 2013. The maximum annual water temperature was 67.4°F, occurring on July 4, 2013. Average water temperature during the reporting period was 58.4°F. Maximum daily average water temperature at this station was 65.8°F, occurring on July 4, 2013. Daily average water temperatures were within the adequate range for steelhead rearing during the entire reporting year.

CONCLUSIONS AND/OR RECOMMENDATIONS:

Water temperatures above Los Padres Reservoir, were adequate for steelhead rearing during the entire sampling period. Water released from Los Padres Reservoir during late summer and fall period exhibited water-quality conditions that were considered stressful to steelhead rearing. This potently reduced growth rates or displaced fish to other sections of river that had more favorable conditions. Water-quality conditions at the sampling sites around the San Clemente Reservoir were adequate for steelhead, with the exception of stressful water temperatures in late summer. Water temperatures down in the Garland Park area were adequate during the entire sampling period.

Water-quality conditions in the Carmel River Lagoon during the summer through early winter (June 2013 through January 2014) were commonly within stressful ranges and likely decrease growth and survival rates of rearing steelhead. This is mainly caused by a lack of river inflow and variability in tidal influences. These factors can dramatically change the water-quality dynamics in the lagoon depending on their outcomes. During the RY 2014, lagoon water levels were low most of the rearing season, this promoted aggressive growth of aquatic vegetation, which in turn causes diurnal variability in dissolved oxygen and carbon dioxide. Suboptimal dissolved oxygen and carbon dioxide measurements were observed in fall season. Water temperatures were commonly at stressful levels for rearing steelhead during the summer and late fall period. Salinity readings were only in stressful ranges during the winter of 2014, when wave over wash entered the lagoon and no freshwater input was occurring. Overall, the biggest threat to steelhead rearing in the lagoon continues to be the high water temperatures observed in the summer and fall rearing period, causing fish to be displaced and reducing the amount of habitat available for favorable rearing.

Figure III-1
Temperature and Semi-Monthly Water Quality Monitoring Locations in the Carmel River Basin During RY 2014

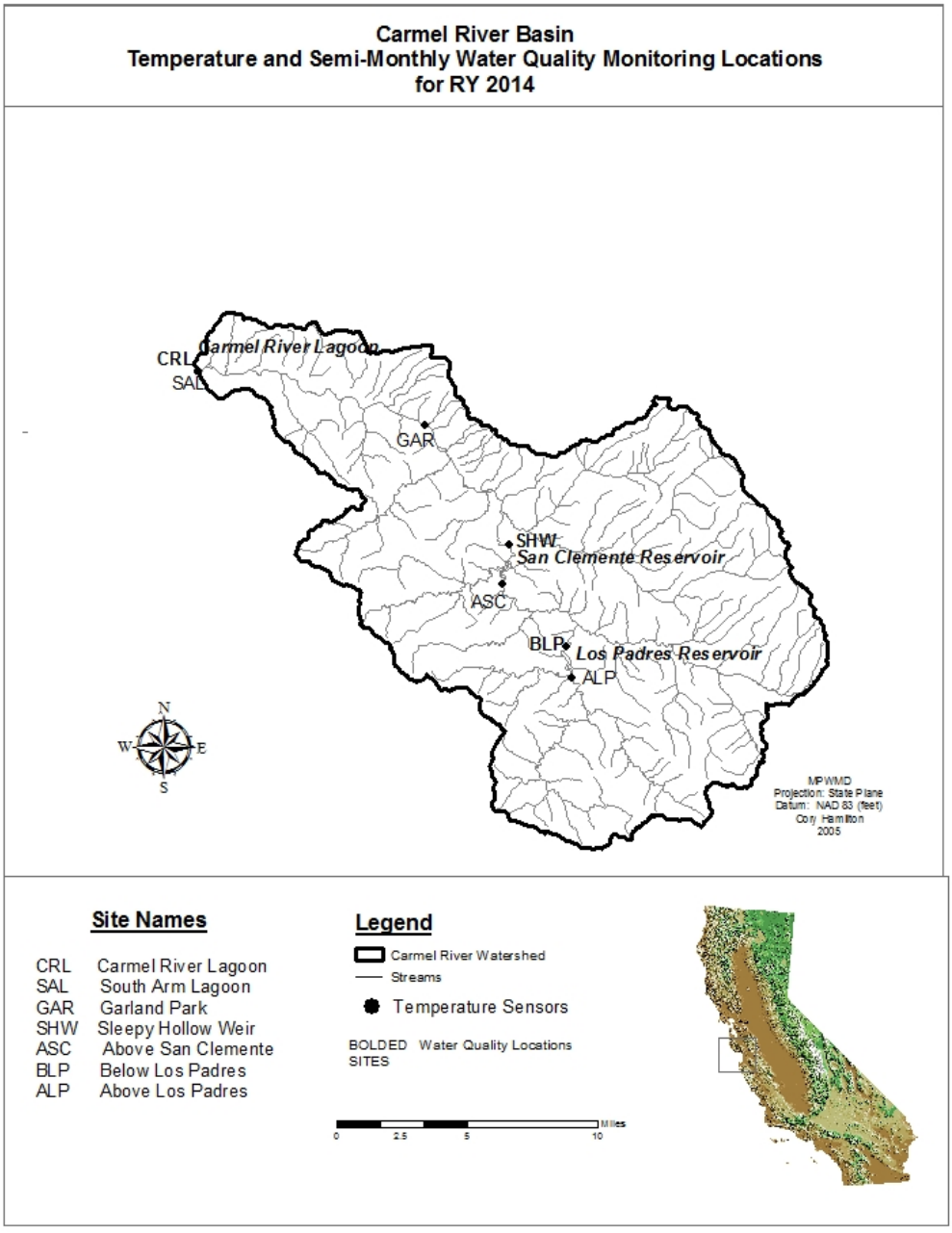


Figure III-2
Daily temperatures recorded from a continuous temperature data logger at the South Arm Lagoon (SAL) station during RY 2014

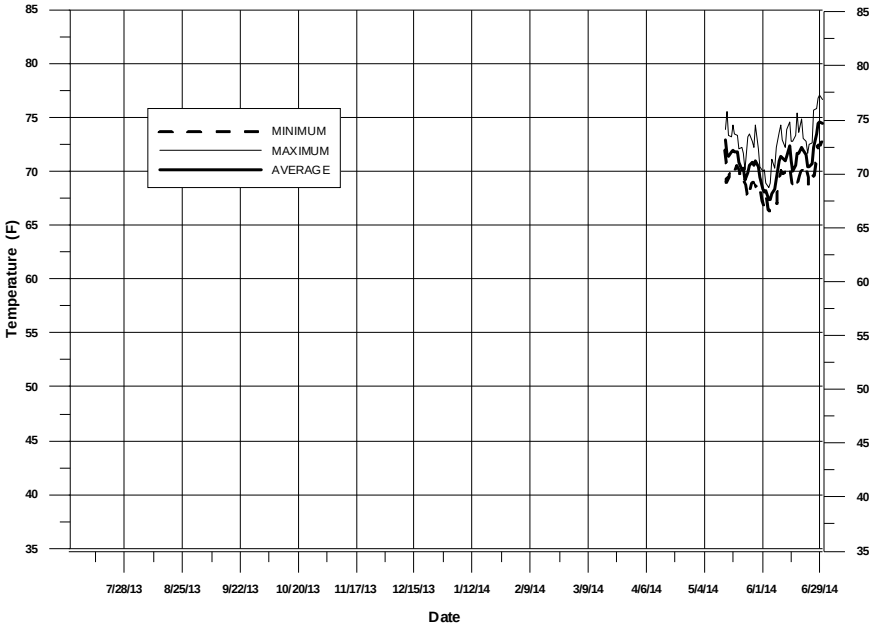


Figure III-3
Daily temperatures recorded from a continuous temperature data logger at the Garland Park (GAR) station during RY 2014

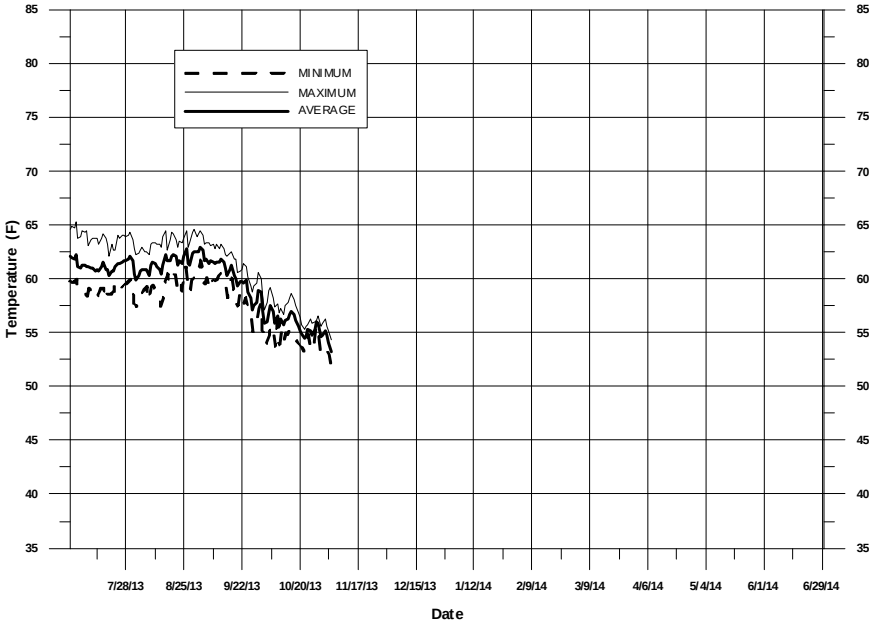


Figure III-4
Daily temperatures recorded from a continuous temperature data logger at the Sleepy Hollow Weir (SHW) station during RY 2014

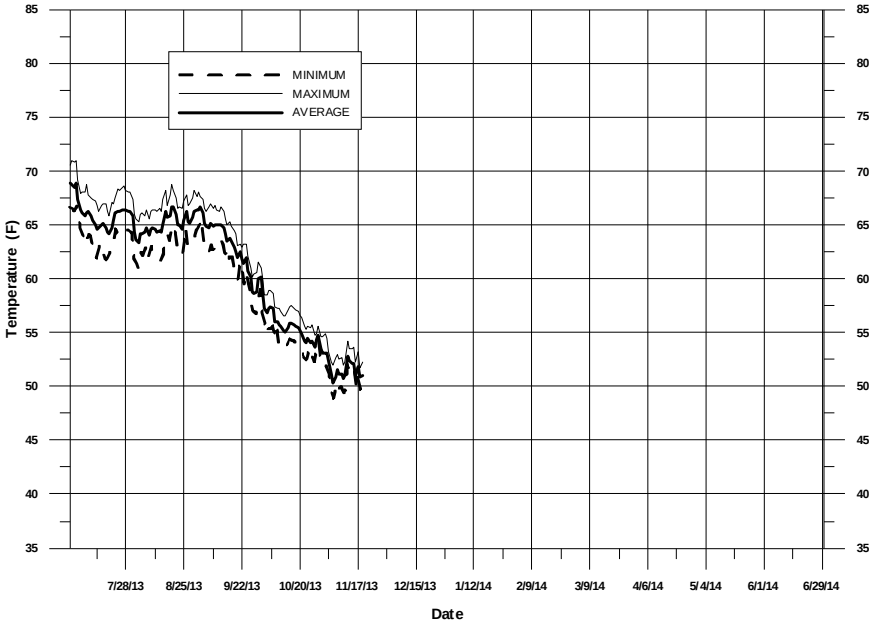


Figure III-5
Daily temperatures recorded from a continuous temperature data logger at the above San Clemente (ASC) station during RY 2014

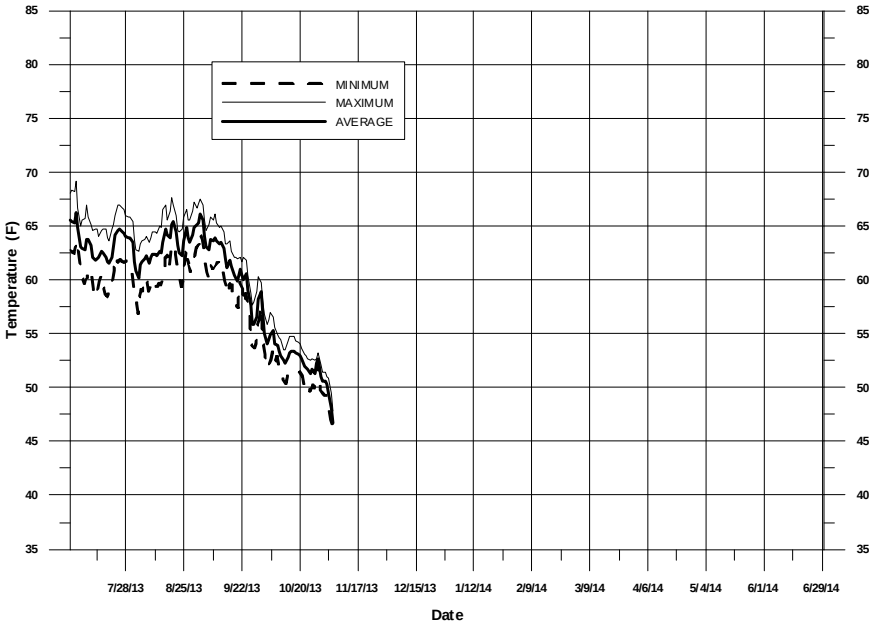


Figure III-6
Daily temperatures recorded from a continuous temperature data logger at the Below Los Padres (BLP) station during RY 2014

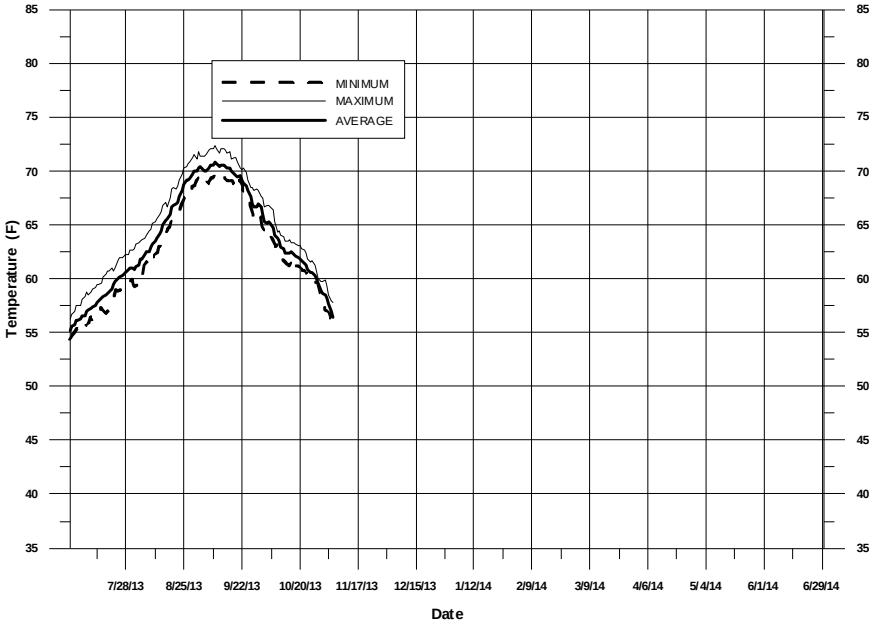


Figure III-7
Daily temperatures recorded from a continuous temperature data logger at the Above Los Padres (ALP) station during RY 2014

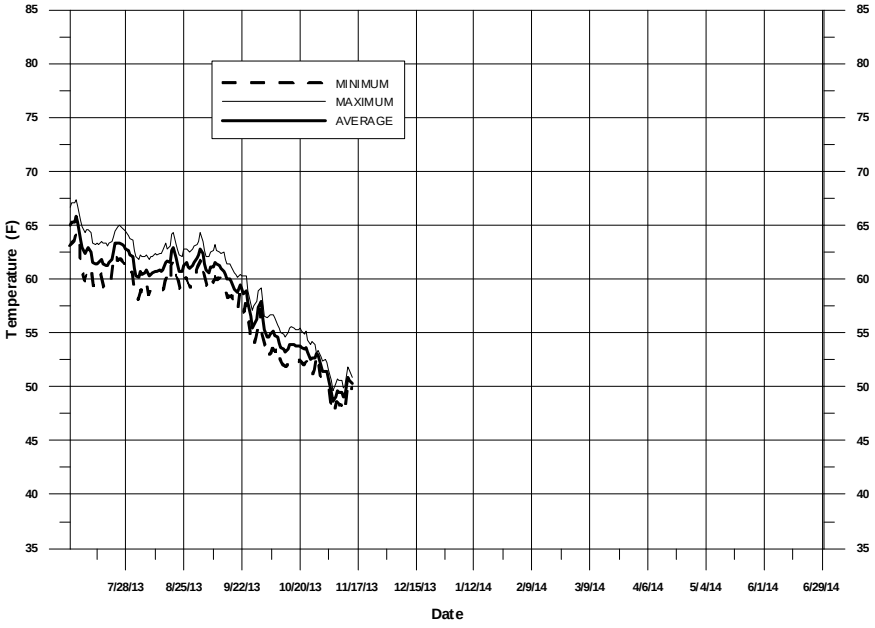


Table III-1
Water quality data collected by MPWMD during RY 2014 at Carmel River Lagoon (CRL) site.

Date	Time 24 Hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Nacl (ppt)	Turbidity (NTU)	WSE (ft)
7/16/13	1340	70.0	9.0	15	8.0	3475	1.8	1.1	3.3
8/6/13	840	65.7	8.7	15	8.0	3404	2.1	0.8	3
8/23/13	820	69.4	9.5	15	8.0	2218	1.2	1.2	3.25
9/6/13	150	73.2	8.7	15	8.0	1739	0.9	1.1	3
9/19/13	240	71.2	10.3	15	8.0	1814	0.8	1.2	3.3
10/17/13	920	56.5	10.0	25	8.5	3666	1.9	4.4	4
10/25/13	1330	61.9	11.0	35	8.0	3658	1.8	4.9	4.14
11/8/13	1100	53.4	9.0	25	8.0	4345	3.2	1.3	4.24
11/21/13	1027	57.7	8.6	25	8.0	4341	3.0	1.5	3.74
12/12/13	1025	41.9	11.7	25	8.0	3500	3.0	2.3	3.52
1/8/14	1108	52.7	10.5	25	7.5	15285	12.4	3.5	4.92
2/27/14	1225	59.1	8.5	10	8.0	5130	6.2	1.5	4.96
3/18/14	1230	60.3	8.8	10	8.0	6948	4.7	1.6	5.48
Minimum		41.9	8.5	10.0	7.5	1739	0.8	0.8	3.0
Maximum		73.2	11.7	35.0	8.5	15285	12.4	4.9	5.5
Average		61.0	9.6	19.6	8.0	4579	3.3	2.0	

Table III-2
Water quality data collected by MPWMD during RY 2014 at Sleepy Hollow Weir (SHW) station.

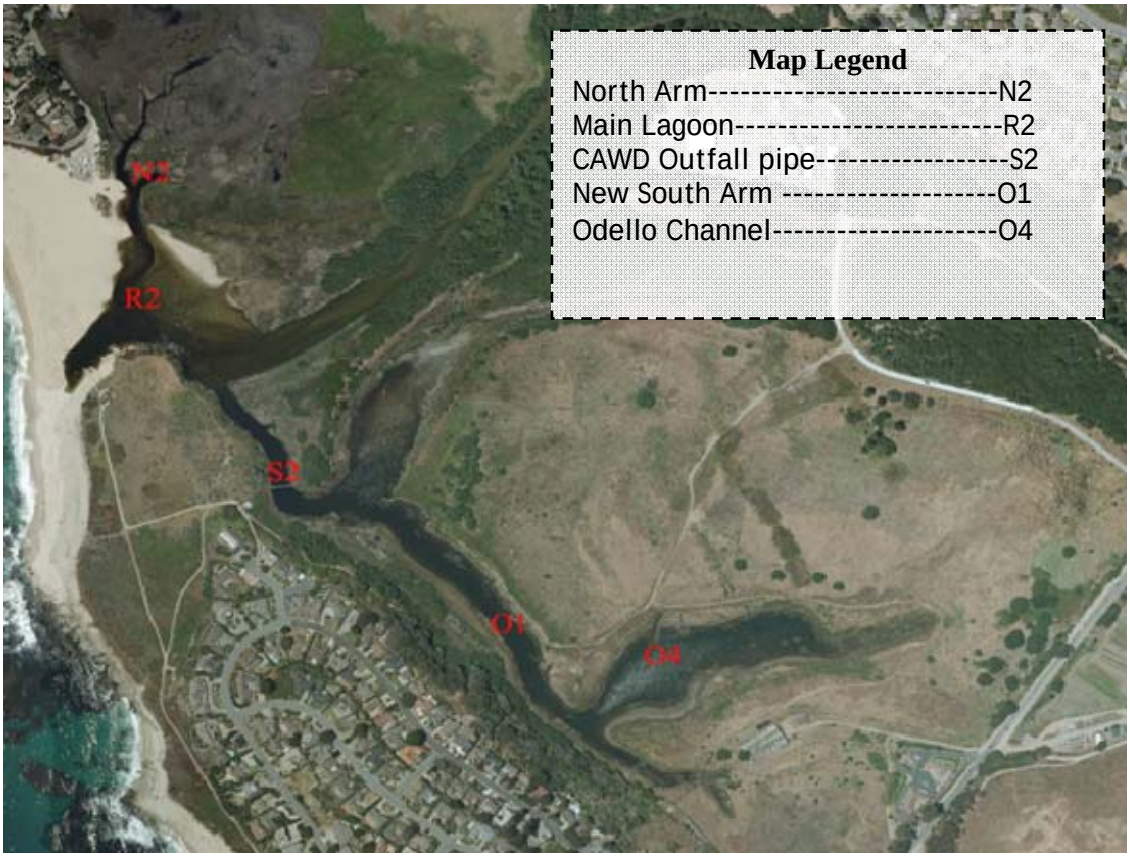
Date	Time 24 hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Turbidity (NTU)
7/16/2013	1240	65.1	8.8	15	7.5	274	4.5
8/6/2013	1210	63.5	11.7	15	7.5	272	4.9
8/23/2013	1200	64.4	9.2	15	7.5	273	5.1
9/6/2013	1115	63.7	8.8	15	7.5	275	5.3
9/19/2013	935	60.4	8.8	15	7.5	271	6.3
10/17/2013	1150	54.5	9.0	25	8.0	276	5.5
10/25/2013	1430	54.3	11.0	20	7.5	285	4.2
11/8/2013	745	49.5	10.0	25	8.0	384	3.3
11/21/2013	1256	54.5	10.0	25	7.5	295	2.7
12/12/2013	1240	41.7	11.2	20	7.0	253	2.5
1/8/2014	850	46.0	10.8	25	8.0	287	5.4
2/27/2014	439	56.0	9.5	10	8.0	312	7.9
3/18/2014	1110	52.9	10.6	10	8.0	158	0.5
Minimum		41.7	8.8	10.0	7.0	158	0.5
Maximum		65.1	11.7	25.0	8.0	384	7.9
Average		55.9	9.9	18.1	7.7	278	4.5

Table III-3
Water quality data collected by MPWMD during RY 2014 at Below Los Padres (BLP) station.

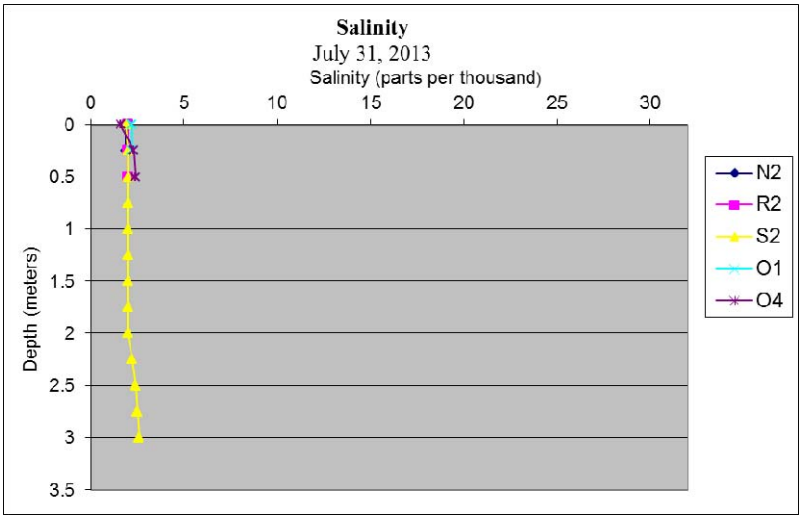
Date	Time 24 hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Turbidity (NTU)
7/16/2013	1054	58.3	11.1	20	7.5	206	1.79
8/6/2013	1040	62.4	9.6	15	7	233	7.64
8/23/2013	1035	67.6	8.2	15	7	260	4.3
9/6/2013	1210	71.8	ND	15	7	303	10.12
9/19/2013	1200	71.6	6.2	20	7.5	296	3.85
10/17/2013	1100	63.5	6.0	35	7.5	313	15.6
10/25/2013	1130	60.1	6.0	25	7.5	298	17.2
11/8/2013	930	56.1	8.0	30	7.5	394	18.9
11/21/2013	1210	56.3	8.0	30	7	311	20.2
12/12/2013	1208	48.2	10.9	25	7	273	19.8
1/8/2014	1005	47.3	9.6	25	7	264	0.64
2/27/2014	331	49.9	9.1	10	7.5	264	3.45
3/18/2014	1030	52.1	9.9	10	7.5	190	2.59
Minimum		47.3	6.0	10.0	7.0	190	0.6
Maximum		71.8	11.1	35.0	7.5	394	20.2
Average		58.9	8.5	21.2	7.3	277	9.7

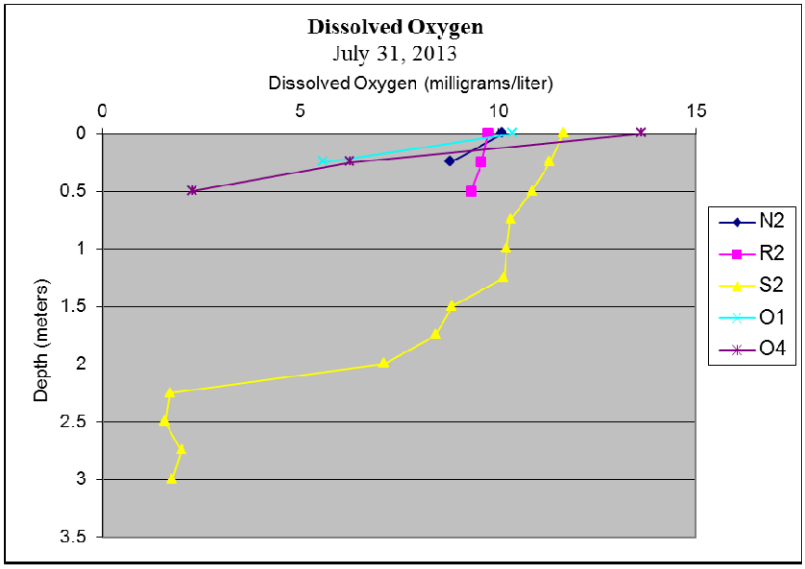
Appendix III-1

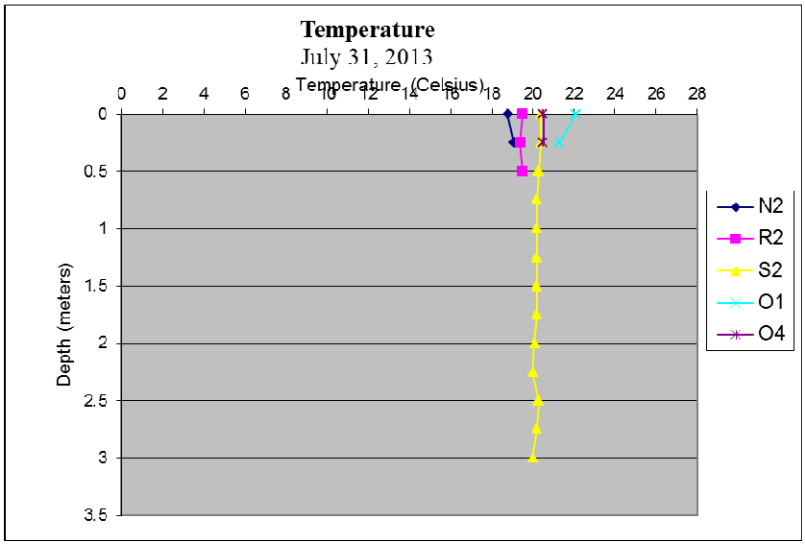
Carmel River Lagoon Profiles.
Salinity (ppt), Dissolved Oxygen (DO), Temperature (degrees C).
July 2013 – June 2014



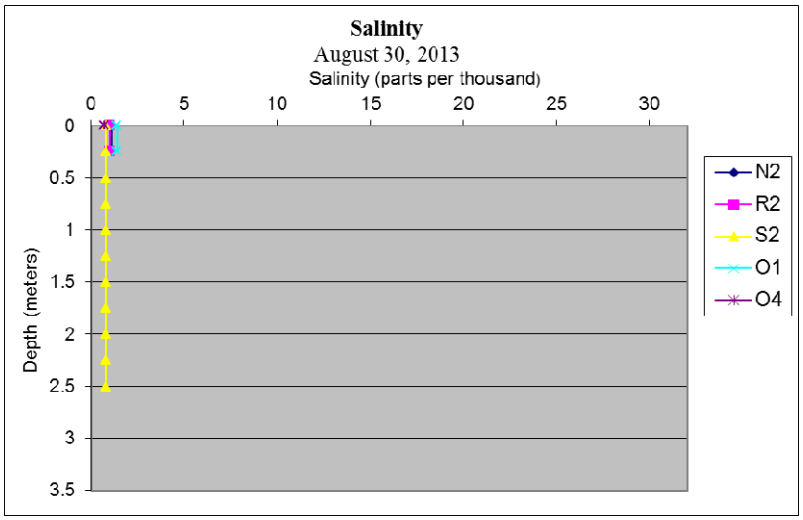
July 2013

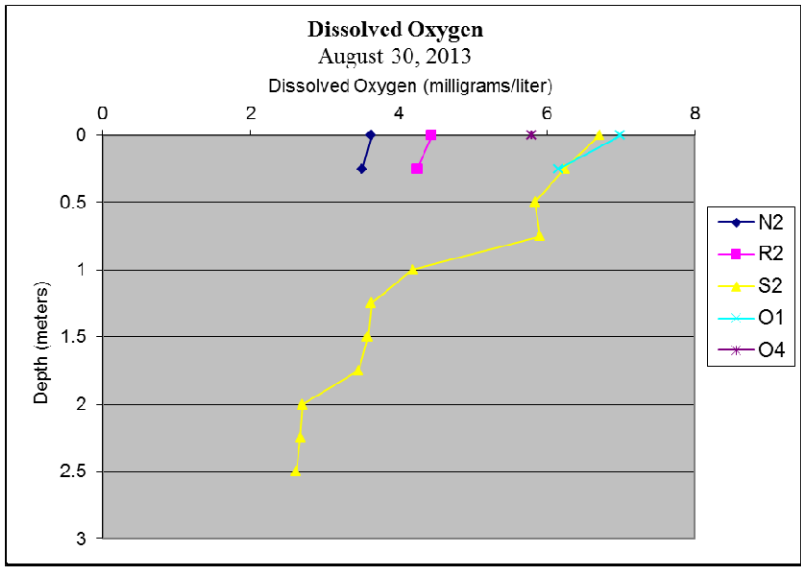

Salinity
July 31, 2013
Salinity (parts per thousand)
0
5
10
15
20
25
30
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
N2
R2
S2
O1
O4

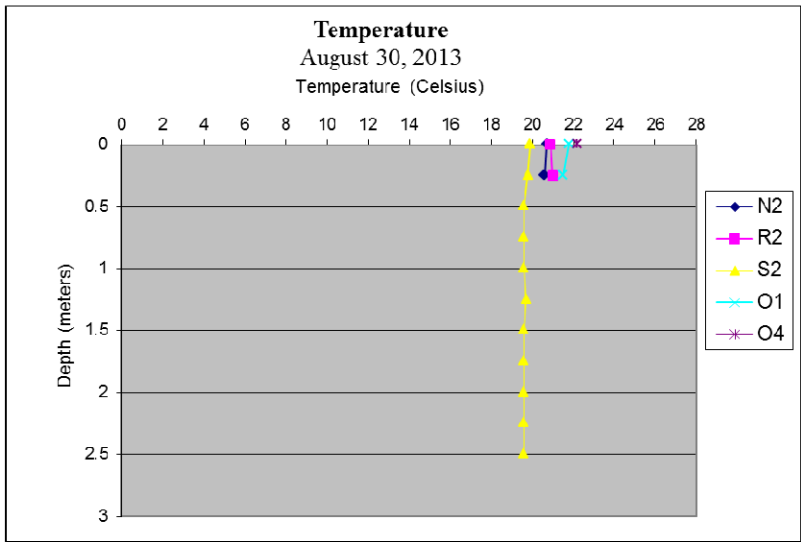

Dissolved Oxygen
July 31, 2013
Dissolved Oxygen (milligrams/liter)
0
5
10
15
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
N2
R2
S2
O1
O4


Temperature
July 31, 2013
Temperature (Celsius)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
N2
R2
S2
O1
O4

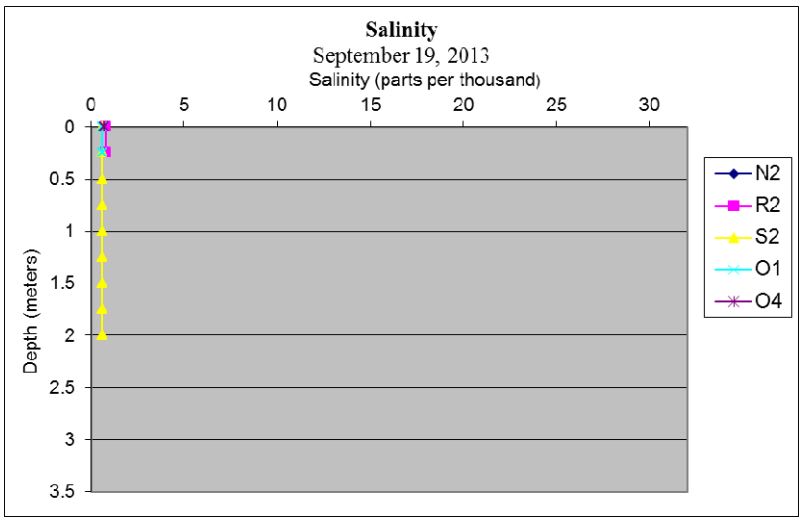
August 2013

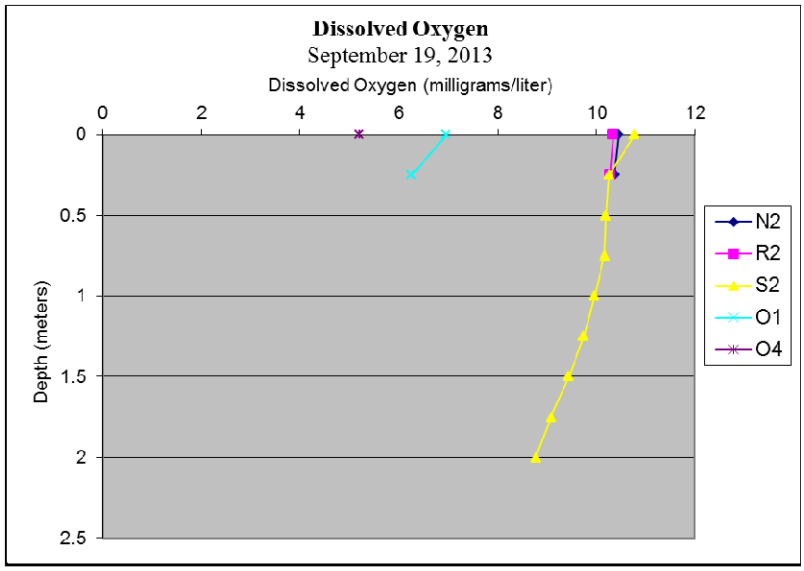

Salinity
August 30, 2013
Salinity (parts per thousand)
0
5
10
15
20
25
30
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
N2
R2
S2
O1
O4

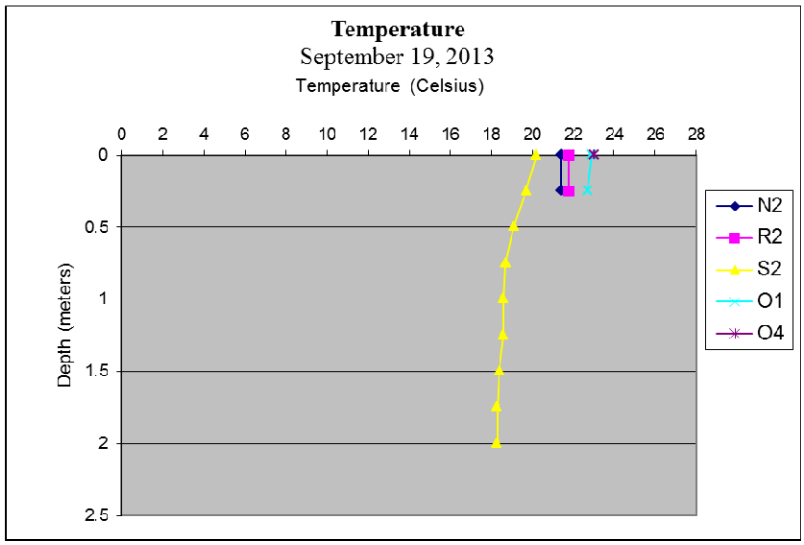

Dissolved Oxygen
August 30, 2013
Dissolved Oxygen (milligrams/liter)
0
2
4
6
8
Depth (meters)
0
0.5
1
1.5
2
2.5
3
N2
R2
S2
O1
O4


Temperature
August 30, 2013
Temperature (Celsius)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
Depth (meters)
0
0.5
1
1.5
2
2.5
3
N2
R2
S2
O1
O4

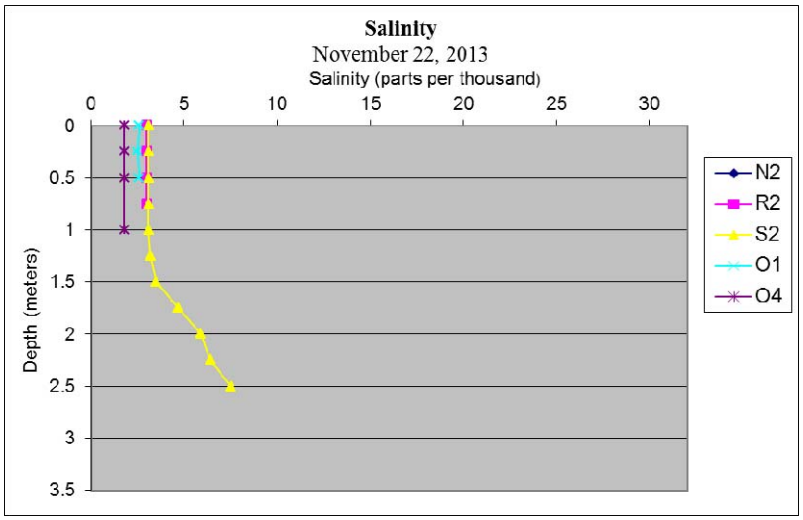
September 2013

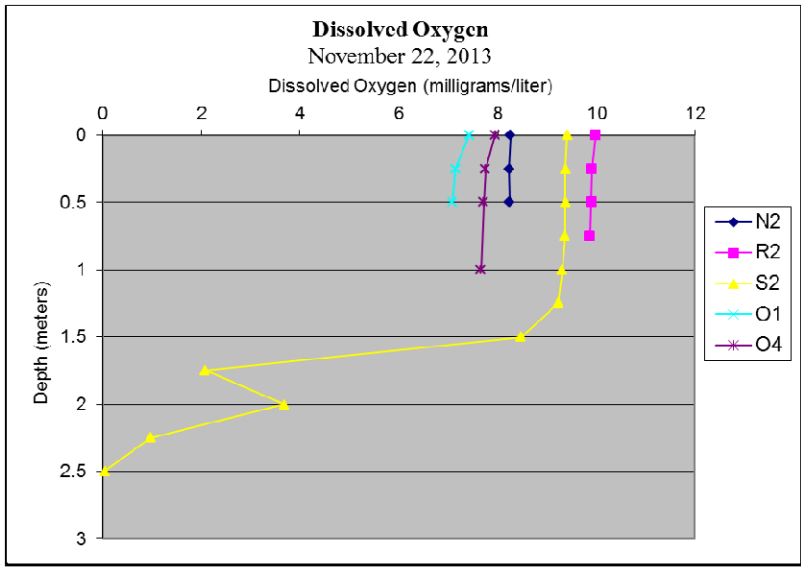


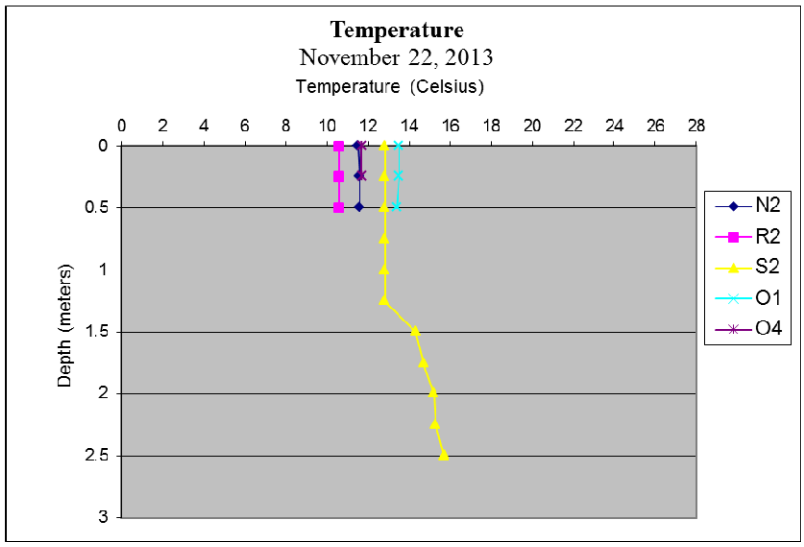




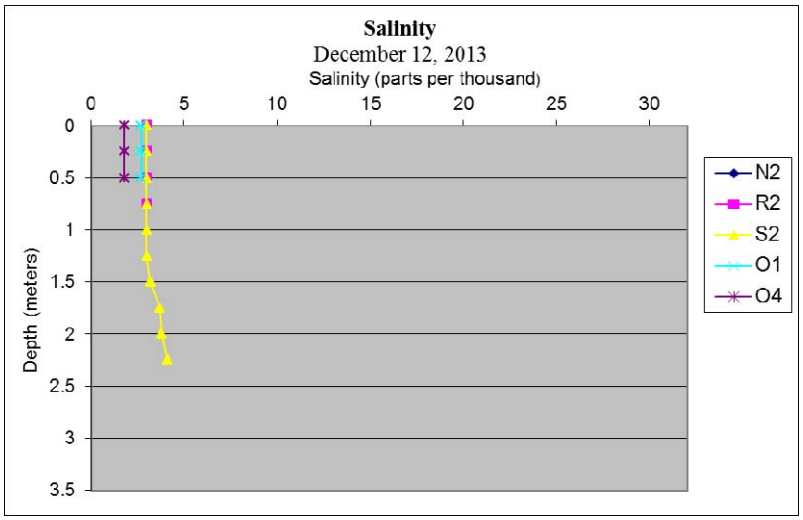
November 2013

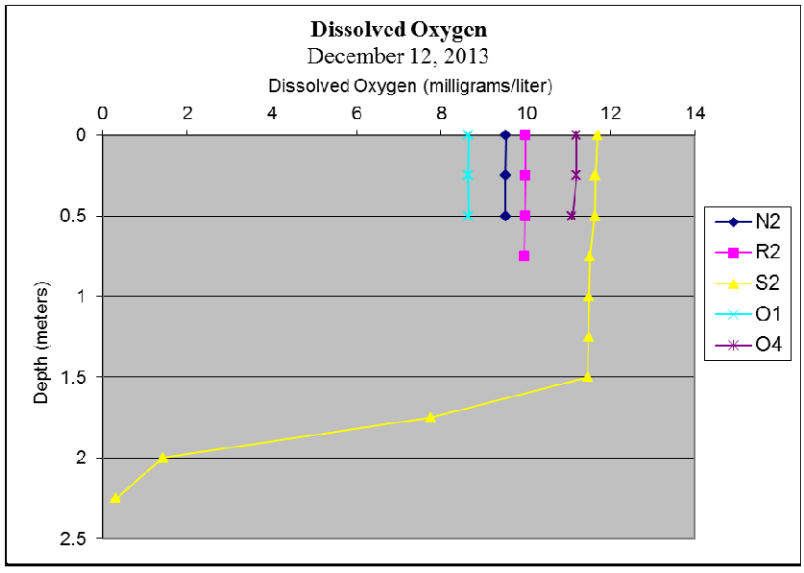


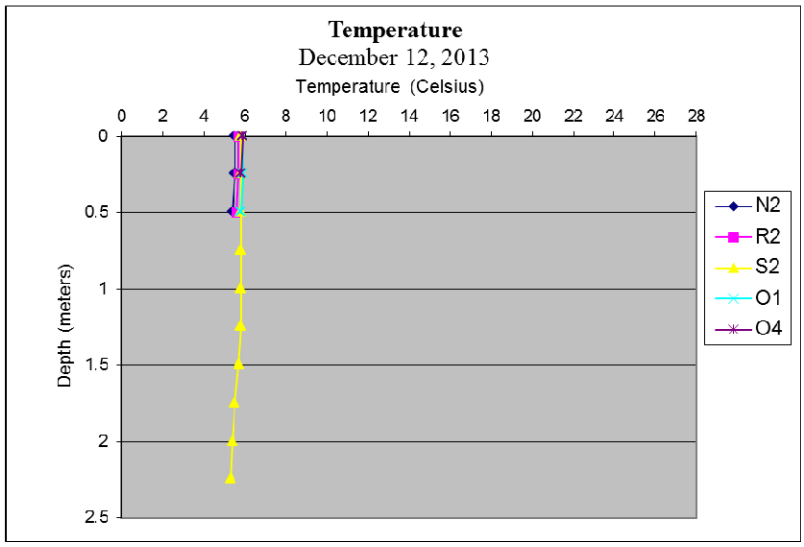




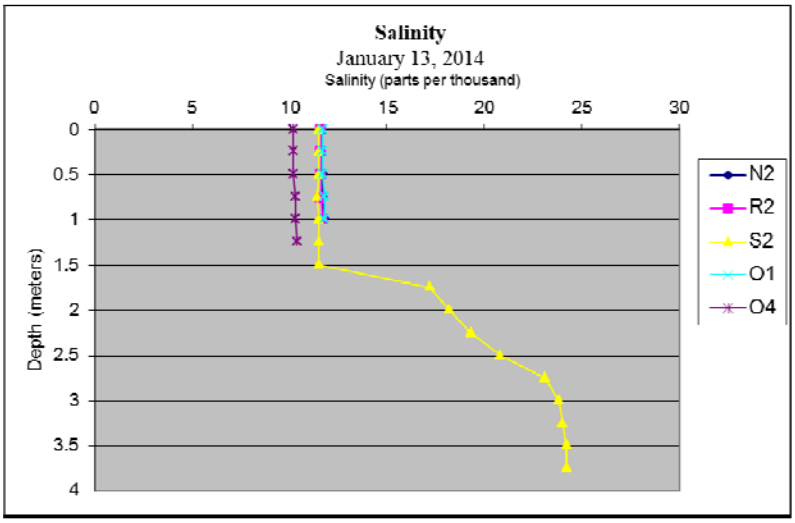
December 2013

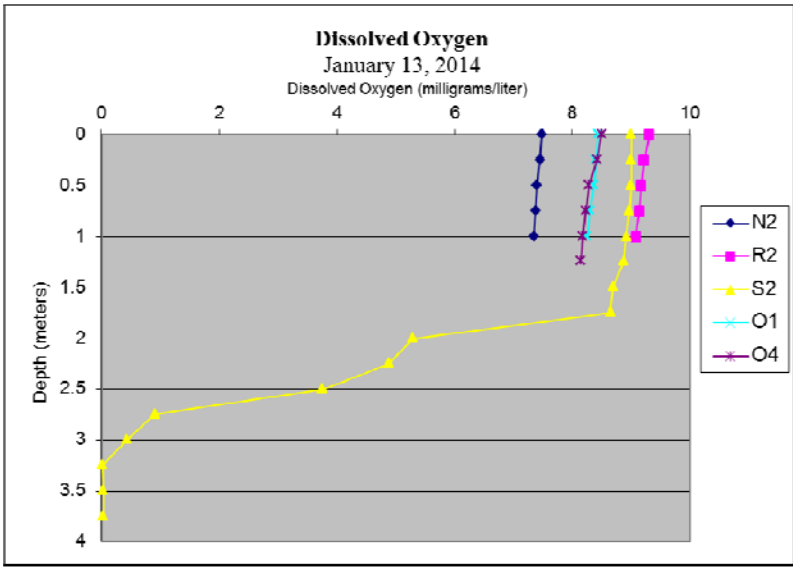


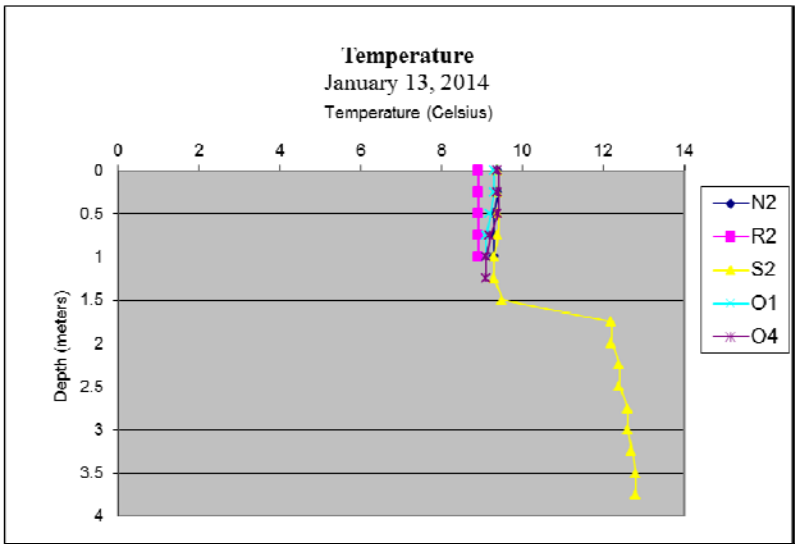




January 2014







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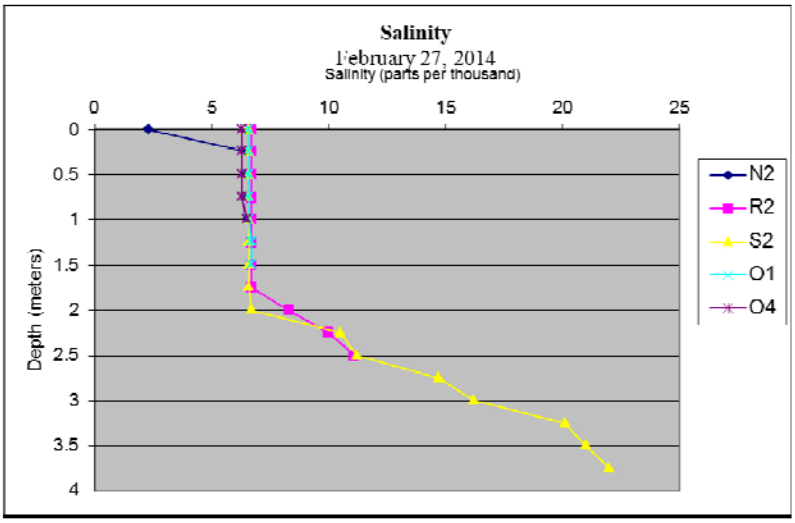
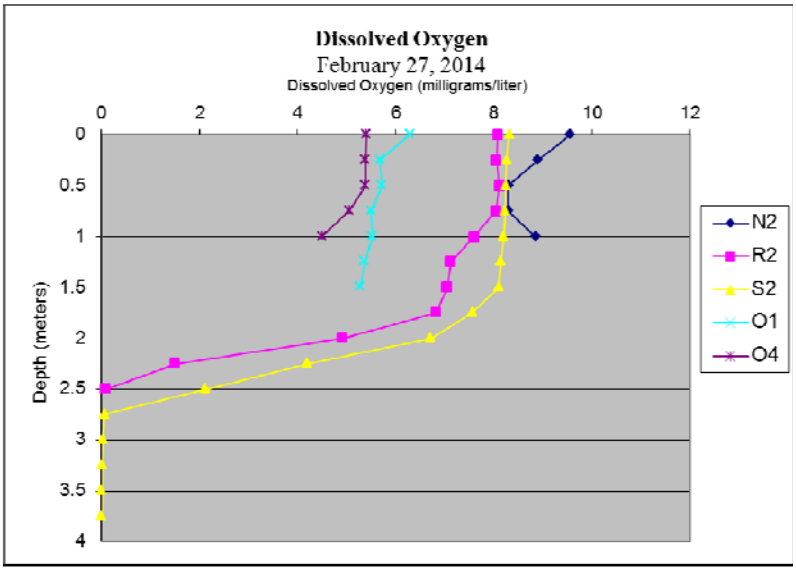
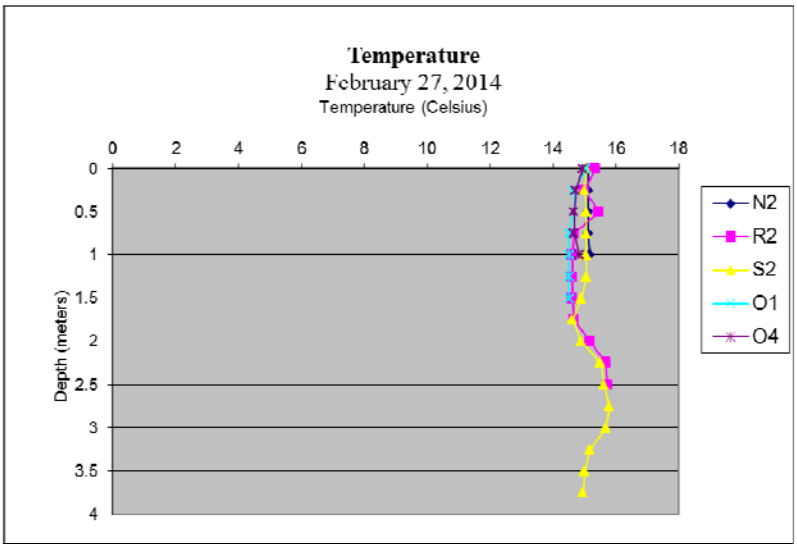
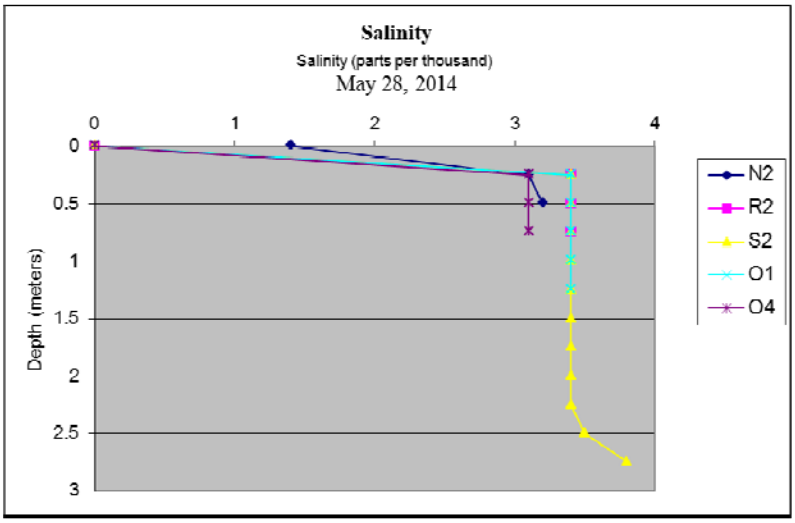
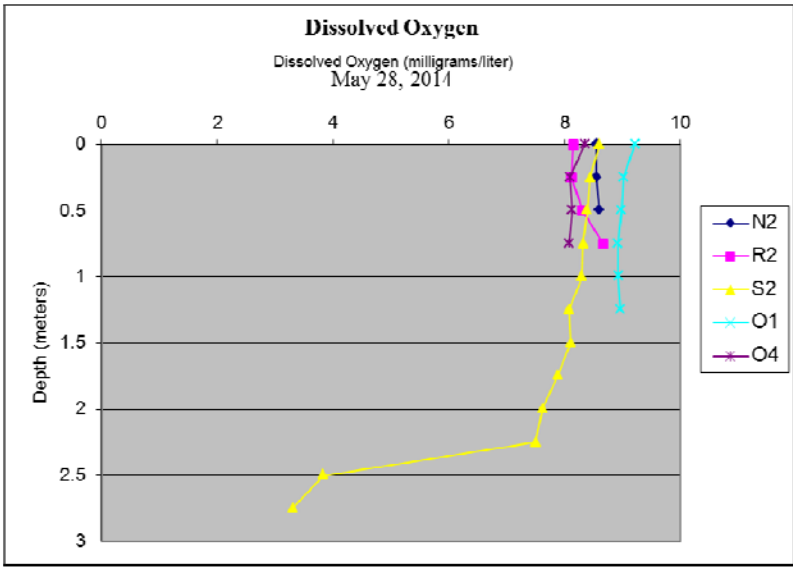


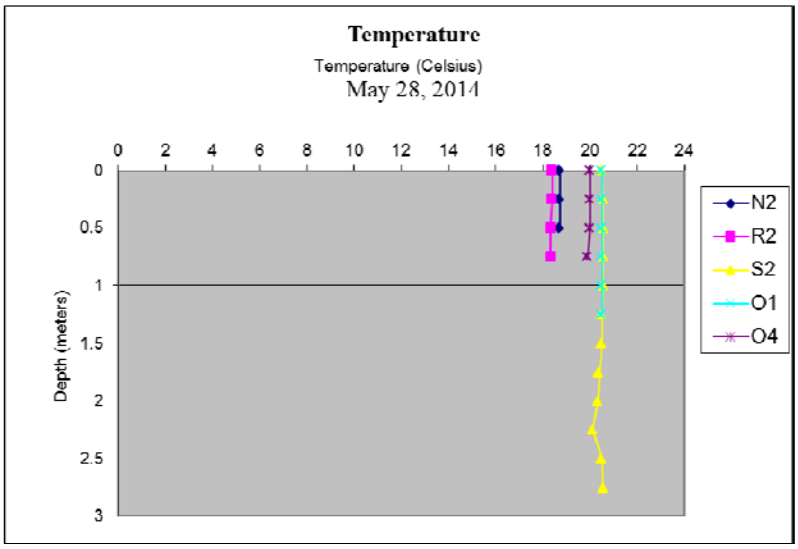




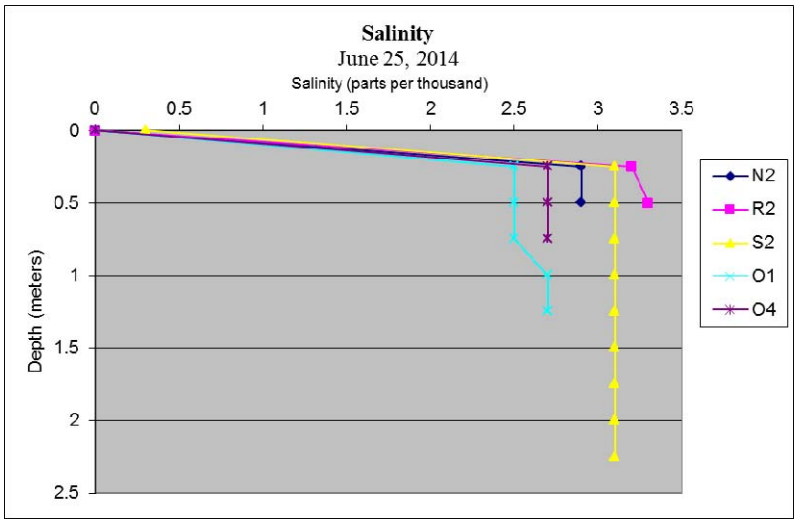
May 2014

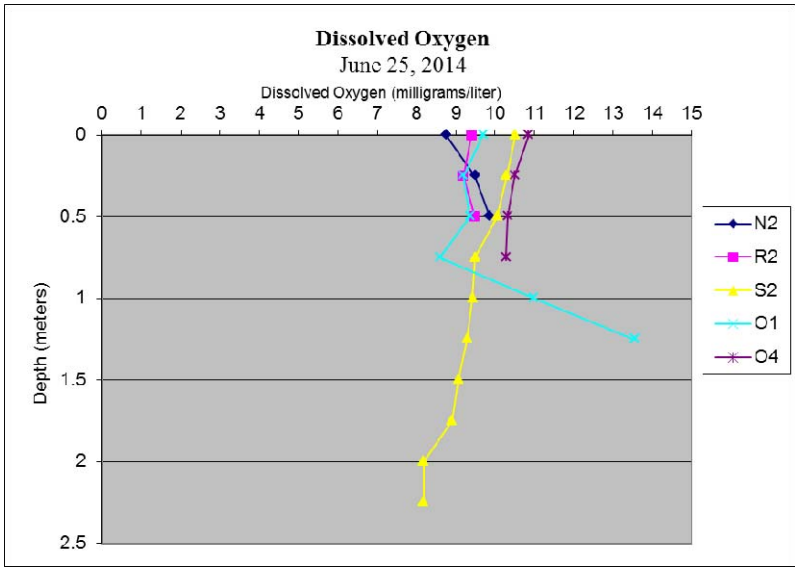

Salinity
Salinity (parts per thousand)
May 28, 2014
Depth (meters)
0
0.5
1
1.5
2
2.5
3
0
1
2
3
4
N2
R2
S2
O1
O4

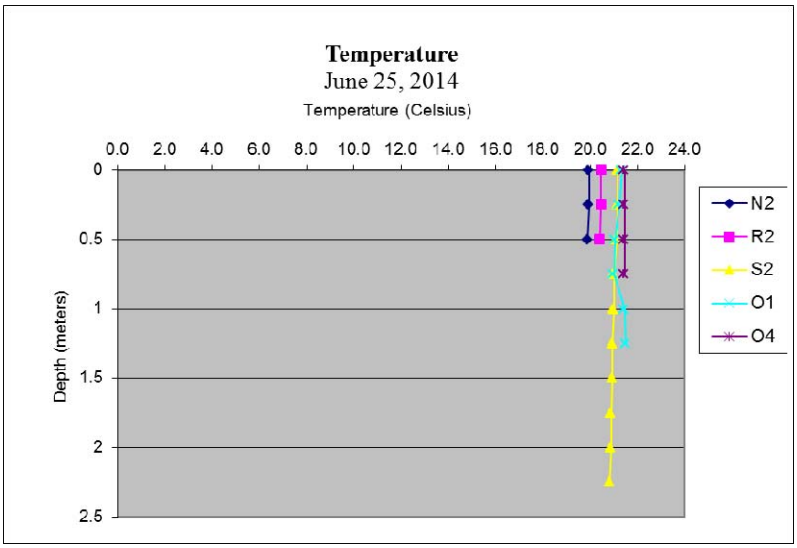

Dissolved Oxygen
Dissolved Oxygen (milligrams/liter)
May 28, 2014
Depth (meters)
0
0.5
1
1.5
2
2.5
3
0
2
4
6
8
10
N2
R2
S2
O1
O4


Temperature
Temperature (Celsius)
May 28, 2014
Depth (meters)
0
0.5
1
1.5
2
2.5
3
0
2
4
6
8
10
12
14
16
18
20
22
24
N2
R2
S2
O1
O4

June 2014


Salinity
June 25, 2014
Salinity (parts per thousand)
0
0.5
1
1.5
2
2.5
3
3.5
Depth (meters)
0
0.5
1
1.5
2
2.5
N2
R2
S2
O1
O4


Dissolved Oxygen
June 25, 2014
Dissolved Oxygen (milligrams/liter)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Depth (meters)
0
0.5
1
1.5
2
2.5
N2
R2
S2
O1
O4


Temperature
June 25, 2014
Temperature (Celsius)
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
Depth (meters)
0
0.5
1
1.5
2
2.5
N2
R2
S2
O1
O4

IV. GROUNDWATER MONITORING

A. Groundwater-Level Monitoring

Description and Purpose

The District maintains a groundwater-level monitoring program in the Carmel Valley Aquifer and the Seaside Groundwater Basin. The data collected as part of this program are used to support a variety of programs including: (a) storage monitoring, (b) compilation of annual and long-term well hydrographs, (c) water-table contour mapping, (d) Carmel River Management Program, (e) Seaside Basin Watermaster Program, and (f) other special projects. The monitor-well measurements are stored in a database program developed by the District to facilitate data entry, access and manipulation of the water-level data. In addition, groundwater-level measurements are collected on a regular basis by California American Water (Cal-Am) from each of their production wells, and these measurements are also utilized in the District's program. The District also participates in the cooperative California Statewide Groundwater Elevation Monitoring (CASGEM) program administered by the California Department of Water Resources (http://www.water.ca.gov/groundwater/casgem/).

Implementation and Activities During 2013-2014

- **Carmel Valley Aquifer --** The District's monitor well network in the Carmel Valley Aquifer consists of dedicated monitor wells and producer production wells, and currently totals approximately 50 water-level monitoring wells. During this period, the wells were measured on a monthly basis, and these measurements were used to compute end-of-month storage volume estimates for the aquifer. In addition, more frequent monitoring of selected wells was conducted during winter storm events to more closely monitor aquifer recharge.

Figure IV-1 is a typical hydrograph from the lower Carmel Valley, showing groundwater-level fluctuations at the Rancho Cañada West monitor well (River Mile [RM] 2.13) and the Rio North monitoring well (RM 1.65) compared with mean daily streamflow in the Carmel River at Highway 1 (RM 1.09). The Rancho Cañada West monitor well is located about one mile downstream (i.e., westerly) of the farthest downstream Cal-Am production well in Carmel Valley, the Cañada well, and approximately 1,350 feet from the river channel. As shown on this figure, the groundwater elevation decreased approximately three feet between the beginning of October 2013 and the end of December 2013, due to the critically dry hydrologic regime and lack of runoff in the Carmel River. Three small runoff events between February 1 and April 2, 2014 did provide enough recharge to produce approximately one foot of recovery in the groundwater elevation in the Rancho Cañada West monitor well from February 1 through May 1, 2014. Groundwater levels remained fairly steady for the remainder of Water Year (WY) 2014. At the end of WY 2014 (i.e., September 30, 2014), the groundwater elevation in this well was about three feet lower than at the start of the WY.

The Rio North well is approximately 790 feet from the river channel. At this location, the magnitude of seasonal water-level fluctuation, approximately five and a half feet, is slightly greater than at the Rancho Cañada West monitor well, due to its location closer to the river. In WY 2014, when very little runoff occurred in the lower river, the Rio North well generally declined in elevation from October 1, 2013 right up until a very minor recovery in September 2014. This year, rather than observing a seasonal rise in winter, the water level in the Rio North well appeared as a slow attenuated decline. The peak groundwater elevations recorded in both wells were observed at the beginning of the WY. During the October 2013-September 2014 period, the monitoring data indicated that overall groundwater storage in the Carmel Valley Aquifer declined slightly in WY 2014. In the river reach between San Clemente Dam and the Narrows (i.e., aquifer subunits 1 and 2), the maximum storage estimate was 94% of capacity at the end of April, declining to the lowest storage estimate at 86% of capacity at the end of September 2014. Similarly, in the river reach from the Narrows to the Carmel River Lagoon (i.e., aquifer subunits 3 and 4), the maximum storage estimate was 85% of capacity at the end of April, declining to the lowest storage estimate at 75% of capacity at the end of September 2014. In spite of the critically dry hydrologic conditions and observed storage decline during WY 2014, the aquifer remained relatively full during the year due to a number of factors, including:

- Availability of some base flows during spring and early summer months,
- Timing and magnitude of controlled river releases from the upstream reservoirs,
- Maximized dry-season production from Cal-Am wells in the Seaside Basin,
- Water-supply management practices implemented by the District, Cal-Am, the California Department of Fish & Wildlife and the National Marine Fisheries Service, as part of the Quarterly Water Supply Strategy and Budget process, and
- State Water Resources Control Board (SWRCB) Order No. WR 95-10 (and subsequent amendments) and the Seaside Basin adjudication decision, which constrain Cal-Am production from the Carmel River and Seaside Groundwater Basins, respectively.

● **Seaside Groundwater Basin --** In the Seaside Basin, monthly water-level measurements were collected from 20 monitor wells in the Seaside Coastal Subareas, and four were monitored in the Seaside Inland Subareas. An additional 29 wells in the Seaside Inland and Laguna Seca Subareas were monitored on a quarterly schedule during the year. These additional wells are a combination of active or inactive production wells, and dedicated monitor wells.

Figure IV-2 shows water-level data available from representative wells in the coastal portion of the Seaside Basin monitor well network. This graph shows the water-level elevations in the two principal aquifer zones, the shallower Paso Robles Formation and the deeper Santa Margarita Sandstone, at both upgradient (Site FO-07) and downgradient (Site PCA East) locations from the Paralta production well, the largest capacity Cal-Am well in the coastal area. The graph illustrates the more dominant effect that production from the coastal Seaside Basin wells has had on water levels in the Santa Margarita

Sandstone. The graph also illustrates the effect of changed water-supply practices resulting from SWRCB Order WR 95-10. Under the Order, Cal-Am was directed to maximize production from its Seaside Basin sources as a means to reduce production and associated impacts from the Carmel River system. This increased pumping resulted in a declining trend in Santa Margarita aquifer water levels, which are currently below sea level over a large area in the coastal portion of the basin. Seasonal recoveries associated with short-term reduced wintertime production and District aquifer storage and recovery (ASR) injection operations have not been sufficient to reverse the observed long-term downward water-level trend. However, the water-level responses in the Santa Margarita Aquifer at these locations indicate a lessening of the seasonal decline during WY 2014. Additional information on the ASR program is available at the District office. Discussion of the Seaside Basin ASR Projects is included in Section XV.

B. Groundwater-Quality Monitoring

Description and Purpose

The District maintains an ongoing groundwater-quality monitoring program for the two principal groundwater sources within the District: (a) the Carmel Valley alluvial aquifer, and (b) the coastal subareas of the Seaside Groundwater Basin. The purpose of the program is threefold:

(1) to characterize the quality of water in the aquifers,
(2) to detect groundwater contamination from septic systems or other sources in the shallow zones of the Carmel Valley aquifer, and
(3) to monitor sea-water intrusion potential in the coastal portions of the Carmel Valley aquifer and Seaside Basin.

The District has maintained a groundwater-quality monitoring program for the Carmel Valley aquifer since 1981, and for the Seaside Basin since 1990. The District's program is in addition to the extensive water-quality monitoring that is conducted by Cal-Am at its production wells. The District manages all well construction, maintenance, and field-sampling activities associated with the program. Water samples are analyzed at Monterey Bay Analytical Services. The Monterey County Health Department, Cal-Am, and the Monterey County Water Resources Agency have also provided assistance with this program in the past. Collection of the water-quality data is intended to detect problems before they can affect the community's water supply.

Implementation and Activities During 2013-2014

The sampling schedule for Carmel Valley is normally staggered, with Upper Valley wells (i.e., upgradient of the Narrows) sampled in Spring and Lower Valley wells (i.e., downgradient of the Narrows) in Fall, to coincide with the historically higher nitrate concentrations in these respective areas. Collection of samples from the Seaside Basin monitor wells is conducted once per year in Fall, coinciding with the historically low water levels in the basin at that time of the year. Additionally, in 2013 and 2014, samples

were collected quarterly from six wells closest to the coast in the Seaside Basin monitoring network by District staff in cooperation with the Seaside Groundwater Basin Watermaster.

- **Carmel Valley Aquifer –** Groundwater-quality data were collected from six of the network of eight monitor wells in the Carmel Valley aquifer in October 2014. One of the eight wells in lower Carmel Valley was not sampled earlier because it was submerged under high water in the Carmel River Lagoon during the sampling period. Another well that had historically been sampled during this period was destroyed by flooding in March 2011 when the river scoured away the south end of the Carmel River State Beach parking lot. The locations of these sampling points are shown in **Figure IV-3** and **Figure IV-4**. The results indicated that, in general, there were only minor changes in overall water quality compared to samples collected in 2013. Staff is particularly interested in tracking indicators of potential seawater intrusion in the coastal portion of Carmel Valley. Accordingly, three clustered sets of wells were established west of Highway 1, with each set being made up of three wells completed at different depths. Review of historical data indicated that the shallower and intermediate wells at the two well clusters closest to the coast are subject to the mixing of fresh water and saline water as high tides and surf overtop the sand berm between the lagoon and the ocean. This contributes to episodic mixing within the shallower and intermediate zones of the aquifer, but is not necessarily representative of larger-scale seawater intrusion into the aquifer. As described above, the three wells in the cluster closest to the ocean were destroyed by river erosion in March 2011, and the wells in the next closest cluster to the ocean were inaccessible due to high water during the sampling period, so during this Mitigation Report period, only the deeper well at the farthest well cluster from the coast (Well 16S/1W-13Lc) was sampled.

Well 16S/1W-13Lc is the deepest in the array of three wells located on State Parks property near the Carmel Area Wastewater District treatment plant at River Mile (RM) 0.65, currently the most proximate well to the ocean in Carmel Valley that was available for sampling. Specific Electrical Conductance (SEC) slightly decreased in 2014 relative to 2013, and Chloride concentration increased in 2014 relative to 2013 (**Figure IV-5**). Very slight overall increases in SEC and Chloride concentration are seen at this monitor well over the period of record. Additional background on historical water-quality at the coastal monitor well sites can be found in District Technical Memorandum 90-04, *Summary of Carmel Valley Groundwater-quality from Coastal Monitor Wells*, which is available at the District office. Staff will continue to track future results for trends that might indicate significant changes in concentrations of these or other constituents in the coastal area of the aquifer.

Water quality in well 16S/1E-23La, located 6.72 miles upstream from the river mouth, remained generally unchanged in 2014 relative to 2013, as shown on the graph of SEC and Chloride that is included to track long-term trends (**Figure IV-6**). Staff will continue to track changes in all of the monitor wells in the basin to determine if they are indicative of long-term trends, or anomalous short-term events.

● **Seaside Groundwater Basin --** Eleven monitor wells in the coastal subareas of the Seaside Basin were sampled in June and July 2014. The locations of the Seaside monitor wells are shown in **Figure IV-7**. One function of the District's monitor-well network in the Seaside Basin is to serve as an early warning of potential sea-water intrusion into the two principal aquifer zones, the Paso Robles Formation and the Santa Margarita Sandstone. The water-quality results from the Seaside Basin indicate that very little water-quality changes have occurred over the period of record since monitoring began in 1990, and that there is no indication of sea-water intrusion in this area of the basin at this time. **Figure IV-8** shows SEC and Chloride concentrations in two coastal wells, one in the shallower Paso Robles Formation aquifer, and one in the deeper Santa Margarita Sandstone aquifer, for the historical period of record beginning in April 1991. Results from the District's monitoring program indicate that SEC averages approximately 350 and 825 microSiemens/centimeter (μS/cm), for the Paso Robles and Santa Margarita aquifer zones, respectively.

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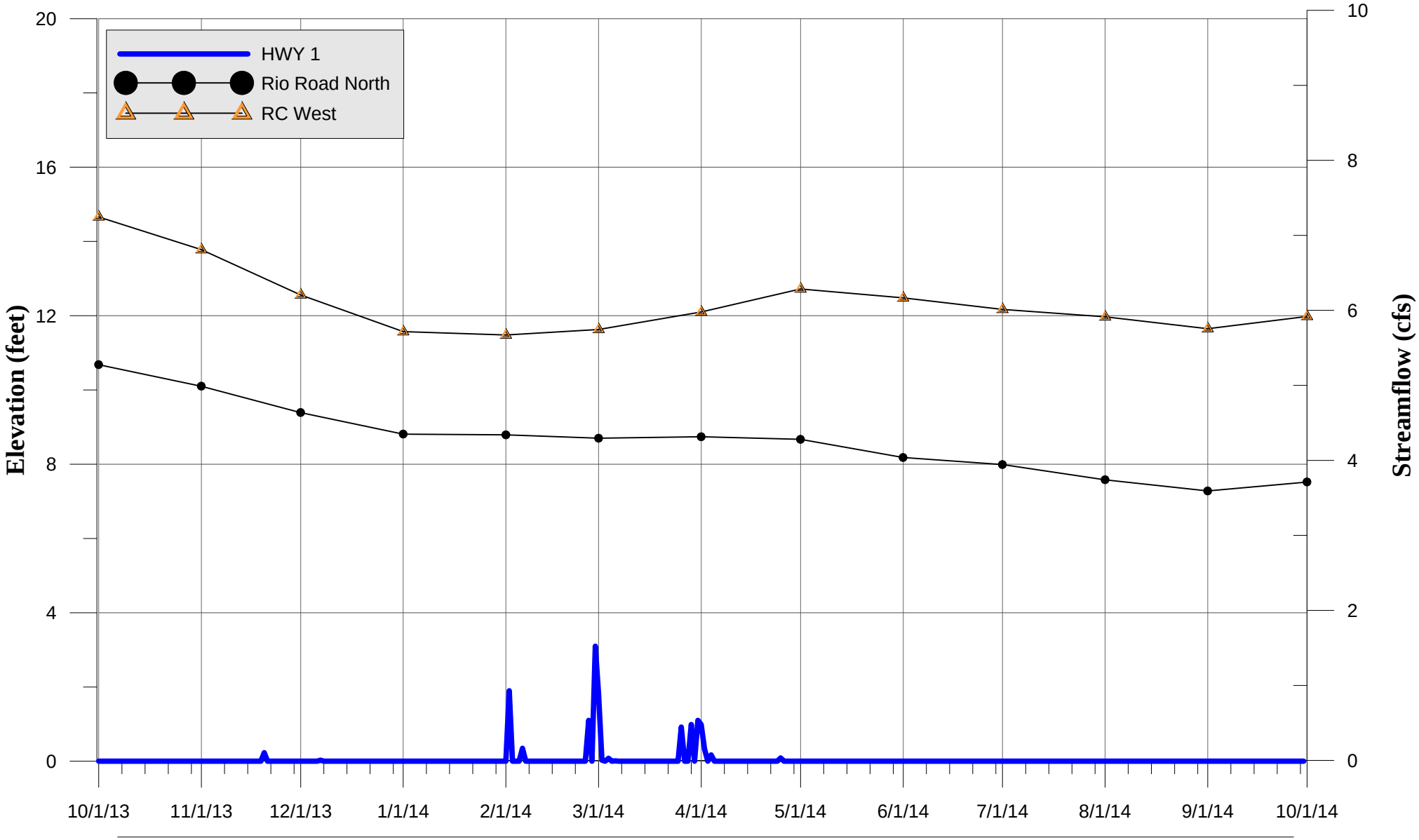
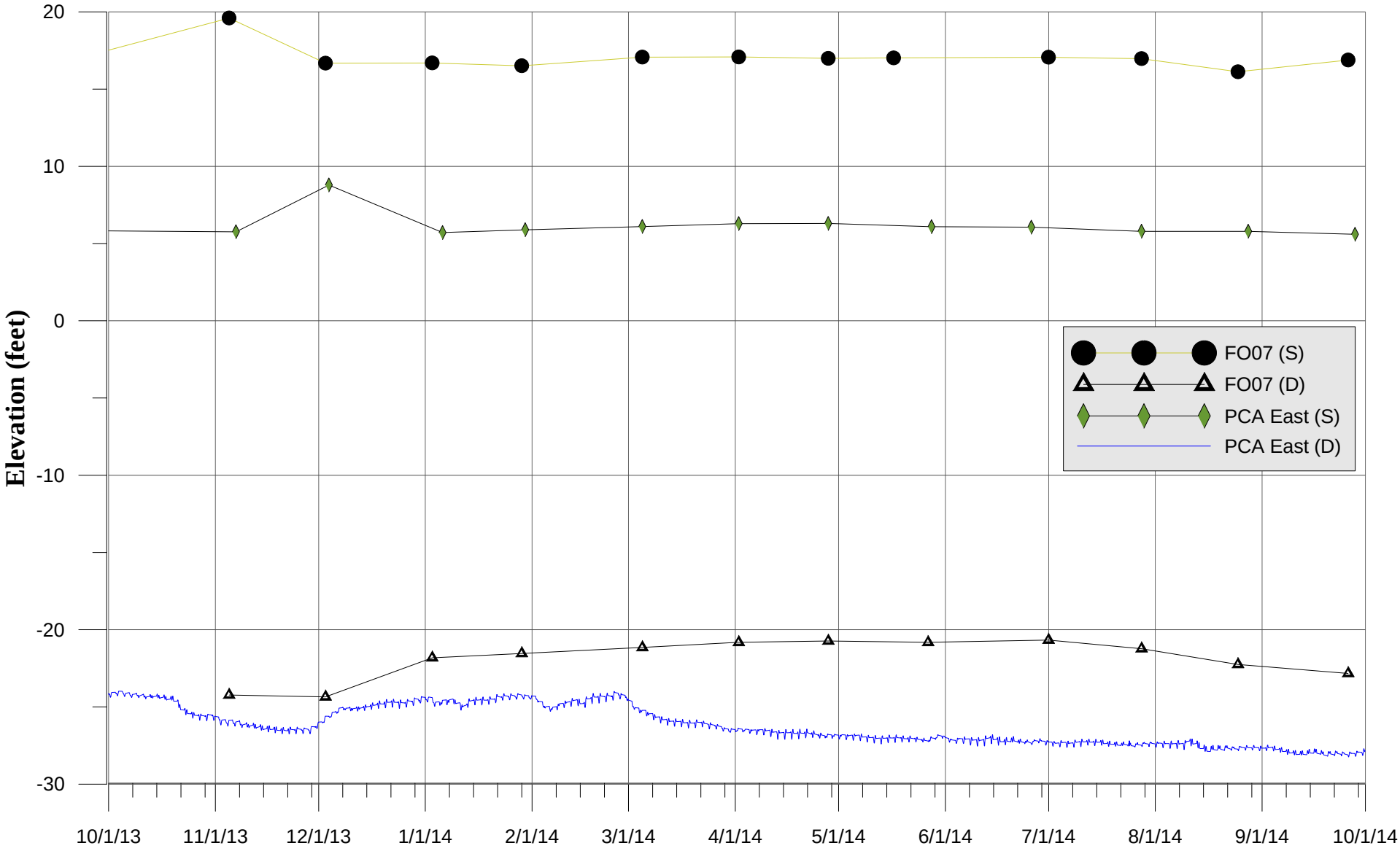


MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

Figure IV-1 Hydrographs of Monitor Well Levels and Carmel River Streamflow

Well levels measured at Rancho Canada West and Rio Road North Monitor Wells.
Carmel River Streamflow measured at Highway 1 Bridge.



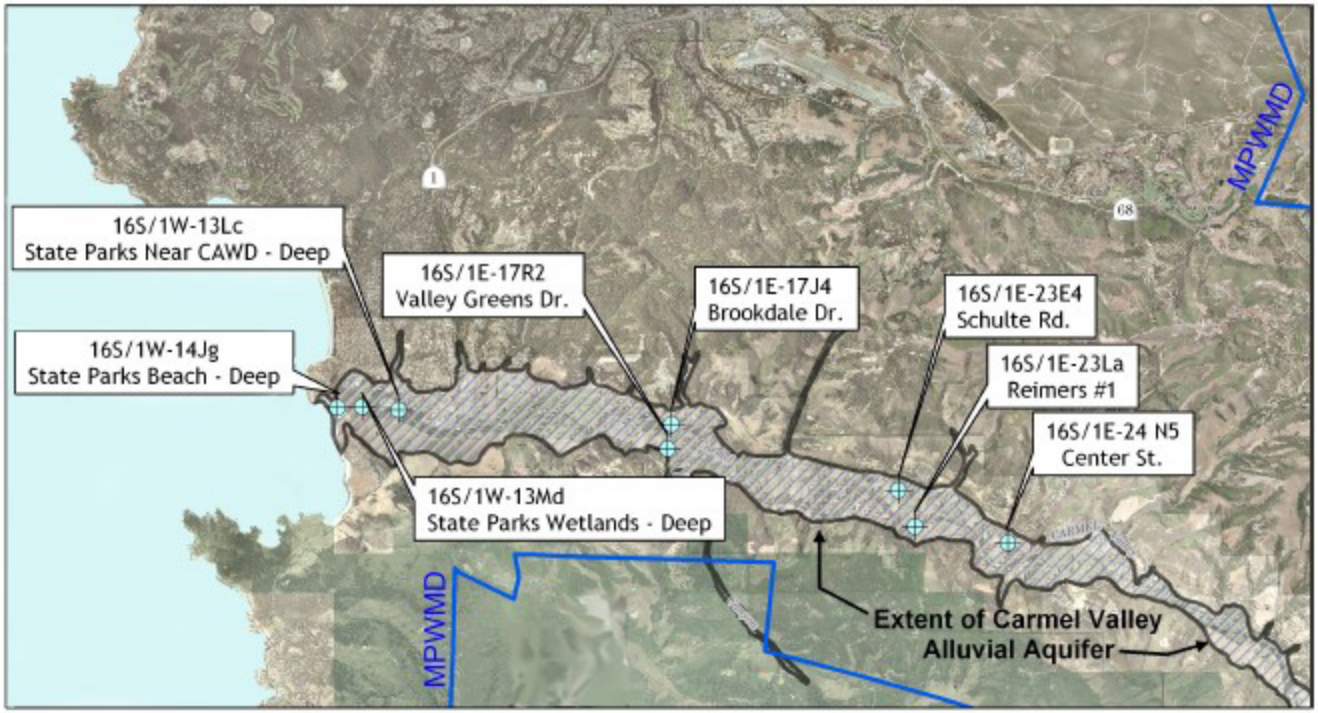
MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

Figure IV-2 Hydrographs of PCA East and FO 07 for WY 2014

Note: Water level in PCA East Deep is monitored by a data logger at 30 min. interval to support MPWMD ASR operations. All other data is collected monthly.

Figure IV-3

LOCATION OF MPWMD LOWER CARMEL VALLEY WATER QUALITY MONITORING WELLS (River Mile 0.0 to 9.0)

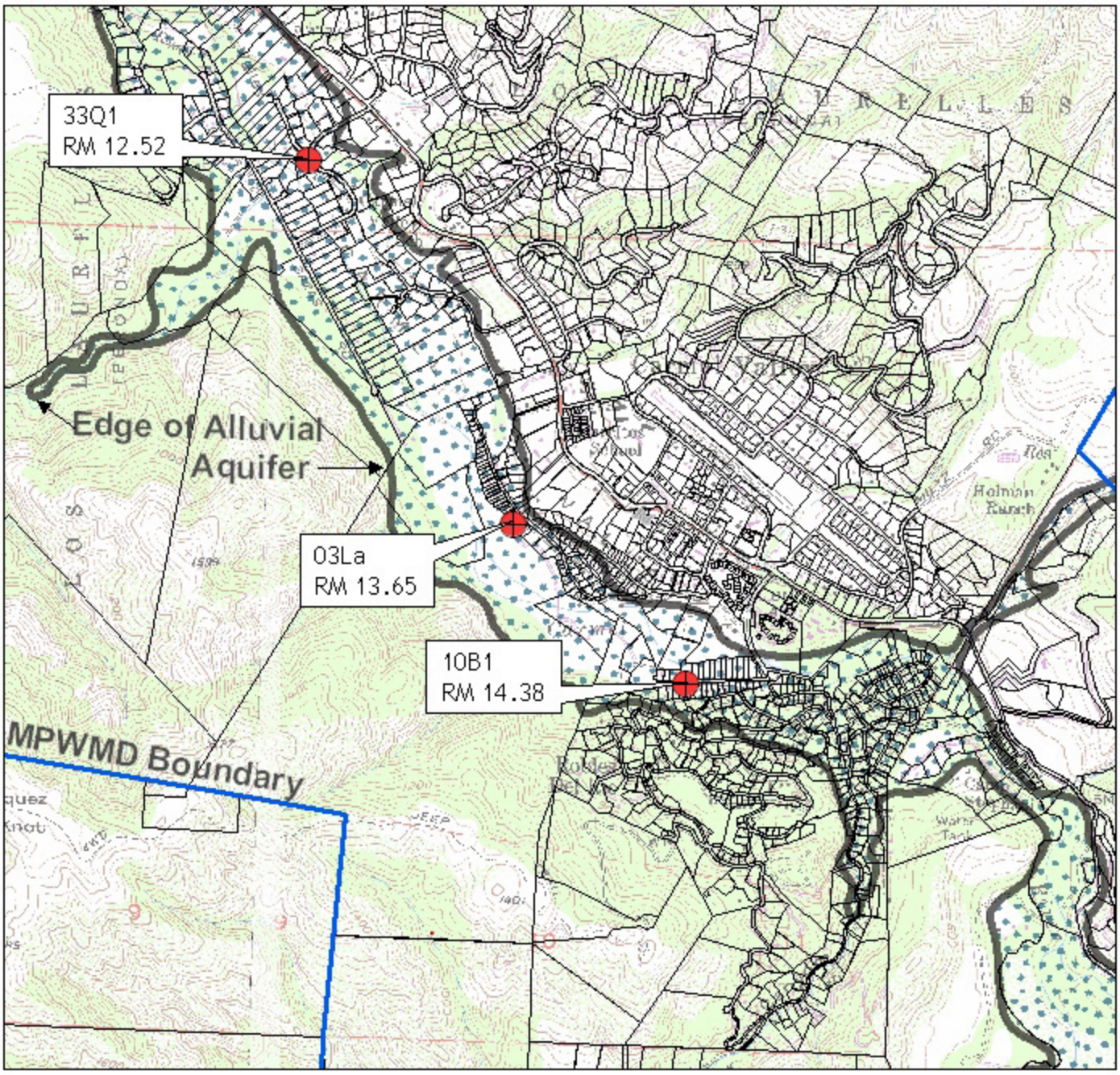


Monterey Peninsula Water Management District

u/tom/pdf12/wellmaps/lvwq.jpg

Figure IV-4

LOCATION OF MPWMD CARMEL VALLEY WATER QUALITY MONITORING WELLS
(River Mile 11.75 to 15.50)



N
W E
S

0 1,250 2,500 5,000 7,500 10,000 Feet

River Mile (RM)	Well Common Name	State Well Number
12.52	Boronda Rd.	T16S/R2E-33Q1
13.65	Little League #1	T17S/R2E-03La
14.28	De Los Helechos	T17S/R2E-10B1

Monterey Peninsula Water Management District

u/tom/pdf2007/WQmapCVU

Figure IV-5

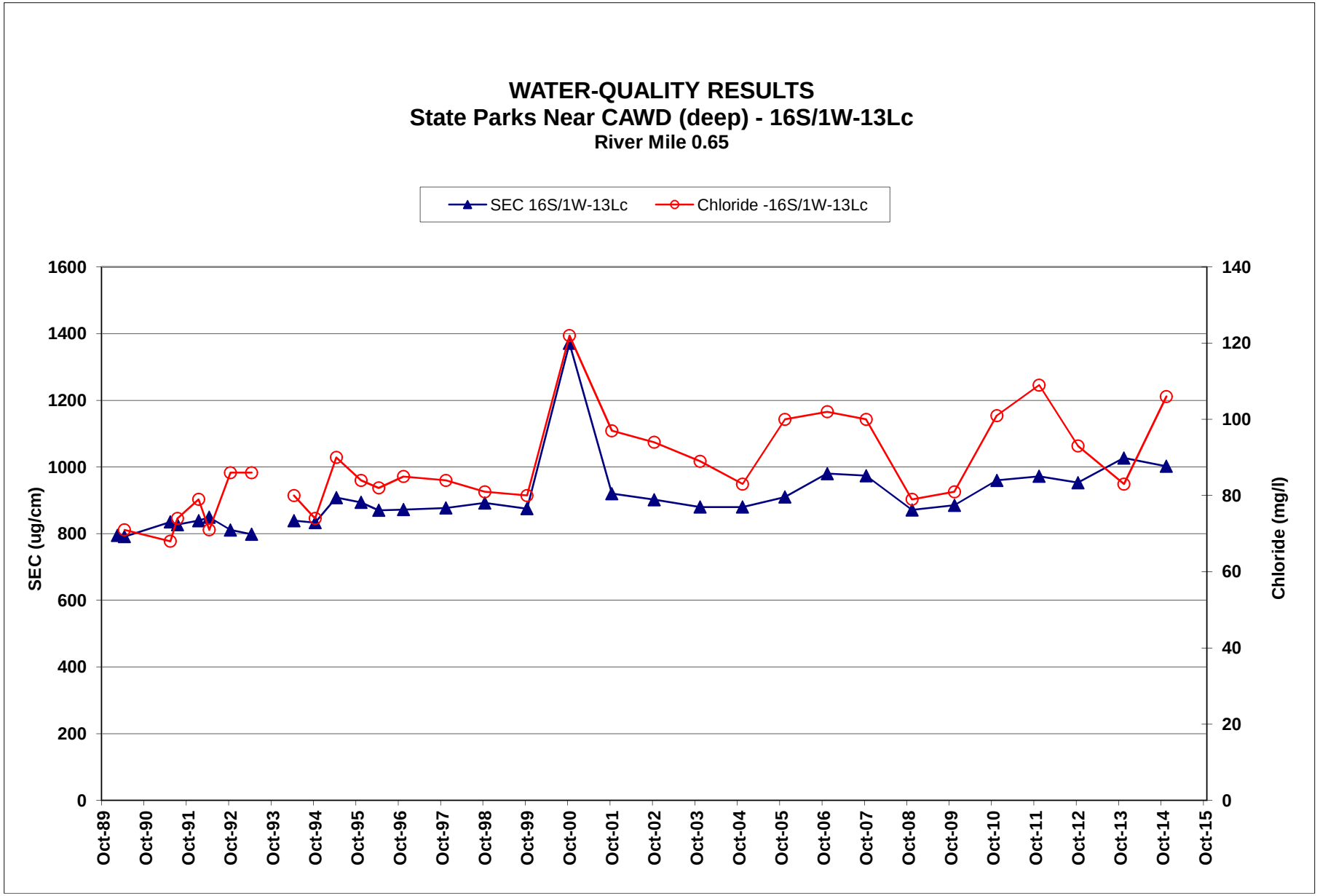


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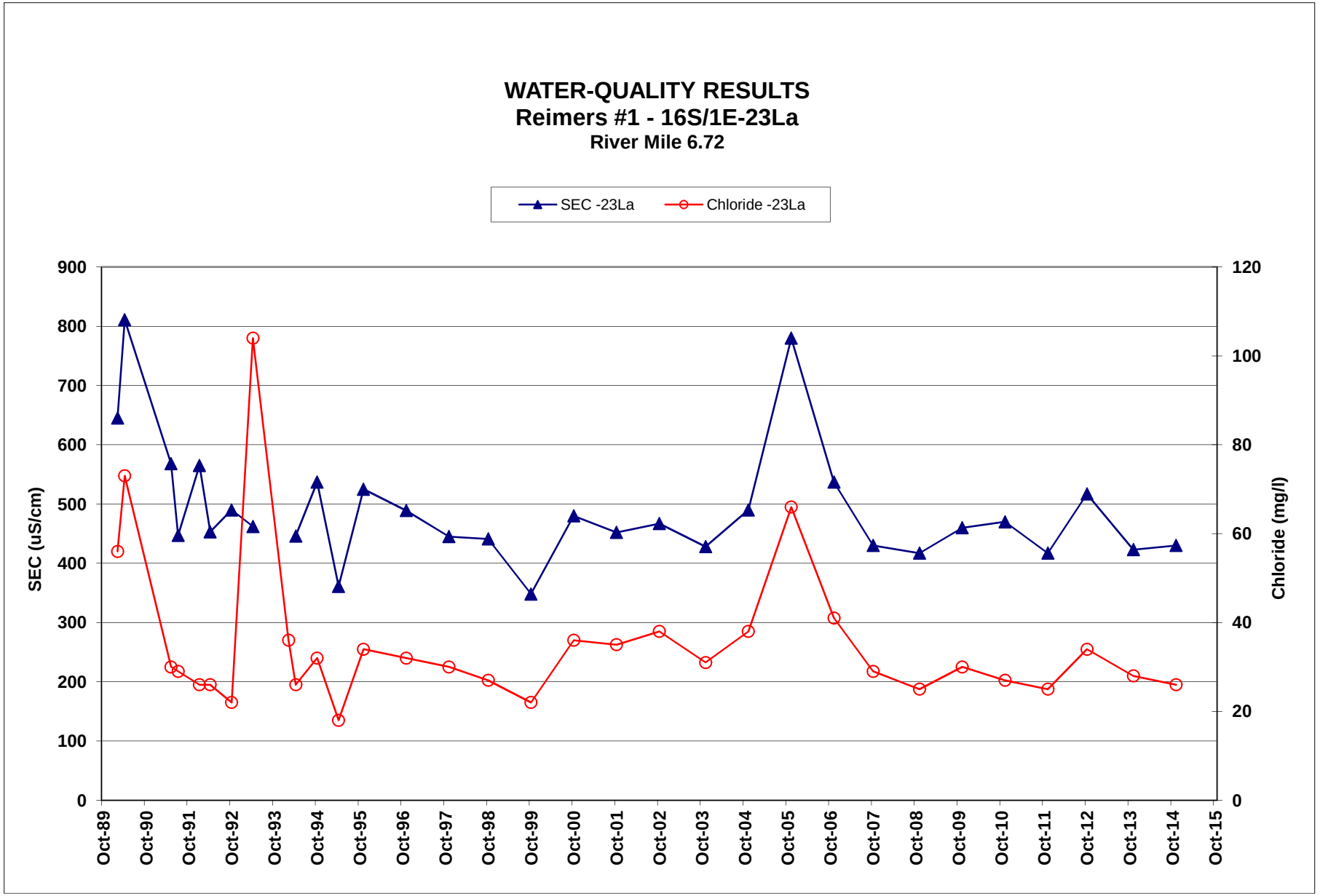
Figure IV-6


WATER-QUALITY RESULTS
Reimers #1 - 16S/1E-23La
River Mile 6.72
SEC -23La
Chloride -23La
SEC (uS/cm)
Chloride (mg/l)
900
800
700
600
500
400
300
200
100
0
120
100
80
60
40
20
0
Oct-89
Oct-90
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
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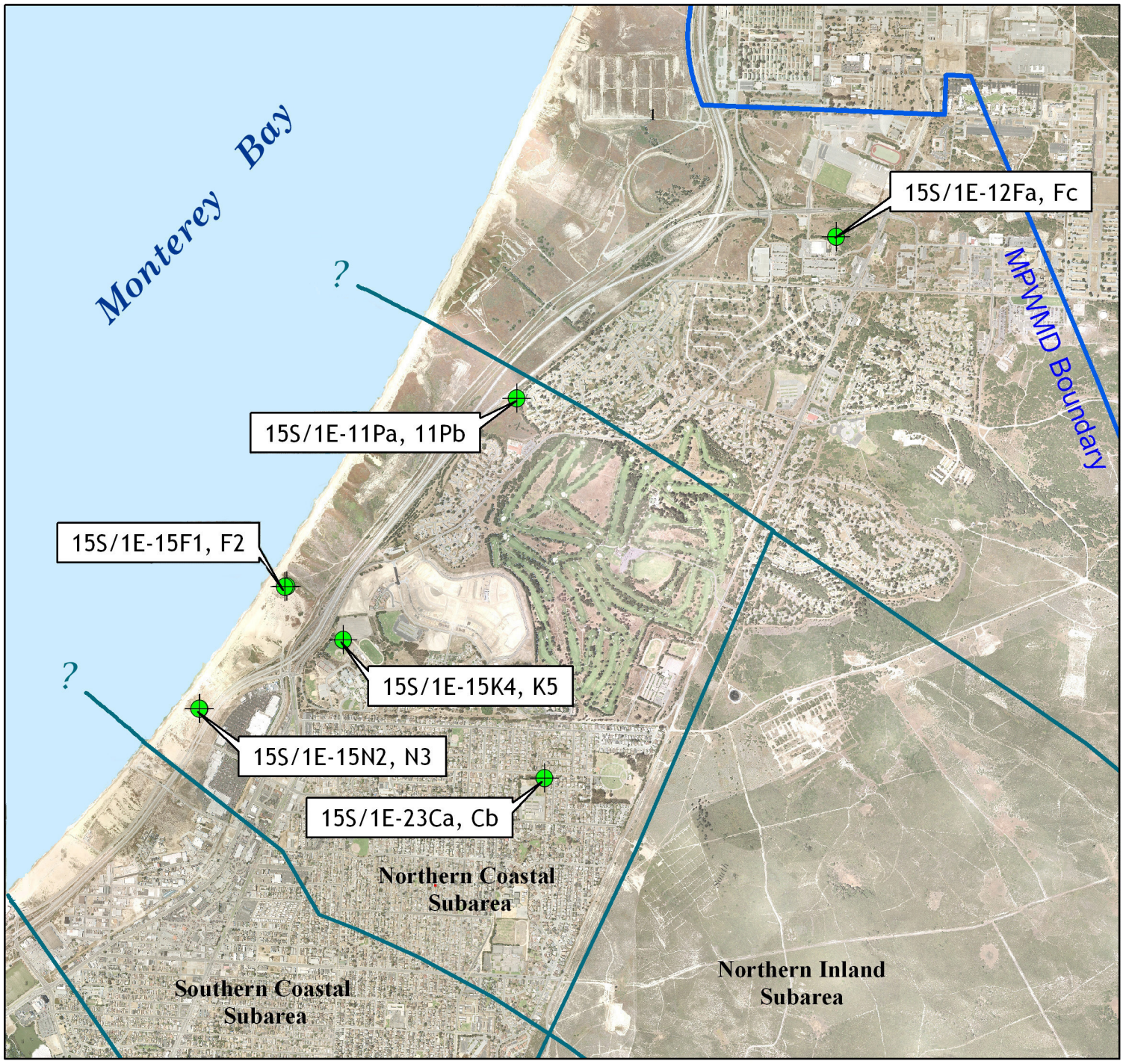
Oct-15

Figure IV-7

SEASIDE BASIN COASTAL GROUND WATER QUALITY MONITOR WELL LOCATIONS



Monterey Peninsula Water Management District

u/tom/pdf12/wqmaps/WQseaside

V. ANNUAL LOW-FLOW MEMORANDUM OF AGREEMENT

Description and Purpose

The original Memorandum of Agreement (MOA) between the California Department of Fish and Game (now California Department of Fish and Wildlife, CDFW), Cal-Am, and the District was developed in July 1983 to balance CDFW's requirement to conserve and protect the fish and wildlife resources of the state and Cal-Am's responsibility to supply water to the citizens of the communities of the Monterey Peninsula. This MOA is modified each year to reflect specific storage conditions and inflow projections at Los Padres and San Clemente Reservoirs in the Upper Carmel River watershed. Specifically, the MOA addresses the release of water into the Carmel River from San Clemente Dam and was originally designed to maximize surface flow to the Narrows during the low-flow season. In addition to specifying minimum flow releases from San Clemente Dam, the past MOAs limited Cal-Am diversions from San Clemente Dam to the Carmel Valley Filter Plant (CVFP) and directed how Cal-Am was to produce water from the Lower Valley Wells. Normally, the MOA is formulated in May and remains in force until the end of December. The agreement may be modified or extended by mutual consent of all the parties.

Implementation and Activities During 2013-2014

- **2013 MOA** – The 2013 MOA was developed on May 7, 2013 and approved by the District Board on June 17, 2013. The final document was signed by the District and forwarded to Cal-Am for their concurrence, but was not signed by CDFW due to the same unresolved language that was proposed in 2009 by CDFW. Based on storage conditions and expected reservoir inflows, it was agreed that Cal-Am would maintain minimum flows in the Carmel River at the Sleepy Hollow Weir of 5 cfs from June through December 2013. The 2013 MOA included terms to: (a) limit Cal-Am diversions at San Clemente Dam during low-flow periods, except during an emergency, as defined in SWRCB Order WRO 2002-0002; (b) allow production from Cal-Am's Russell Wells at a maximum rate of 0.5 cfs; (c) limit operation of Cal-Am wells in the Carmel Valley above Robinson Canyon Road Bridge during low-flow periods; and (d) require Cal-Am to make reasonable efforts to operate the lower Carmel Valley wells in sequence from the most downstream well, progressing upstream as wells are needed and available for production.

- **2014 MOA** – The 2014 MOA was developed on May 13, 2014 and approved by the District Board on May 19, 2014. The final document was signed by the District and forwarded to Cal-Am for their concurrence, but was not signed by CDFW due to the same unresolved language that was proposed in 2009 by CDFW. Based on storage conditions and expected reservoir inflows, it was agreed that Cal-Am would maintain minimum flows in the Carmel River at the Sleepy Hollow Weir of 3.5 cfs from June through December 2014. The 2014 MOA included terms to: (a) limit Cal-Am diversions at San Clemente Dam during low-flow periods, except during an emergency, as defined in SWRCB Order WRO 2002-0002; (b) allow production from Cal-Am's Russell Wells at a maximum rate of 0.5 cfs; (c) limit operation of Cal-Am wells in the Carmel Valley above Robinson Canyon Road Bridge during low-flow periods; and (d) require Cal-Am to make reasonable efforts to operate the lower Carmel Valley wells in sequence from the most downstream well, progressing upstream as wells are needed and

available for production.

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VI. QUARTERLY WATER SUPPLY STRATEGY AND BUDGET

Description and Purpose

Under Ordinance No. 19, which was adopted in December 1984, the District was required to develop an annual water-supply strategy. This strategy included estimates of projected demands and proposed production targets for the Cal-Am system. The strategy was designed to limit Cal-Am surface-water diversions from the Carmel River to no more than 35 percent of total Cal-Am production. Based on the District strategy, Cal-Am developed a water-supply budget specifying monthly production targets.

Under Ordinance No. 41, which was adopted in March 1989, development of the water-supply strategy and budget was changed from an annual to a quarterly process, and Cal-Am's annual surface-water diversions were reduced to a goal of no more than 29 percent of total production. Currently, the quarterly strategy and budget values are developed jointly by Cal-Am, the District, CDFW and NMFS, in conformance with the annual low-flow Memorandum of Agreement (MOA). The strategy is designed to maximize the long-term production potential and protect the environmental quality of the Carmel Valley and Seaside basins. The budget includes monthly production targets for each of Cal-Am's major production sources -- San Clemente Reservoir, Upper Carmel Valley (UCV) Aquifer, Lower Carmel Valley (LCV) Aquifer, and the Coastal Subareas of the Seaside Basin -- which reflect current and expected system conditions. The quarterly strategies and budgets are normally developed in December, March, June, and September of each year.

Starting in April 2002, the Quarterly Water Supply Strategy and Budgets were fundamentally changed by the State Water Resources Control Board (SWRCB), which adopted Order WRO 2002-0002 on March 21, 2002, and by NMFS and Cal-Am, who signed a Conservation Agreement on September 18, 2001. This order and agreement changed the way that Cal-Am operates its diversions and wells upstream of Robinson Canyon Road Bridge. Specifically, Cal-Am was ordered to:

1. Immediately upon issuance of SWRCB Order WRO 2002-0002, cease withdrawal of water from the San Clemente Dam during low-flow periods except during an emergency. For the purpose of the Order, “low-flow periods” are defined as times when stream flow in the Carmel River at the Don Juan Bridge gage (RM 10.8) is less than 20 cfs for five consecutive days.

2. Reduce diversions during low-flow periods from the Scarlett No. 8 Well, Los Laureles Wells Nos. 5 and 6, Panetta Wells, Garzas Wells Nos. 3 and 4, and the Robles Well. Current diversions are 1-7 days per month at each well. Diversions at these wells shall be reduced to a maximum of two eight-hour days per month, except that those wells that currently operate only one eight-hour day per month shall continue to operate at not more than one eight-hour day per month. To the maximum degree practicable, Cal-Am shall operate these wells at night. In consultation with NMFS, USFWS, CDFW and the District, Cal-Am can operate the Scarlett 8 well incrementally to meet maximum daily demand after using all other available downstream sources at

maximum capacity.

3. Install, not later than March 31, 2002, a pump that delivers water from the Begonia Zone to the Carmel Valley Village Zone. The "Begonia Zone" is defined to include water well production facilities in AQ3, AQ4 and the Seaside Groundwater Basin. The "Carmel Valley Village Zone" is defined to include all Cal-Am users upstream from the Del Monte Regulating Station.

4. The Russell Wells shall be limited to a combined total instantaneous diversion rate of not more than 0.5 cfs during low-flow periods.

5. During the low-flow periods, except for 0.5 cfs, all water diverted to Carmel Valley Village Zone shall be water that originates from the Begonia Zone (as defined in Paragraph 3 above).

In addition, the production goals for the quarterly budget process have changed over time. Beginning in 1998, the quarterly budgets were formulated with an annual production goal of 11,285 AF during each Water Year from the Carmel River Basin, in conformance with goals and requirements established by SWRCB Orders WR 95-10, WR 98-04, and subsequently in conformance with WRO 2002-0002, and CDO 2009-0060. Releases from San Clemente Reservoir were maximized throughout the year and groundwater production in the UCV was limited to periods when sufficient streamflow was available to recharge the aquifer.

Starting in March 2006, the annual limit for Cal-Am's production from its wells in the Coastal Subareas of the Seaside Groundwater Basin for customers in its main system used in the quarterly budgets was reduced from 4,000 AF per year to 3,504 AF per year based on the final judgment in the basin adjudication. Accordingly, the total annual limit for Cal-Am from the Carmel River and Seaside Groundwater Basins for its main system was set at 14,789 AF. It should be noted that the March 2006 Seaside Basin adjudication decision was amended in February 2007. The decision was amended in part to allow Cal-Am to combine its production allocation from the Coastal Subareas with its production allocation from the Laguna Seca Subarea.

On January 15, 2008, the SWRCB issued a draft Cease and Desist Order (CDO) against Cal-Am. The Draft CDO refers to the 1995 SWRCB Order 95-10, and notes that compliance with Order 95-10 had not been achieved after 12 years. The CDO institutes a series of cutbacks to Cal-Am production from the Carmel River and prohibits new or intensified connections in the Cal-Am main system. MPWMD and several other parties participated in formal hearings before the SWRCB in the summer of 2008. After several draft versions, the final SWRCB determination on the CDO was issued on October 20, 2009. The District subsequently filed a suit to challenge this ruling, and the Monterey County Superior Court issued a stay on November 3, 2009. In response to a challenge by SWRCB, the court ruled on November 23, 2009 that the stay will remain in effect until the hearing that was held in Santa Clara in April 22, 2010. At that hearing, the Court lifted the stay and the CDO was reinstated. The CDO reduced the Cal-Am annual upper limit of diversion from the Carmel River previously set by Order 95-10 at 11,285 AF to 10,429 AF in WY 2010.

In WY 2014, the CDO (Order 2009-0060) set Cal-Am Carmel River production to 10,066 AF. The Seaside adjudication decision limited Cal-Am production in the Coastal and Laguna Seca Subareas of the Seaside Basin to 2,669 AF and 147 AF, respectively. This brought the WY 2014 total production limit from all sources to 12,882 AF (not including any adjustments for supplemental supplies or carryover storage).

Implementation and Activities During 2013-2014

During 2013 and 2014, the quarterly strategies and budgets were structured to optimize production from the Coastal Subareas of the Seaside Basin and minimize impacts from production in the Upper Carmel Valley (UCV). Activities in Water Year 2014 are described below.

- **Cal-Am Main System Production in Water Year 2014**[1] – During WY 2014, Cal-Am produced 11,154 acre-feet (AF) of water for customer service from all sources in its Carmel River, Seaside Coastal and Laguna Seca Subarea systems. This production consisted of 7,744 AF from Carmel River source wells, 2,871 AF of native water from Seaside Coastal wells, 362 AF from Laguna Seca Subarea wells, and 179 AF from the Sand City desalination plant. Of the system total, no water was diverted at San Clemente Dam, which represents the 11th consecutive year this has occurred since Cal-Am's record of diversions began in 1916. Currently, Cal-Am's ability to divert at this site is constrained by: (1) sediment nearly filling the reservoir and blocking the intake structure, (2) higher turbidity standards limiting the duration and period of diversion, (3) the Conservation Agreement with NMFS, and (4) SWRCB Order 2002-0002 that restricts diversions during the low-flow season. During WY 2014, a construction project was begun to reroute the Carmel River around the San Clemente Dam sediment field and de-construct the dam.

[1] Beginning with the 2002-2003 Mitigation Report, Cal-Am production is reported on a Water Year basis, from October 1 of one Calendar Year through September 30 of the following Calendar Year. This is a change from previous annual reports in which the reporting period was July of one year through June of the following year. This change makes the mitigation report consistent with reporting requirements under SWRCB Order No. WR 95-10.

VII. WELL REGISTRATION AND REPORTING PROGRAM

Description and Purpose

All owners of wells within the District are required to register and report their annual water production. The purpose of the program is to provide annual aggregate estimates of water production from both Cal-Am and non-Cal-Am wells in the various groundwater production zones in the District. The information provided is used to make decisions regarding management of the limited water resources of the Monterey Peninsula area.

The District began its Well Registration and Reporting Program in 1980. From 1981 through 1990, well owners were allowed to report water production by one of three methods: Water Meter, Land Use, or Power Consumption Correlation. In March 1990, the District adopted Ordinance No. 48 requiring installation of water meters on all large production wells (i.e., those producing 20 or more AFY). In November 1991, District rules were further amended with the adoption of Ordinance No. 56, which extended the metering requirement to all existing medium production wells, defined as those producing between 5 and 20 AFY, and all new wells within the District. Ordinance No. 56 also eliminated the Power Consumption Correlation reporting method.

Implementation and Activities During 2013-2014

Figure VII-1 shows summaries of reported production from Cal-Am and non-Cal-Am wells in WY 2014, and **Figure VII-2** shows the WY 2013 previous year data for comparison.

Figure VII-3 compares reported production from Cal-Am and non-Cal-Am wells and surface diversions located within the Monterey Peninsula Water Resources System (MPWRS) in WY 2014 with production limits set by the District's Water Allocation Program. The MPWRS includes the Carmel River Basin, Carmel Valley Alluvial Aquifer, the coastal subareas of the Seaside Groundwater Basin, and the Laguna Seca Subarea of the Seaside Groundwater Basin. With respect to the District's Water Allocation Program limits, Cal-Am production from the MPWRS in WY 2014 was 10,976 AF, or 6,665 AF (37.8%) less than the Cal-Am production limit of 17,641 AF that was established with the adoption of Ordinance No. 87 in 1997. Preliminary calculations of available data indicate that non-Cal-Am production within the MPWRS in WY 2014 (including surface water diversions) was 3,384 AF, or 338 AF (11.1%) greater than the non Cal-Am production limit of 3,046 AF established by Ordinance No. 87. Combined production from Cal-Am and non Cal-Am sources within the MPWRS was 14,360 AF in WY 2014, which is 6,327 acre-feet (30.6%) less than the 20,687 acre-feet production limit set for the MPWRS as part of the District's Water Allocation Program. Therefore, no action is necessary at this time, although staff will continue to monitor production trends within the MPWRS and District-wide. It should be noted that this production limit set for the MPWRS did not include production from the Laguna Seca Subarea (LSS), whereas the WY 2014 production values above include the Laguna Seca Subarea. Prior to 2008, the LSS was not included in the MPWRS, but was added with the adoption of Ordinance 135 on September 22, 2008. However, the production limits in the Distict's Allocation Program did not change.

During WY 2014, District staff inspected 14 new water meter installations to ensure compliance with the District's water meter installation standards and guidelines. In addition, staff reviewed copies of 11 applications for permits for construction of new wells within the District from the Monterey County Health Department. Staff also advised recipients of County well construction permits that MPWMD Water Distribution System permits were also required.

Lastly, it should be noted that 99% of the groundwater production within the District was reported by the water meter method in WY 2014. In addition, 98% of registered well owners in the District reported annual production for their wells in WY 2014.

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MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
DRAFT WATER PRODUCTION SUMMARY FOR WATER YEAR 2014

SOURCE AREAS [1, 2]	NON CAW (NON CAL-AM) WELLS						CAW (CAL-AM) WELLS		AQUIFER SUBUNIT TOTALS	
	WATER METER		LAND USE		SUB-TOTAL		WATER METER			
	NO. OF WELLS	PRODUCTION (AF) [3]	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)
AS1	9	103.9	1	0.1	10	103.9	0	0.0	10	103.9
AS2	51	148.4	34	33.8	85	182.2	3	83.1	88	265.3
AS3	130	1,273.8	46	34.7	176	1,308.5	6	[5] 6,021.8	182	7,330.3
AS4	29	974.9	6	3.1	35	978.0	1	1,638.7	36	2,616.7
SCS	5	252.2	2	1.8	7	254.0	6	2,870.5	13	3,124.5
LSS	6	535.0	2	2.7	8	537.7	5	361.6	13	899.3
CAC	8	37.7	8	12.9	16	50.6	0	0.0	16	50.6
CVU	303	674.2	44	45.6	347	719.8	0	0.0	347	719.8
MIS	117	336.6	10	5.6	127	342.2	0	0.0	127	342.2
ACTIVE	658	4,336.6	153	140.4	811	4,476.9	21	10,975.6	832	15,452.5
INACTIVE	314		33		347		12		359	
NOT REPORTING	15		9		24		0		24	
SAND CITY DESAL							0	178.5		adjusted
METHOD TOTALS:	987	4,336.6	195	140.4	1,182	4,476.9	33	11,154.1	1,215	15,631.1

NOTES:
1. Shaded areas indicate production within the Monterey Peninsula Water Resources System. The LSS was added to the Monterey Peninsula Water Resources System in Septembter 2008.
2. CAW - California American Water
3. Source areas are as follows:
   AS1 - UPPER CARMEL VALLEY - San Clemente Dam to Esquiline Bridge
   AS2 - MID CARMEL VALLEY - Esquiline Bridge to Narrows
   AS3 - LOWER CARMEL VALLEY - Narrows to Via Mallorca Bridge
   AS4 - LOWER CARMEL VALLEY - Via Mallorca Bridge to Lagoon
   SCS - SEASIDE COASTAL SUBAREAS
   LSS - LAGUNA SECA SUBAREA (Ryan Ranch Area is within LSS)
   CAC - CACHAGUA CREEK and UPPER WATERSHED AREAS
   CVU - CARMEL VALLEY UPLAND - Hillsides and Tularcitos Creek Area
   MIS - PENINSULA, CARMEL HIGHLANDS AND SAN JOSE CREEK AREAS
4. Any minor numerical discrepancies in addition are due to rounding.
5. No amount of production was subtracted from CAW production in AS3 to account for water provided to ASR Water Projects (ASR Wells #1, 2 and 3) in WY 2014.
6. This total includes 131.3 AF of WY 2012 ASR injection, 294.5 AF ofWY 2013 injection recovery, 217.9 AF from Pre-Permanent Water Rights recovery, and 2,700 AF of Native Groundwater production.
7. No water was provided to Seaside (Municipal) from CAW SCS.

DISTRICT-WIDE PRODUCTION		
SURFACE WATER DIVERSIONS:		
	CAW Diversions (San Clemente Dam):	0.0
	Non Cal-Am Diversions:	19.9
CAW WELLS:		
	[6] SEASIDE:	3,232.1
	CARMEL VALLEY:	7,743.5
	Within the Water Resources System:	10,975.6
	Outside the Water Resources System:	0.0
	Sand City Desal	178.5
	CAW TOTAL, Wells and Diversion:	11,154.1
NON CAW WELLS:		
	Within the Water Resources System:	3,364.3
	Outside the Water Resources System:	1,112.7
	NON CAW TOTAL, Wells and Diversion:	4,496.9
	GRAND TOTAL:	15,651.1

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
DRAFT WATER PRODUCTION SUMMARY FOR WATER YEAR 2013

SOURCE AREAS [1, 2]	NON CAW (NON CAL-AM) WELLS						CAW (CAL-AM) WELLS		AQUIFER SUBUNIT TOTALS	
	WATER METER		LAND USE		SUB-TOTAL		WATER METER			
	NO. OF WELLS	PRODUCTION [3] (AF)	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)	NO. OF WELLS	PRODUCTION (AF)
AS1	8	84.6	1	0.1	9	84.7	0	0.0	9	84.7
AS2	46	165.7	36	43.0	82	208.7	4	350.3	86	559.0
AS3	133	1,090.2	48	48.1	181	1,138.3	6	[5] 5,407.2	187	6,545.5
AS4	29	974.9	7	4.2	36	979.1	1	1,955.8	37	2,934.9
SCS	6	284.6	1	1.1	7	285.8	6	3,343.7	13	3,629.4
LSS	5	510.6	2	2.7	7	513.3	5	376.6	12	889.9
CAC	12	44.9	8	13.0	20	57.9	0	0.0	20	57.9
CVU	293	667.3	45	44.6	338	711.9	0	0.0	338	711.9
MIS	115	411.4	10	6.8	125	418.2	0	0.0	125	418.2
ACTIVE	647	4,234.2	158	163.7	805	4,397.9	22	11,433.6	827	15,831.5
INACTIVE	304		33		337		11		348	
NOT REPORTING	9		5		14		0		14	
SAND CITY DESAL							0	188.3		adjusted
METHOD TOTALS:	960	4,234.2	196	163.7	1,156	4,397.9	33	11,621.9	1,189	16,019.8

NOTES:
1. Shaded areas indicate production within the Monterey Peninsula Water Resources System. The LSS was added to the Monterey Peninsula Water Resources System in Septembter 2008.

2. CAW - California American Water

3. Source areas are as follows:
   AS1 - UPPER CARMEL VALLEY - San Clemente Dam to Esquiline Bridge
   AS2 - MID CARMEL VALLEY - Esquiline Bridge to Narrows
   AS3 - LOWER CARMEL VALLEY - Narrows to Via Mallorca Bridge
   AS4 - LOWER CARMEL VALLEY - Via Mallorca Bridge to Lagoon
   SCS - SEASIDE COASTAL SUBAREAS
   LSS - LAGUNA SECA SUBAREA (Ryan Ranch Area is within LSS)
   CAC - CACHAGUA CREEK and UPPER WATERSHED AREAS
   CVU - CARMEL VALLEY UPLAND - Hillsides and Tularcitos Creek Area
   MIS - PENINSULA, CARMEL HIGHLANDS AND SAN JOSE CREEK AREAS
4. Any minor numerical discrepancies in addition are due to rounding.

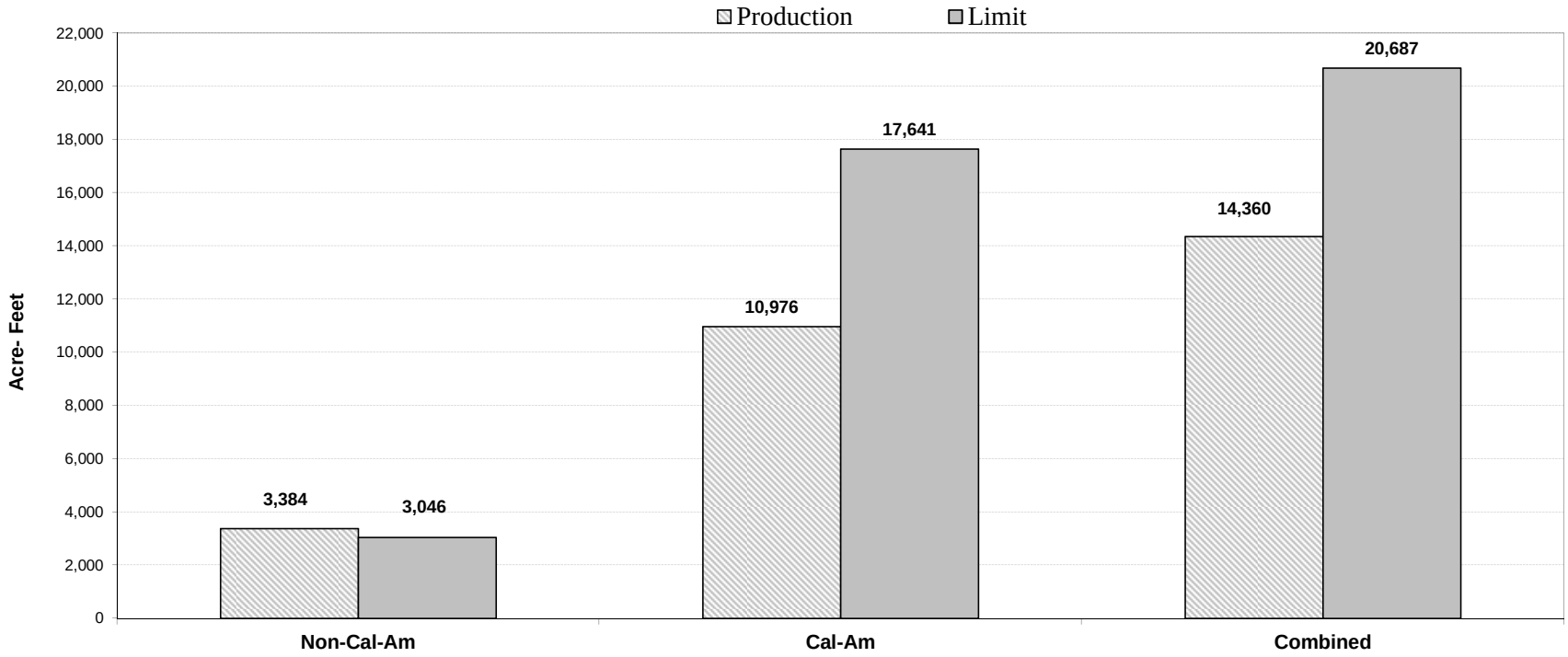
5. 294.5 AF was subtracted from CAW production in AS3 to account for water provided to ASR Water Projects (ASR Wells #1, 2 and 3) in WY 2013.

6. This total includes 131.3 AF of WY 2012 ASR injection, 294.5 AF ofWY 2013 injection recovery, 217.9 AF from Pre-Permanent Water Rights recovery, and 2,700 AF of Native Groundwater production.
7. No water was provided to Seaside (Municipal) from CAW SCS.

DISTRICT-WIDE PRODUCTION	
SURFACE WATER DIVERSIONS:	
CAW Diversions (San Clemente Dam):	0.0
Non Cal-Am Diversions:	26.5
CAW WELLS:	
[6] SEASIDE:	3,720.3
CARMEL VALLEY:	7,713.3
Within the Water Resources System:	11,433.6
Outside the Water Resources System:	0.0
Sand City Desal	188.3
CAW TOTAL, Wells and Diversion:	11,621.9
NON CAW WELLS:	
Within the Water Resources System:	3,209.8
Outside the Water Resources System:	1,188.1
NON CAW TOTAL, Wells and Diversion:	4,424.4
GRAND TOTAL:	16,046.3

Figure VII-3

Comparison of Reported Production to Allocation Limits
within the Monterey Peninsula Water Resources System
Water Year 2014



VIII. WATER EFFICIENCY AND CONSERVATION

Description and Purpose

As a legislated function of the Monterey Peninsula Water Management District (MPWMD or District), a comprehensive water Conservation Program was implemented in October 1979. The Conservation Program expanded in 1983 when the District facilitated development of *The Water Conservation Plan for Monterey County*. The Conservation Plan, adopted by the MPWMD Board in 1986, included a goal to reduce demand by 15 percent of the then-estimated year 2020 demand through implementation of a number of water saving measures including retrofits, use of recycled water, education and other means. At the time the plan was adopted, 2020 demand was expected to be 24,000 AFY for the Peninsula, making the conservation goal 3,600 AF.

Ordinance No. 30, adopted in 1987, was the cornerstone conservation ordinance for the Monterey Peninsula. This ordinance required retrofit to Ultra-Low Flush 1.6 gallons per flush toilets upon resale and in new construction, remodels/additions and changes in use. The ordinance was adopted in July 1987 and codified as MPWMD Regulation XIV, Water Conservation. Regulation XIV also implemented other mandatory water saving measures and a verification process. MPWMD's Regulation XIV has been regarded as a model for other agencies.

In 2009, MPWMD undertook an extensive overhaul of Regulation XIV. Revisions incorporated new technology and best management practices and made the regulation easier to understand. Substantial amendments to the program included significantly expanded indoor and outdoor water efficiency requirements for new construction, visitor-serving commercial uses and Non-Residential customers. For example, all Non-Residential Users that did not have 1.6 gallons-per-flush (gpf) toilets by January 1, 2010 were required to install High Efficiency Toilets (HET) by December 31, 2013. Another example is a requirement for Rain Sensors to be installed on all automatic Irrigation Systems upon Change of Ownership or Use and Expansion of Use (i.e., remodels).

Another legislated function of the MPWMD is the authority to implement and enforce water rationing. A water rationing plan developed by the Monterey Peninsula Water Management Agency (the predecessor to the MPWMD) was available when the MPWMD was established. Amendments to the plan were made in 1981 (Ordinance No. 7) and in 1988 (Ordinance Nos. 35 and 37) during drought-related rationing administered by MPWMD that continued through 1991. Water-use reductions of approximately 30 percent were achieved during the 1988-91 rationing.

In 1997, in response to SWRCB Order 95-10[1], the MPWMD Board of Directors tasked its staff with preparing a plan to address compliance with the Order (i.e., regulatory supply shortage) as well as with physical water shortages. MPWMD worked with a variety of community interests including California American Water (CAW), to conceive and develop the Expanded Water Conservation and Standby Rationing Plan (Plan), which was adopted as Ordinance No. 92 in 1998 (codified as Regulation XV). The Plan consists of seven stages. The first four stages provide CAW and the District with conservation "tools" to keep community water use within

1 SWRCB Order No. WR 95-10 concluded that CAW does not have a legal right for about 10,730 AFA (about 69% of the water supplied to CAW customers) which was being diverted from the Carmel River and that diversions were having an adverse effect on the public trust resources of the river.

regulatory limits. Stages 5-7 of the Plan contain more stringent actions including per-capita rationing that would be triggered by a drought-induced water supply shortage and/or non-compliance with regulatory restrictions.

A key element of the Conservation Program was also added in 1997 when the District began issuing rebates for voluntary toilet replacements with Ultra-Low Flush (ULFT) 1.6 gallons-per-flush toilets. Initially, the District shared funding with CAW. Today, the rebate funds for CAW's customers are supported by the ratepayers through a conservation surcharge on the CAW bill, with the District administering the program.

The Rebate Program has been expanded over the years. At the end of WY 2014, the following items qualified for a rebate[2]:

Residential Indoor

- High Efficiency Toilet
- Ultra High Efficiency Toilet
- High Efficiency Residential Dishwasher
- High Efficiency Residential Clothes Washer
- Instant-Access Hot Water System
- On-demand pump or point-of source water heater as part of an Instant-Access Hot Water System

Non-Residential Indoor

- High Efficiency Toilet
- Ultra High Efficiency Toilet
- High Efficiency Urinal
- Pint Urinal
- Zero Water Consumption Urinal
- High Efficiency Residential Clothes Washer
- Commercial High Efficiency Clothes Washer
- Water Broom
- Cooling Tower Conductivity Controller
- CEE Tier II Water Efficient Ice Machine
- X-ray film processor recirculation system
- Cooling Tower pH/Conductivity Controller
- Dry Vacuum Pumps
- High Efficiency Connectionless Steamer
- Water Efficient Commercial Dishwashers
- Medical equipment steam sterilizer retrofit with a water tempering device

Outdoor Water Efficiency Rebates

- Smart (Weather-Based) Irrigation System Controller
- Soil Moisture Sensor
- Rainwater Harvesting (water storage capacity)

2 Rebates are issued when funding is available.

- Lawn removal and replacement with low water use plants or permeable surfaces
- Rotating Sprinkler Nozzles (minimum purchase and installation of ten)
- Graywater Irrigation System supplied by one Clothes Washer for irrigation and/or one or more Bathrooms that have a Bathtub/Shower connected to a Graywater Irrigation System
- Non-Residential Graywater Irrigation Systems considered on a case-by-case basis

Implementation and Activities During 2013-2014

● **Conservation Inspections** -- District staff continued an intensive inspection program to ensure compliance with the Conservation and Permit Regulations. Change of Ownership inspections make up the bulk of the District's inspection program. Most of the 1,475 properties that changed ownership in FY 2013-2014 were inspected prior to the close of escrow. Ninety-two percent (**92%**) of the inspected properties were found to be in compliance during the first inspection. An additional four percent (**4%**) passed during the second inspection, typically after replacing older toilets identified during the initial inspection. Subsequent enforcement is through non-compliance notice on the title of the property.

District staff inspected 840 properties for compliance with Water Permit conditions during FY 2013-2014.

A total of about 2,101 inspections were conducted in FY 2013-2014. An estimated 15.671 acre-feet (AF) of water were saved by new retrofits verified this year in these two categories.

● **Other Conservation Incentives** -- The District continued to offer incentives for property owners who agree to install water efficient appliances to offset new water fixtures as a condition of a Water Permit. Credit, in the form of water fixture units, remained available to offset new water fixtures in Remodels and Additions when an older model appliance is replaced with a High Efficiency Dishwasher (HEDW), High Efficiency Clothes Washer (HECW), High Efficiency Toilet (HET), and/or Instant-Access Hot Water (IAHW) System. This incentive program is one way to allow limited Remodeling and Additions without increasing water use.

● **Rebate Program** -- The Water Conservation Rebate Program for CAW customers was reinstated as of November 19, 2012, when funding became available. District staff continues to meet with local community organizations to advertise the program.

From July 1, 2013, through June 30, 2014, a total of 2,917 applications for rebates were received, 2,314 applications were approved with the use of rebate refund. **Table VIII-1** summarizes the Rebate Program for FY 2013-2014.

● **Conservation Education** -- District activities remained focused on public education and encouraging Peninsula residents and businesses to implement new water conservation and efficiency practices and to maintain existing equipment and behaviors. Individualized Water Waste education took place as necessary to remind water users not to wash sidewalks, leave hoses running or ignore leaks. Efforts again successfully kept community water use below regulatory limits. A comprehensive report on the conservation program is prepared annually and is available on the District's website.

- The District continued supporting water conservation education through the Water Awareness Committee of Monterey County (WAC). WAC is a nonprofit water-education organization serving Monterey County. The District, as a founding member, holds a seat on the WAC Board of Directors and contributes annual financial and staff support to its efforts. WAC provides books on water-efficient landscaping, Drip Irrigation, and other water related subjects to libraries in Monterey County, sponsors a school water education program and provides outreach opportunities for the public to learn about local water issues.

- District staff participated in several events during FY 2013-2014. Events included presentations at the Graniterock Contractor's Expo and at the Association of Environmental Planners Annual Conference. Outreach events included: Pebble Beach Community Services District Open House, Monterey Peninsula College Earth Day, Naval Postgraduate School Earth Day, City of Monterey's Cutting Day, City of Pacific Grove's Good Old Days, and Water Awareness Day at Del Monte Shopping Center. Staff also judged the annual Water Wise Garden Contest at the Monterey County Fair. The events provided the public with an opportunity to learn about the District's extensive activities and programs.

- District staff participated in the Monterey Business Council's Graywater Roundtable. The group was convened to establish guidelines and a process to permit and install Graywater Irrigation Systems in Monterey County. The group successfully completed the assignment and links to the County's process are provided on the District's websites.

- The District hosted two Laundry to Landscape classes. The classes were provided instruction on using graywater from the washing machine to irrigate outdoors.

- The District co-sponsored two Green Gardener courses. One course was for advanced Green Gardeners and the other focused on Graywater Irrigation System design and installation.

- District staff partnered with CAW and the Water Awareness Committee to sponsor two classes exclusively for irrigation and landscape professionals on Irrigation Scheduling & Smart Controller Programming and Low Volume (Drip) Irrigation. Instruction was available in Spanish and English.

- District staff submitted comments on various development projects subject to CEQA. Projects subject to District water efficiency requirements include: September Ranch, the Cottages at Carmel, Holman Ranch and Villas de Carmelo.

- Water Demand Manager attended the leading-edge WaterSmart Innovations Conference and Exposition. The conference offered four sessions with choices of eight different water efficiency tracks per session.

- District staff contributed to development of a water workbook with local water-supply information for school children. The book was printed and distributed to area schools.

- The school grant program awarded grants to San Carlos School and to schools in the

Monterey Peninsula Unified School District to upgrade Irrigation System controllers and to retrofit plumbing fixtures.

- In 2012, a third CIMIS station (#193) was installed in ET zone 2 at the Pacific Grove Municipal Golf Course. A second CIMIS station is located at Laguna Seca Golf Ranch. This CIMIS Station (#229) was activated on January 1, 2011, and is located in ET zone 3. CIMIS Station #210 is located on the border of zones 3 and 6 and was activated on July 22, 2008.

- Several ordinances were approved in recent years that affect water savings.

    - Ordinance No. 144, adopted August 16, 2010, added Rebates for Cooling Tower Conductivity/pH Controllers, Dry Vacuum Pumps, High Efficiency Connectionless Food Steamers, High Efficiency Commercial Dishwashers, Graywater Irrigation Systems, retrofits of medical steam sterilizers that utilize a continuous water flow with a water tempering device, and WaterSense labeled Ultra-High Efficiency Toilets.

      The ordinance also amended the Rebate amounts for Pint Urinals (from $250 to $300), Rotating Sprinkler Nozzles (from $0.50 to $4.00 with a minimum purchase of ten), Water Efficient Ice Machines (from $450 to $500), and X-ray film processor recirculation systems (from $2,000 to $3,500), Cistern storage capacity was increased from 3,000 to 25,000 gallons with an added eligibility condition that the Site must have sufficient roof area to provide the runoff to fill the Cisterns during a normal Water Year. The ordinance also increases the maximum Lawn Rebate increases from 2,000 to 5,000 square-feet.

    - Ordinance No. 145, adopted September 20, 2010, clarified and amended rules found in the permits, conservation, and enforcement regulations of the District.

    - Ordinance No. 148, adopted April 18, 2011, amended Rule 141, Water Conservation Rebates, to implement new and additional policies related to Lawn removal Rebates adopted by the District's Board in Resolution 2011-04. The ordinance also amended portions of the Rebate Program to strengthen conditions of approval, clarified that Sites must comply with applicable District rules before Rebates are issued, and disqualified from the Rebate Program Qualifying Devices mandated by local, State or Federal water conservation programs.

Table VIII-1
Summary of Rebate Program

	Rebate Paid	Number of devices	Estimated AF	Gallons Saved
High Efficiency Toilet (HET)	113,084.94	649	26.677	8,692,718
Ultra Low Flush to HET	112,852.60	749	7.590	2,473,209
Ultra HET	16,826.89	110	1.030	335,627
High Efficiency Dishwasher	40,523.99	322	0.966	314,772
High Efficiency Clothes Washer	545,320.18	1028	23.185	7,554,852
Instant-Access Hot Water System	7,166.99	36	0.000	0
On Demand Systems	500.00	5	0.000	0
Zero Use Urinals	2,759.77	14	0.280	91,238
High Efficiency Urinals	3,428.50	13	0.195	63,541
Cisterns	41,173.50	31	0.000	0
Smart Controllers	797.67	9	0.000	0
Rotating Sprinkler Nozzles	328.00	82	0.125	40,811
Moisture Sensors	0.00	0	0.000	0
Lawn Removal & Replacement	32,848.00	22	2.423	789,670
Graywater	200.00	2	0.000	0
Ice Machines	0.00	0	0.000	0
Total	**917,811.03**	**3072**	**62.472**	**20,356,437**

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IX. ALLOCATION OF NEW WATER SUPPLY

The Water Allocation Program requires that each new water Connection or Expansion of Use be accounted for so that System Limits are not exceeded. Ordinance No. 70, adopted by the District Board on June 21, 1993, ended the moratorium on the issuance of new water Connections that was imposed in January 1991 as a result of the Water Allocation Program EIR. The ordinance established a consumption Allocation of water that could be used by each Jurisdiction from a total of 358 acre-feet (AF). This amount was calculated from a formula based on the production capacity of the Paralta well, an interim water supply project development by the District in cooperation with California American Water (CAW) (see also **Section X**).

Of the 358 AF available from the Paralta well, a 50 AF District Reserve Allocation was established in 1993 for community benefit projects. In February 1995, Ordinance No. 73 rescinded the District Reserve and allocated the remaining water equally among the eight Jurisdictions. Of the original 50 AF, 34.72 AF remained and was distributed equally (4.34 AF each) among the Jurisdictions.

As described in Section XI of this report, specific water "Entitlements" associated with funding of the Pebble Beach Reclamation Project are available for areas within the Del Monte Forest pursuant to Ordinance No. 109. These Entitlements are not water "Allocations", and are therefore tracked separately. In addition, there are several other Entitlements of water available to specific areas of the CAW service area.

Implementation and Activities During 2013-2014

Between August 1993 and July 2014, a total of 319.887 AF of the 342.720 AF Paralta Well Allocation had been permitted for use by Jurisdictions, leaving 22.833 AF remaining, or 6.7 percent of the Jurisdictions' Paralta well Allocations. Credits from expired or canceled Water Permits ("Pre-Paralta Credits") are tracked by Jurisdiction and may be used for Expansions of Use and New Connections similar to the Paralta Allocation. Finally, credits that were received for public retrofit projects from March 1995 to July 1998 (pursuant to Ordinance Nos. 75 and 91) and Water Use Credits that were transferred to a Jurisdiction are tracked as "Public Credits". **Table IX-1** provides the status of water Allocations for each Jurisdiction as of June 30, 2014.

Table IX-2 summarizes the Entitlements of water available to specific areas of the CAW service area.

In April 2005, the first Water Use Permits were issued to property owners in the Del Monte Forest who purchased water from the Pebble Beach Company (PBC). By June 30, 2014, the District had issued Water Use Permits allowing **1.960 AF** to be transferred from the PBC to independent property owners in Del Monte Forest. Property owners taking advantage of this program pay PBC for the Entitlement and receive documentation of their purchase. The District

processes and records a Water Use Permit on the title of the property that provides notice of the amount of Water Entitlement available. Regular Water Permits are required when the property owner desires to use the water available from a Water Use Permit. As of June 30, 2014, **36.447 AF** of Water Use Permit water had been used to permit new and expanded uses.

Ordinance No. 132. In January 2008, the Board adopted Ordinance No. 132 (adding Rule 23.6) to allow the expansion and extension of the CAW System to provide Connections to, and Potable water service for the use on and benefit of property located within Sand City. This rule enables the issuance of Sand City Water Use Permits for new and expanded water uses on Sand City sites, in a cumulative amount of no more than 206 AF. As of June 30, 2014, **eleven** Water Use Permits and Water Permits had been issued for a total of **3.319 AF**.

Table IX-1

ALLOCATION REPORT
Reported in Acre-Feet
Water Year 2014

Jurisdiction	Paralta	Pre-Paralta Credits	Public	Total Water Available
Airport District	5.197	0.000	0.000	5.197
Carmel-by-the-Sea	1.397	1.081	0.182	2.660
Del Rey Oaks	0.000	0.000	0.000	0.000
Monterey	0. 193	0.030	5.447	5.670
Monterey County	10.345	0.000	2.200	12.545
Pacific Grove	0.000	0.768	0.228	0.996
Sand City	0.000	0.000	23.373	23.373
Seaside	5.701	34.438	1.144	41.283
TOTALS	22.833	36.317	32.574	91.724

Allocation Holder	Total Demand from Water Permits Issued	Remaining Water Available
Quail Meadows	32.229	0.771
Water West	8.478	4.282

* Does not include 15.280 AF from the District Reserve prior to adoption of Ordinance No. 73.

Table IX-2

ENTITLEMENT REPORT
Reported in Acre-Feet
Water Year 2014

Entitlement Holder	Entitlement	Total Demand from Water Permits Issued	Remaining Entitlement/and Water Use Permits Available
Pebble Beach Co. [1]	243.650	11.572	232.078
Del Monte Forest Benefited Properties [2] **(Pursuant to Ord No. 109)**	121.350	36.447	84.903
Macomber Estates	10.000	9.595	0.405
Griffin Trust	5.000	4.809	0.191
CAWD/PBCSD Project Totals	**380.000**	**62.423**	**317.577**

Entitlement Holder	Entitlement	Total Demand from Water Permits Issued	Remaining Entitlement/and Water Use Permits Available
City of Sand City	165.00	3.319	161.681

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Increases in the Del Monte Forest Benefited Properties Entitlement will result in reductions in the Pebble Beach Co. Entitlement.

X. WATER-USE TRENDS

Description and Purpose

Based on data provided by California American Water (Cal-Am), Monterey Peninsula Water Management District staff tracks water use (Cal-Am metered consumption) over time to assess community water-use trends. These data are used in water-supply planning (augmentation) as well as development of conservation programs (e.g., assess the degree of conservation savings needed and the effectiveness of conservation programs).

Implementation and Activities During 2013-2014

Water-use trends may be tracked by using production data at the well head, as described above, or by considering Cal-Am metered consumption information, as described below. **Figure X-1** provides water-use trends from 1980 through 2014, as represented by consumption in acre-feet per Cal-Am connection (AF/connection) for customers[1] in the Cal-Am's Monterey Co. District (i.e., the "Main System"). This is based on Cal-Am annual "Customers & Consumption by Political Jurisdiction & Classification" reports that provide water-use information for each political jurisdiction and Cal-Am system subunits, as well as several user classifications. For WY 2014, the use per connection is based on Cal-Am's total metered consumption[2] (9,841 AF) divided by Cal-Am's total customers (38,751) and equaled 0.254 AF/connection.

Water consumption per connection in WY 2014 was the lowest rate on record during the 1980-2014 period, likely due in part to increased awareness of the need for conservation and higher water charges, and possibly depressed economic conditions. Review of **Figure X-1** indicates that water use per connection for the last 25 years (1989-2014) is significantly less than in the preceding 9 years (1980-1988). The sharp decline in WYs 1989, 1990, and 1991 is attributable to mandatory water rationing in response to the 1987-1991 drought period. From 1989-2013, annual water consumption has remained relatively stable, with a range from approximately 0.27 to 0.40 AF/connection, and average of 0.335 AF/connection, compared to the average of 0.500 AF/connection for the 1980-1988 period. Notably, water consumption in WY 2013 (0.266 AF/connection) was 53% of the pre-drought consumption in RY 1987 (0.503 AF/connection).

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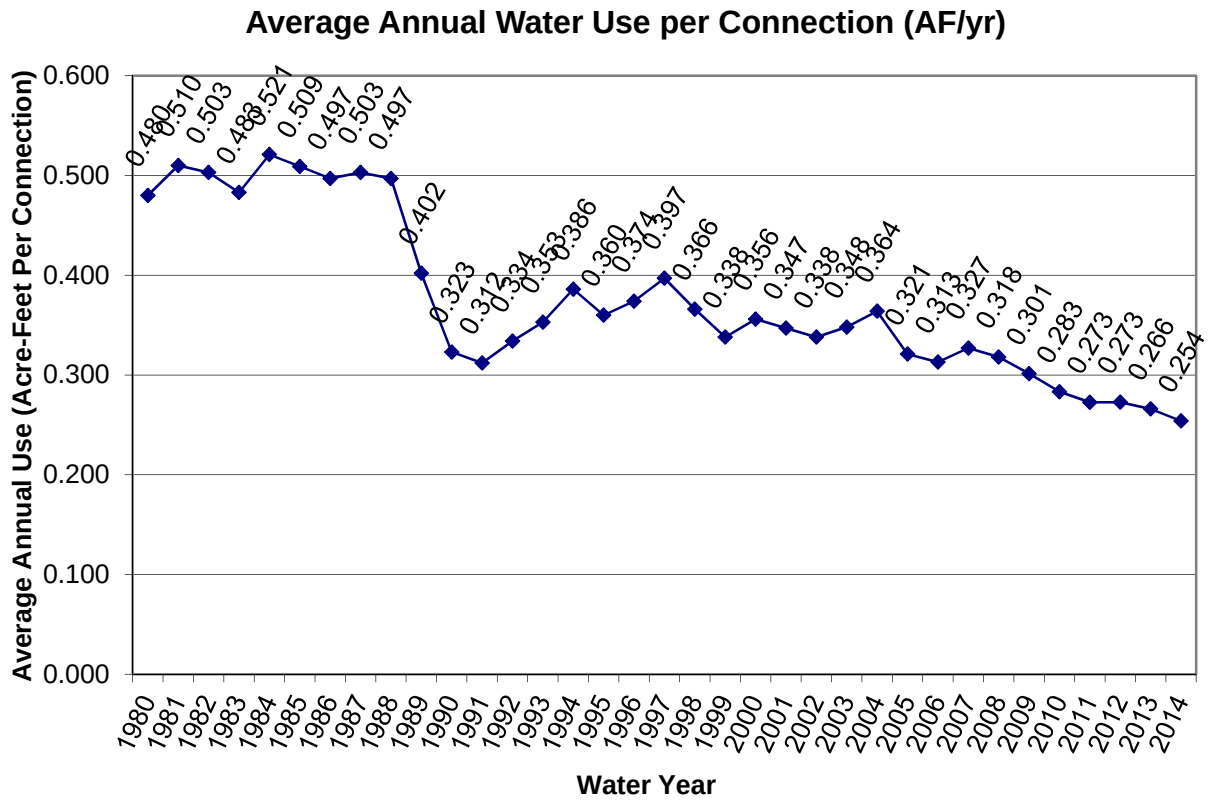
[1] Includes residential, multi-residential, commercial, industrial, golf course, public authority, other and non-revenue metered connections.

[2] Excludes Cal-Am satellite systems with separate well sources (i.e., Ryan Ranch, Hidden Hills, Bishop, Ralph Lane, Chualar and Ambler). Also excludes water supplied to MPWMD by Cal-Am wells to irrigate Carmel River riparian vegetation as part of the Allocation EIR Mitigation Program.

Figure X-1. California American Water Use Per Connection for Main System: 1980 – 2014



XI. WATER DISTRIBUTION SYSTEM MANAGEMENT (WATER PERMITS)

Description and Purpose

The Monterey Peninsula Water Management District (MPWMD or District) balances water supply and demand by carefully tracking the amount of allotted water used by the eight Jurisdictions within the MPWMD boundaries. The Monthly Water Allocation Program Report, found in the District's regular meeting Board packet, summarizes the amount of water available to each Jurisdiction. The current Allocation system, implemented after adoption of the Water Allocation Program EIR, replaced a system based on each Jurisdiction receiving a percentage of the total available production. The current process makes only newly developed water supplies available for new and expanding uses through an Allocation by Jurisdiction system, which is tracked every time a Water Permit is issued. In mid-1993, water from the Paralta Well project resulted in an Allocation of water to the Jurisictions, ending a moratorium that was established in 1989.

In addition to Allocations for each of the Jurisdictions, there are several separate Water Entitlements: Water West, a water company purchased by California American Water (CAW) in the early 1990's, has an independent Entitlement of water for properties within the boundaries of the former system. Properties located in the Quail Meadows subdivision, Pebble Beach Company (PBC) properties, Hester Hyde, Griffin Trust, and J. Lohr properties also have an independent Entitlement of water. Water from the PBC's Entitlement can be assigned to other properties located within the Del Monte Forest (Pebble Beach).

Implementation and Activities During 2013-2014

- **Permit Activity** -- From July 1, 2013, through June 30, 2014, a total of **852** Water Permits were issued. As shown in **Table XI-1**, **30** new residences and **679** residential Remodels/additions were permitted in the CAW system. There were **80** Non-Residential Water Permits issued for Remodels/Additions and Changes of Use in the CAW system. As of June 30, 2014, a total of **91.724 AF** of water remained available in the areas served CAW, as shown in **Section IX**. This includes water from pre- and post-Paralta Allocations and water added to a Jurisdiction's Allocation from Water Use Credit transfers and public retrofits.

- **Reclamation** – The Carmel Area Wastewater District/Pebble Beach Community Services District (CAWD/PBSCD) Recycled Water Project began operation in 1994, producing Reclaimed Water to replace Potable water previously used to irrigate golf courses and recreational open space in the Del Monte Forest (Pebble Beach area). At the start of operation, the District released Water Entitlements to the project sponsors for their fiscal participation. The PBC received 365 AF, Macomber Estates received 10 AF, and the Griffin Trust received 5 AF. The District retains 420 AF of the project's estimated savings of 800 AFA; none of the District share has been allocated.

Ordinance No. 109. In May 2004, the Board adopted Ordinance No. 109 (amending Rule 23.5) to enable financing of upgrades to the CAWD/ PBCSD Recycled Water Project. This ordinance

enabled Water Entitlements held by the PBC to be made available to properties throughout the Del Monte Forest in order to finance the Project Expansion. Ordinance No. 109 also provided a framework for several ancillary agreements for financing, construction and operation, and sale of Recycled Water.

In April 2005, the first Water Use Permits were issued to property owners in the Del Monte Forest who purchased water from the PBC. By June 30, 2014, the District had issued Water Use Permits allowing **121.35** AF to be transferred from the PBC to independent property owners in the Forest. Property owners taking advantage of this program pay PBC for the Entitlement and receive documentation of their purchase. The District processes and records a Water Use Permit on the title of the property that provides notice of the amount of Water Entitlement available. Regular Water Permits are required when the property owner desires to use the water available from a Water Use Permit. As of June 30, 2014, **36.447** AF of Water Use Permit water had been used to permit new and expanded uses (see **Section IX**).

Ordinance No. 132. In January 2008, the Board adopted Ordinance No. 132 (adding Rule 23.6) to allow the expansion and extension of the CAW System to provide Connections to, and Potable water service for the use on and benefit of property located within Sand City. This rule enables the issuance of Sand City Water Use Permits for new and expanded water uses on Sand City sites, in a cumulative amount of no more than 206 AFA. As of June 30, 2014, **ten** Water Use Permits and Water Permits had been issued for a total of **3.319** AF.

- **Interagency Coordination** -- District staff continues extensive coordination with community development personnel from the local Jurisdictions to facilitate communication regarding the Water Permit process. Presentations on the local water-supply situation are given regularly, and meetings are held to discuss permit procedures and to answer questions about Allocation management. Through these meetings, rapport has been developed with the local agencies, making the management of water supplies more productive and accurate.

Table XI-1
Summary of Water Permits Issued

CALIFORNIA AMERICAN WATER **Main System** **(July 2013-June 2014)**			
Type of Water Permit	**No. of Permits**	**Capacity (Acre-Feet)**	**Average Use Per Permit (Acre-Feet)**
New Residential	30	0.602	0.020
• *Pebble Beach Entitlements**	5	1.657	0.332
• *Sand City Entitlement**	0	0	0.000
Residential Remodels/Additions	679	1.658	0.003
• *Pebble Beach Entitlements**	4	0.334	0.084
• *Sand City Entitlement**	0	0	0.000
New Non-Residential	0	0	0.000
• *Pebble Beach Entitlements**	0	0	0.000
• *Sand City Entitlement**	0	0	0.000
Non-Residential Remodels/Additions	80	1.251	0.016
• *Pebble Beach Entitlements**	0	0	0.000
• *Sand City Entitlement**	2	0.900	0.450

**Pebble Beach and Sand City Entitlements are tracked separately from Main California American Water System permits.*

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XII. MONITOR PRODUCTION AND COMPLIANCE WITH SWRCB ORDER WR 2009-0060

Implementation and Activities During 2013-2014

Regarding compliance with State Water Resources Control Board (SWRCB) Order WR 2009-0060 (i.e, the "Cease and Desist Order" or CDO), California American Water (Cal-Am) target production from the Carmel River Basin in Water Year (WY) 2014 for the SWRCB tally was based on the initial regulatory limit of 10,978 acre-feet (AF). This number was then reduced by the CDO reduction of 912 AF, and by the WY 2014 Sand City Desalination Project production of 179 AF, resulting in an adjusted base amount of 9,887 AF. Actual Cal-Am Carmel River Basin diversions (after adjustments) for WY 2014 were 7,744 AF. Thus, Cal-Am reported diversions were 2,143 AF below the adjusted diversion limit from the Carmel River Basin imposed by the SWRCB. WY 2014 was the 17th straight year in which compliance with Order WR 95-10 was achieved and the 5th year for compliance with Order WR 2009-0060. A major purpose of the District's *Expanded Conservation Plan and Standby Rationing Program* is to ensure continued compliance with the SWRCB Orders. The community was in Stage 1 of the conservation program throughout the 2013-2014 reporting period.

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XIII. MONITOR PRODUCTION AND COMPLIANCE WITH MPWMD ALLOCATION LIMITS

Description and Purpose

The adoption of Ordinance No. 70 in June 1993 revised the Monterey Peninsula Water Resource System (MPWRS) supply limit from an annual production limit of 19,881 acre-feet per year (AFY) to 20,673 AFY. The California American Water (Cal-Am) annual production limit of 16,744 AFY (Option V from Finding No. 403 of the Final Water Allocation Program EIR; Ordinance No. 53) was revised to 17,619 AFY, and the non-Cal-Am production limit of 3,137 AFY was revised to 3,054 AFY. This new water supply limit reflected the 385 AFY of new water production allocation from the Paralta Well project and minor adjustments to reflect the integration of the Water West system into the Cal-Am system, the annexation of Quail Meadows Subdivision into Cal-Am, and the refinement of the non-Cal-Am production estimate.

Ordinance No. 83, adopted in April 1996, set Cal-Am's annual production limit at 17,621 AFY and the non-Cal-Am annual production limit at 3,046 AFY, based on permanent reductions in water use by non-Cal-Am water users in exchange for water service from Cal-Am. As part of the agreement, 15% of the historical non-Cal-Am production was set aside to meet the Monterey Peninsula Water Management District (District) long-term water conservation goal. Based on these changes, a new limit for the MPWRS as a whole was set at 20,667 AFY.

The Cal-Am production limit was again amended in February 1997, when Ordinance No. 87 was adopted as an urgency ordinance to provide a special community benefit reserve allocation of 19.6 AFY of production to the Community Hospital of the Monterey Peninsula. Ordinance No. 87 increased the total annual Cal-Am production limit to 17,641 AFY, but did not change the non-Cal-Am limit. Thus, the new limit for the MPWRS as a whole is 20,687 AFY.

In addition to District-imposed production limits as part of its Water Allocation Program, Cal-Am must also comply with limits set by the State Water Resources Control Board (SWRCB) in 1995 as part of Order WR 95-10. The Order includes a provision that Cal-Am water diversions (surface and groundwater production) from the Carmel River basin should not exceed 11,990 AF in Water Year (WY) 1996, and not exceed 11,285 AF in WY 1997 and subsequent years. In 2009, the SWRCB issued Order 2009-0060 (i.e., the "Cease and Desist Order" or CDO), which further modified the Cal-Am production limits and imposed a production ramp-down schedule by water year (see **Section XII**). The water year begins on October 1 and ends on September 30 of the following year. The District program to monitor water use includes tracking Cal-Am compliance with the SWRCB goals.

Implementation and Activities During 2013-2014

District staff continued to manage the overall supply budget, sending periodic reports to the cities and/or county and providing updates and general information as needed. The monitoring programs initiated by Ordinance Nos. 52 and 53 continue to be implemented. Beginning with the 2001-2002 Annual Report, the District changed the reporting period for the Well Registration and Reporting Program from a Reporting Year (July 1-June 30) to a Water Year (October 1-

September 30) to be consistent with the SWRCB Order reporting requirements, and other hydrological reporting programs. The 2000-2001 Annual Mitigation Report was the last report in which groundwater production within the District was presented in a Reporting Year format. Water production tables for the current year in this report use WY 2014 data (October 1, 2013 through September 30, 2014).

Regarding compliance with production limits imposed by MPWMD as part of the Water Allocation Program as shown in **Table XIII-1**, Cal-Am water production from the MPWRS in WY 2014 was 10,976 AF, or 62% of the annual allocation limit, compared to 65% in the previous year, WY 2013. In WY 2014, Cal-Am production accounted for about 77% of total production within the MPWRS.

Non-Cal-Am WY 2014 production of 3,266 AF (including surface diversions) was about 107% of the annual limit, or a 1% increase relative to WY 2013 production.

Overall, combined Cal-Am and non-Cal-Am water produced within the Monterey Peninsula Water Resources System during WY 2014 was 14,242 AF, or about 69% of the total Water Allocation Program limit, compared to 71% during WY 2013 (**Table XIII-1)**.

Table XIII-1
MPWMD ALLOCATION LIMIT COMPARED TO WATER PRODUCTION[1] IN THE MONTEREY PENINSULA WATER RESOURCE SYSTEM
Data from Water Years 2013 and 2014

WATER USER	ALLOCATION LIMIT	WY 2013 PRODUCTION	% LIMIT	WY 2014 PRODUCTION	% LIMIT
Cal-Am	17,641 AF	11,434 AF	65%	10,976 AF	62%
Non-Cal-Am	3,046 AF	3,236 AF	106%	3,266 AF	107%
TOTAL	**20,687 AF**	**14,670 AF**	**71%**	**14,242 AF**	**69%**

Notes:
1. MPWRS includes production from the Carmel River and underlying Carmel Valley alluvial aquifer, Coastal Subareas and Laguna Seca Subarea of the Seaside Groundwater Basin. Does not include Sand City desal plant production.
2. The Water Year (WY) runs from October 1 to September 30.
3. The non Cal-Am Production figures include non Cal-Am surface-water diversions.

Source: MPWMD production reports

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[1] Production values (table above) are based on amounts of water diverted and pumped and are, therefore, higher than the metered sales figures for water delivered to customers.

XIV. DETERMINE DROUGHT RESERVE

Description and Purpose

In conceptual terms, drought reserve can be defined as the balance between water supply and water demand that is necessary to insure a specified level of drought protection. The question that remains is how much protection is "adequate". There is no universally accepted standard for quantifying "adequate" levels of drought protection for municipal water supply systems. Moreover, drought protection can be measured in a number of ways including safe or firm yield, annual shortfalls, frequency or severity of water rationing, carryover storage, or some indicator of environmental stress.

For the Monterey Peninsula Water Management District (MPWMD), the level of desired drought protection has been specified by the Board of Directors in terms of water rationing. Adequate drought protection exists as long as the frequency of mandatory water rationing is less than predetermined standards. The determination of whether or not mandatory water rationing would be imposed during a reoccurrence of particular drought periods is based on simulated system operations for the 1958-2002 period of record.

In more specific terms, drought reserve can be expressed as the total usable storage in the Monterey Peninsula Water Resources System that is required on May 1 to limit mandatory water rationing to the predetermined frequency. The total storage that is required includes carryover storage for use during the following water year and the storage necessary to satisfy the demand that is expected to occur during the remainder of the current water year. In August 1993, the Board adopted a drought protection goal that allows no more than 20 percent mandatory water rationing two percent of the time, or two out of 100 years, on average.

Implementation and Activities During 2013-2014

In 2014, District staff determined that approximately **24,110 acre-feet (AF)** of usable storage were required on May 1, 2014 to avoid requesting a District-wide voluntary 15 percent reduction in water demand. Similarly, approximately **19,065 AF** were required to avoid imposing mandatory 20 percent water rationing. Given that actual, usable storage on May 1 was estimated at **29,070 AF**, no demand reductions beyond existing Stage 1 restrictions were necessary for 2014 based on physical water availability. The 2014 trigger values are based on the maximum California American Water (CAW) production limit set by the State Water Resources Control Board in Order No. WR 2009-0060 (10,066 AF) for CAW's diversions from the Carmel River, the maximum production limit for CAW's diversions from the Coastal Subareas of the Seaside Groundwater Basin set by the Court as a result of the Seaside Groundwater Basin adjudication (2,669 AF), and the non CAW water production limit that was specified in the District's Water Allocation Program (3,046 AF). The 2014 trigger value for requesting voluntary 15 percent water conservation includes the water demand for the remainder of the current water year (8,820 AF) and one full year of carryover storage (15,290 AF).

XV. AUGMENT WATER SUPPLY

The Findings for Adoption of the Water Allocation Program EIR identified a set of general mitigation measures that relate to increasing the water supply. Finding No. 403-A states that the Monterey Peninsula Water Management District (MPWMD or District) shall pursue construction of a major, long-term water supply project to provide water for restoration of the environment and for public water supply. Finding No. 403-B states that the District should pursue a series of smaller "near-term" water supply projects to provide additional water for drought protection and some new growth until the long-term project is completed.

In 1996, District efforts related to both long-term and near-term projects were consolidated into the MPWMD Water Augmentation Plan (WAP). The first WAP report was received by the Board in December 1996, and specific goals were adopted in January 1997. Revised WAP objectives were set in January 1998, April 2000, and March 2001. Since 2001, the MPWMD Board has held Strategic Planning Workshops to set strategic planning initiatives, set goals and objectives to guide District activities, receive progress reports and provide policy guidance. Augmenting the water supply remains a major focus.

Activities for the July 2013 through June 2014 reporting period were guided by goals and objectives in the Strategic Plan adopted by the Board on April 15, 2013, as described below.

To maintain consistency with the Water Allocation Program EIR, the following sections describe MPWMD efforts for long-term and near-term projects separately. In practice, District water augmentation efforts are integrated. For aquifer storage and recovery (ASR), the long-term MPWMD ASR Phase 1 and Phase 2 Projects and associated water rights will be described under **Section XV-A**; the annual ASR testing activities will be discussed under **Section XV-B**.

A. Long-Term Water Supply Project

Description and Purpose

The overarching District water supply purpose is to provide a reliable supply to meet long-term community needs while sustaining the environmental quality of the Monterey Peninsula Water Resource System (Carmel River and Seaside Basins). The following paragraphs provide a detailed setting due to the complexity of the water supply situation. This background information is followed by a review of action in July 2013 through June 2014. Additional information is provided by the General Manager at the monthly regular board meetings, available on the District website at:
http://www.mpwmd.dst.ca.us/asd/board/meetings/meeting.htm (click on desired year; typically written reports are in odd numbered months).

Carmel River Basin Setting: In November 1995, the electorate did not approve the then-proposed 24,000 acre-foot (AF) New Los Padres Dam and Reservoir (NLP) Project, and did not authorize the District to issue revenue bonds for the project. Since then, the District has focused its efforts on non-dam alternatives through its Water Augmentation Plan and Strategic Planning Workshops. The District extensively participated in the 1999-2002 California Public Utilities

Commission (CPUC) "Plan B" process to identify a non-dam alternative to the NLP; and the District continues to work with California American Water (CAW or Cal-Am) and other local agencies on water supply solutions.

The State Water Resources Control Board (SWRCB) decisions on Carmel River issues in July 1995 continued to influence water augmentation efforts through June 2014. The SWRCB Order WR 95-10 identified an estimated 10,730 acre-feet per year (AFY) of historical unpermitted Cal-Am diversions from the Carmel River that must be replaced by another water project or projects. Order 95-10 includes a "one-for-one replacement" requirement, whereby any new water that is developed must first completely offset the 10,730 AFY unlawful diversions from the Carmel River before any water can be used for new construction or remodels that intensify water use in the Cal-Am system. Thus, near-term projects could potentially serve as a source of "supplemental water" to provide for the needs of existing legal lots of record and other future needs only when Order 95-10 requirements have been fully satisfied by a larger project or series of projects.

On January 15, 2008, the SWRCB issued a draft Cease and Desist Order (CDO) against Cal-Am. The draft CDO asserted that compliance with Order 95-10 had not yet been achieved after many years, and that Cal-Am water diversions to serve the community continue to have adverse impacts to fish, wildlife and their habitat, with particular reference to federally protected species such as the Carmel River steelhead fish and California red-legged frog. The draft CDO proposed a series of cutbacks in Cal-Am water diversions that would have resulted in a 50% reduction in community water use in Water Year 2015. Extensive fines could be levied against Cal-Am, which potentially could pass them on to the community, if compliance was not achieved. Given that the Monterey Peninsula already has one of the lowest water-use rates in the state, concerns have been consistently expressed about the feasibility of the cutbacks in the draft CDO and/or health and safety, economic and quality of life impacts to the community.

Cal-Am protested the draft CDO and was granted a formal hearing before the SWRCB. The District and several other entities testified at SWRCB hearings in June-August 2008 regarding: (1) compliance with Order 95-10 and the State Water Code; and (2) recommended content of the final CDO, and rationale for changes.

The SWRCB Board issued the Final CDO on October 20, 2009 (CDO 2009-0060). This would result in more than a 60% reduction in available water supply from the Carmel River in Water Year 2017 (begins October 1, 2016). The District (and other parties) subsequently filed suit to challenge this ruling, and the Monterey County Superior Court issued a stay on November 3, 2009. In response to a challenge by SWRCB, the Court ruled on November 23, 2009 that the stay will remain in effect until a hearing outside of Monterey County was held on April 22, 2010 (pursuant to SWRCB request for change in venue). On April 22, 2010, the Santa Clara County Superior Court lifted the stay, that is, determined that the CDO is in effect and will remain in effect until litigation is resolved. District Counsel and staff, at the direction of the Board, subsequently continued to actively participate in CDO settlement and mediation efforts.

The District website includes *Answers to Frequently Asked Questions about the CDO* (FAQ), dated February 2011, which also addresses a May 2010 submittal by Cal-Am to the CPUC requesting a moratorium on new connections in its Monterey District Main System, with certain

exceptions. The CDO FAQ is located on the District website at:
http://www.mpwmd.dst.ca.us/CDO/FAQ/CDO_FAQ_20110202_HS.pdf

The District also participated in CPUC procedures regarding Cal-Am's moratorium request to ensure that exempted areas are clearly identified and certain text is clarified to be consistent with previous action. On January 25, 2011, a proposed decision was issued by Administrative Law Judge (ALJ) Gary Weatherford. The full Commission acted on March 24, 2011. The proposed and final decision is available on the District website at:
http://www.mpwmd.dst.ca.us/puc/CAWMoratorium_2011/InfoPage.htm

On June 4, 2013, the SWRCB held its regular business meeting in Monterey. The District, Cal-Am and the Monterey Peninsula Regional Water Authority gave presentations on compliance with the CDO. The District's presentation is provided on its website at:
http://www.mpwmd.dst.ca.us/Presentations/2013Presentations/SWRCB%20Presentation%206-4-13.pdf

The District also co-hosted a June 5, 2013 for the SWRCB to visit San Clemente Dam and the Sleepy Hollow Steelhead Rearing Facility. The General Manager held a follow-up meeting with the SWRCB Chairman Marcus on June 7, 2013 to reinforce District goals with respect to metering mixed-use projects during the moratorium, treatment of local water projects, and rationing.

On January 15, 2014 the District General Manager and General Counsel met with SWRCB enforcement staff, Cal-Am, the Monterey Peninsula Regional Water Authority, Sierra Club, attorneys for water rights holders, and the Pebble Beach Company (Parties to the CDO lawsuit) to discuss the process for petitioning for a modification of the CDO under section 1832 of the California Water Code. A confidential proposed set of terms and conditions for an extension of the CDO was prepared and forwarded to the SWRCB in April 2014. Negotiations continued into 2015, and will be addressed in a subsequent annual report.

Seaside Basin Setting: Though much attention is focused on the Carmel River Basin due to Order 95-10 and subsequent orders, management of the Seaside Basin also has important ramifications for long-term community water supply. SWRCB Order 95-10 directs Cal-Am to maximize pumping in the Seaside Basin to the extent practicable in order to reduce diversions from the Carmel River. Thus, since 1995, the Seaside Basin has become an increasingly important source of water supply. Unfortunately, it has also exhibited signs of stress from over-pumping due to Order 95-10 as well as significant increases in non-Cal-Am use. In December 2000, the MPWMD Board directed staff to begin planning activities to prepare a Seaside Basin Groundwater Management Plan (SBGMP) in compliance with protocols set by the State of California (AB 3030 as amended by SB 1938), in coordination with major well owners in the basin. In 2002, the District began evaluating two conceptual interim ordinances that would be in place until the long-term SBGMP is adopted, but this effort was terminated in 2004.

Complicating this task was litigation filed by Cal-Am on August 14, 2003 requesting a Court adjudication of the Seaside Basin. The lawsuit involved issues such as: (a) prioritization and quantification of water rights within the basin; (b) rights to aquifer storage within the basin; (c) rights to artificially introduce non-native water into the basin through direct injection or spreading grounds; (d) a judicial determination that the basin is in overdraft; and (e) the

appointment of a Watermaster to manage the basin water rights and resources. The District was recognized as an interested party and participated in all proceedings, including a non-jury trial in December 2005. District staff served as expert witnesses in the hearing and helped prepare extensive pre-trial documentation.

Judge Robert Randall rendered a Final Decision on March 27, 2006 (as amended). The Decision determined that the Seaside Basin is in overdraft; quantified water rights for parties with overlying water rights ("Alternative Producers"); and set a reduced "natural safe yield" and a near-term "operating yield" allowed to be produced by certain parties with appropriative rights ("Standard Producers") as they work toward a "physical solution" (including ASR and wastewater reclamation) to eliminate the overdraft. A nine-member Watermaster Board was created to implement the Decision with continued oversight by the Court. The MPWMD holds one seat on the Watermaster Board with two out of 13 votes; a MPWMD Board member serves as the MPWMD representative. The Watermaster has generally held monthly meetings since its formal commencement on April 5, 2006. The Watermaster website is at: http://www.seasidebasinwatermaster.org/.

District staff sits on the Watermaster Technical Advisory Committee and contributes data and analysis for several technical reports required by the Court. MPWMD staff and consultants, along with other partners, have been retained by the Watermaster to provide contract technical services, including project management, data collection, and preparation of documents required by the Court as part of the Seaside Basin Monitoring and Management Program.

Water Supply Needs: Community water-augmentation efforts have focused on compliance with Order 95-10, the CDO and the Seaside Basin Adjudication. A special Board workshop was held on August 25, 2011 to review the ramifications of the required cutbacks in the Carmel River and Seaside Basins, along with progress on five MPWMD Water Projects. The materials on required cutbacks are provided at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2011/20110825/ppt/item3_A.pdf

Discussion continues on what the targeted water supply amount should be, which depends on various technical, legal and economic assumptions as well as stated goals. The Monterey Peninsula Regional Water Authority, through its Technical Advisory Committee, asked the District in May 2012 to evaluate the necessary water supply required by a new project or projects. The MPWMD staff memorandum provided to the Board at its May 21, 2012 meeting is available at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120521/10/item10_exh10a.htm.

An October 2014 table describing the "water supply gap" is provided at:
http://www.mpwmd.dst.ca.us/WaterSupplyGap_files/ChartUpdates/WaterGapRev20141022.pdf

Participation in Regional Water Supply Project Planning and Selection: The District has adopted a leadership position in the community with respect to regional water supply planning related to the community's compliance with Order 95-10 and the Seaside Groundwater Basin adjudication. This reflects previous Board goals to have meaningful influence over the type, management and financing of the selected regional project, with emphasis on accountability to the community. Over the years since 2004, Cal-Am has proposed regional

projects known as the Coastal Water Project, the Regional Water Project, or the Regional Desalination Project. District participation in the CPUC approval process for a large Cal-Am project has accounted for significant staff and legal effort. Since 2011, District staff has met with representatives of Monterey County, Marina Coast Water District (MCWD), and Cal-Am to discuss governance of a regional project.

The regional project originally proposed by Cal-Am focused solely on legalizing the existing supply; a second, expanded phase would be needed to address future needs of the jurisdictions such as legal lots of record and new subdivisions to be served by Cal-Am. Thus, the portfolio of MPWMD water projects was viewed as either a replacement for the regional project, if it did not move forward, or as an adjunct to facilitate needed future supply. On January 17, 2012, Cal-Am announced that it was withdrawing support for the Regional Desalination Project (formerly in partnership with Monterey County and MCWD), effectively terminating that project. The announcement came on the heels of Judge Villareal's December 22, 2011 ruling that MCWD should have been the lead agency on the project EIR (not the CPUC).

On April 23, 2012 Cal-Am submitted a new application (A.12-04-019) to the CPUC for new water supply project, comprised of desalination, groundwater replenishment (GWR) and Aquifer Storage and Recovery (ASR). This project is currently known as the Monterey Peninsula Water Supply Project (MPWSP). In May 2012, the District Board voted to become involved in the CPUC process as a formal Party. The District's initial position statement included support, in concept, for the GWR and ASR components of the proposed project, and a desire to lend the Districts capabilities as a public agency to help the desalination component achieve the lowest cost impact on ratepayers. On June 4, 2012, the District filed its pre-hearing conference statement regarding Cal-Am's application. This process continues to evolve as new facts emerge and the projects become refined over time.

The MPWSP website sponsored by Cal-Am is: www.watersupplyproject.org. The GWR website sponsored by the Monterey Regional Water Pollution Control Agency (MRWPCA) is: www.mpwaterreplenishment.org.

In addition to Cal-Am's proposed MPWSP project, two other possible regional desal projects exist:

1. "Deep Water Desal" -- A desalination project to be located in Moss Landing proposed by private investors that features a deep water intake to avoid harm to shallow marine organisms, and co-location with the power plant to serve a large computer "server farm" in association with the City of Salinas (www.deepwaterdesal.com); and

2. "The People's Water Project" -- A desalination project to be located in Moss Landing proposed by private investors that would partner with a public agency to deliver water to the Salinas Valley and Monterey Peninsula (http://www.thepeopleswater.com/).

Monterey Peninsula Regional Water Authority (MPRWA or Water Authority): In early 2012, the mayors of six peninsula cities -- Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City and Seaside -- created a Joint Powers Authority (JPA) called the Monterey

Peninsula Regional Water Authority. According to its website, the Water Authority's goal to find a solution to the pending Peninsula water shortage due to the SWRCB's Cease and Desist Order and the Seaside Basin Adjudication. The Authority is concerned that the community has been unable to reach a consensus on a water supply solution, and if a project is not in place by the CDO deadlines, the community will face severe rationing and an economic crisis. The Authority believes in a portfolio approach to achieve an adequate and cost-effective water supply for the Peninsula while addressing public concerns about the transparency of the project development process, and about the projected increased cost of water. The Water Authority website is: www.mprwa.org.

The Water Authority met on February 9, 2012, and invited the MPWMD General Manager to serve on its Technical Advisory Committee (TAC). District staff attended the first Authority TAC meeting on March 15, 2012, and continues to play an important role on the TAC. The District General Manager was elected as chair of the TAC at its July 2, 2012 meeting. The Authority also retained its own consultant to provide an independent, unbiased, third-party cost assessment of the three proposed regional desalination projects, as well as an evaluation of schedules and financing.

Monterey Peninsula Water Supply Project Governance Committee (MPWSPGC or Governance Committee): In order to enhance coordination between the public and private sector, provide oversight on behalf of the public, and help reduce the cost of future regional water supply projects to Cal-Am ratepayers, the Governance Committee was formed under an Agreement dated November 5, 2013 (revised April 30, 2014). The Governance Committee is comprised of the Water Authority, MPWMD, County of Monterey and Cal-Am. A key task is to select a Value Engineer to analyze the Monterey Peninsula Regional Water Project to potentially lower the costs of, or maximize the value of, the Desalination component, including cost effectiveness, performance, reliability, quality, safety, durability, effectiveness, or other desirable characteristics.

Through mid-2014, the Governance Committee recommended approval of Cal-Am's decision to hire CDM Constructors, Inc. as the design-build team for the desalination facility. The District, jointly with the Water Authority, contracted with Separation Processes, Inc. to participate in the procurement process. The District worked with the Water Authority to secure a Value Engineer for the desalination project, and the District Engineer participated in a review and selection panel on May 15, 2014. The Governance Committee made the final selection, while the Water Authority was responsible for contract award and administration. A review of the initial results of the study was panned for July 10, 2014.

MPWMD Water Supply Project Priorities: On April 15, 2013, the District Board adopted its latest Strategic Plan, which included 1-Year and 3-Year goals. The 1-Year Strategic Goals include pursuit of the following water supply projects:

> **Desalination**: Further develop the "Ratepayer Relief Bonds" proposal for a public contribution for the Cal-Am regional desalination project. (Note: Though not enumerated as a specific goal, the Board also supported evaluation of an alternative non-

Cal-Am desalination project as a "back-up" measure, given the delays and uncertainties associated with the Cal-Am desalination project).

Groundwater Replenishment (GWR): Enter into a cost-sharing agreement for GWR and advance CEQA and feasibility work. This project is also known as "Pure Water Monterey" with the MRWPCA as the lead.

Aquifer Storage and Recovery: Complete Water Project 1 (ASR Phase 1), including an enhanced back-flush pond; redefine easement and enter into agreements with City of Seaside and Fort Ord Reuse Authority (FORA); complete construction.

Local Projects: Work with jurisdictions to advance planning and development of local supplies. Possible examples include: Seaside Municipal replacement supply, Pacific Grove golf course irrigation with stormwater or recycled water, Carmel irrigation with recycled water and perennial springs, or other possibilities. Consider providing seed-level matching funding to advance local planning.

Odello Property: Regulate and provide oversight to owners' proposal to de-link their water rights and transfer those rights to Cal-Am for community use, and transfer the agricultural property into open space public land.

The 3-Year Strategic Goals include:

Develop Comprehensive Strategy for SWRCB Permit 20808-B: The District has successfully reassigned portions of the original New Los Padres Reservoir water rights Permit #20808 to Phases 1 and 2 of ASR (20808-A and 20808-C.) However, permit conditions for each are different and should be consistent. The remainder Permit 20808-B could be revoked by the SWRCB if water is not put to an authorized use by the year 2020, unless an extension is approved. A strategy for the remainder will include:

- Identify two to three potential new injection and recovery sites, both in the Seaside Basin and the Carmel Valley;
- Evaluate possible source well rehabilitation and/or expansion in Carmel Valley, which could entail potential treatment capacity expansion.
- Develop strategy for direct diversion component of water right.
- Amend existing permits and conform all permits to same standards; Attempt to create greater operating flexibility such that any injection well can inject any water and wells can be used for both recovery and production.
- Consider completing a water availability analysis and an IFIM study to develop new permit conditions.

Prepare for Allocation of "New Water": The District will need to develop fair and equitable mechanisms to allocate water from new water projects to the jurisdictions. Policies need to be considered for:

- Allocation of nearly 1,200 acre-feet for legal lots of record;
- Local projects that may free-up potable supplies within jurisdictions;

- Additional water supplies that could be created by future ASR, Table 13 water rights, Odello East water rights, and changes in water right permit conditions;
- Use of any "excess" supplies in the early years of the regional project, before allocation to full build-out of Pebble Beach or legal lots of record;
- Update and evaluation of the jurisdictions' general plan needs.

Establish a Long-Term Strategy for Los Padres Dam: In 2011, the District proposed increasing water supply capacity at Los Padres Dam through either a rubber dam on the existing spillway, or dredging. Cal-Am has expressed little or no interest in these projects in the past, due in part to the high cost and logistical challenges associated with replacing or enhancing fish transport through the dam, dredging the reservoir, and because the National Marine Fisheries Service (NMFS) has indicated that permanent removal of Los Padres Dam is a priority for restoration of the Central Coast Steelhead. However, many fisheries experts believe that a regulated river with the dam intact would be a better long-term solution for the steelhead as well as property owners along the river. The District will address:

- Dam ownership;
- Dam removal and steelhead recovery;
- Property owners and rights;
- Additional water supply;
- Fish passage;
- Extending District river work permit jurisdiction upriver to extend regulatory authority.

Additional information on the 2013 Strategic Plan is provided on the District website at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130415/13/item13.htm.

Implementation and Activities During 2013-2014

The following paragraphs describe action on the Water Projects identified above in the July 2013 through June 2014 period, unless only data for a Water Year (October 2013 through September 2014) are available. A brief summary of accomplishments is provided in bold italic, followed by several paragraphs of background or explanatory information.

Desalination Goal: **Further develop "Ratepayer Relief Bonds" financing proposal for a public contribution for the Cal-Am regional desalination project.**

July 2013 - June 2014 Action: The District worked with Cal-Am and elected officials to facilitate passage of Water Rate Relief Bonds (SB 936) to help reduce the cost of the regional water supply project to the public. State Senator Monning introduced the bill in February 2014 and it was approved by the California Legislature in September 2014. The District actively participated in CPUC hearings and settlement agreements regarding Cal-Am's Application A.12-04-019 for the regional water supply project. The District continued oversight of a Cost-Sharing Agreement with Deep Water Desalination as an alternative to the Cal-Am regional project.

Water Rate Relief Bond (Application A.12-04-019): In Fall Oct 2013, agreement with Cal-Am and other settling parties was achieved to incorporate "Water Rate Relief Bonds" public financing to help reduce the cost of desalination facility. The District developed calendar for introduction and adoption of legislation and hired an implementation team. The General Manager made 15 public presentations on the status of the water supply projects and the use of the Water Rate Relief Bond financing. Legislation was introduced by Senator Monning in February 2014 (SB 936). In March, District and Cal-Am staff and consultants met with staff of the Senate Governance and Finance Committee, the Senate Energy, Utilities, and Communications Committee, the Senate Republican caucus, and the Public Utilities Commission to discuss SB 936. SB 936 was unanimously passed by the Senate Governance and Finance Committee on April 2, 2014 and the Senate Energy, Utilities, and Communications Committee on April 29, 2014. On June 23, 2014, the Assembly Utilities and Commerce committee approved the legislation on a vote of 7 – 0 referred it to the Appropriations committee. The bill was passed by the full legislature and signed by the governor on September 19, 2014.

Cal-Am Desalination Facility (Application A.12-04-019): In late 2012, the CPUC's Judge Weatherford set the stage regarding issues that the Parties need to address, and hopefully settle. Topics of interest to the CPUC include:

- Project costs for desalination, ASR and GWR
- Storage and distribution facilities Costs
- Preconstruction project costs such as test wells, land acquisition, permitting, etc.
- Cost impact of contingencies, such as changes in source water, facility site, plant failure or interruption, outfall use, water demand forecasts, or project delay.
- Financial modeling and project scenarios.
- Project description and any planned changes in that description;
- Shifting cost recovery issues to a separate phase or application;
- Status of public agency participation proposals and discussions; and
- CEQA status and developments.

In April 2013, the District and the mayor's Water Authority co-hosted a public workshop on the issues that might be considered for settlement. After extensive meetings, conference calls and settlement discussions in April through July 2013, the settlement agreement was signed on July 31, 2013.

The District participated in a joint opening brief on the sizing of the desalination facility, submitted to the CPUC on January 21, 2014. On February 14, 2014, the District participated in a joint closing brief in support of approval and implementation of the large settlement agreement, primarily a refutation of claims made by Marina Coast Water District, and a joint closing brief on the sizing of the desalination facility, primarily a refutation of claims made by Surfrider Foundation.

Throughout 2013-2014, Cal-Am encountered delays for permits for test extraction wells along the Marina coastline due to challenges by various parties, including the City of Marina. As of June 2014, the permit for the test slant well and associated monitor wells was slated for review

by the Marina Council at its August 2014 meeting. Given the importance of these data, the CPUC delayed the planned release of the project EIR until December 2014.

Please refer to previous subsections describing the mayor's Water Authority and project Governance Committee regarding related design-build activities.

Alternative Desalination Project: In 2012, representatives from Deep Water Desalination and "The Peoples Desalination Project" made presentations and participated in the District's Water Supply Planning Committee. This led to a November 2012 comparison of various desalination alternatives, which is provided at:
http://www.mpwmd.dst.ca.us/desalination-projects/2012Reports/Report%20to%20MPRWA%20TAC%20-%202012Nov_MPWMDFinAnalysisofSPICostComparisons.pdf

The District determined that the Deep Water Desalination (DW Desal) concept was most viable. At its March 18, 2013 meeting the Board directed staff to enter into further negotiations with DW Desal to establish a cost-sharing relationship for the environmental and permitting work necessary to advance that project as an alternative to the Cal-Am proposal. In May 2013, a detailed project description was provided to the CPUC environmental consultants, State Lands Commission (CEQA Lead Agency) and MPWMD so the project could be evaluated in the MPWSP EIR as a potential alternative project. District staff met with DW Desal representatives to review the status of legal agreements, technical progress, and financial commitments by the DW Desal team. A formal Cost Sharing Agreement was developed and approved by the Board at its July 2013 meeting. This agreement includes a list of deliverable milestones that would affect the District's financial commitments.

In January 2014, MPWMD staff met with the DW Desal team, including their data center developer, to assess progress. Studies on impacts of the intake facility and energy delivery needs were completed, and an application for lease of state lands was submitted to the State Lands Commission (SLC) in May 2014.Work on a combined environmental impact statement and report will be managed jointly by the SLC and the Monterey Bay National Marine Sanctuary, which agreed to be the federal lead for the project. The Cost Sharing Agreement with DW Desal required execution of certain activities which were not accomplished as of June 30, 2014. These efforts continue, and include agreements to:

- purchase the "Tank Farm" parcel adjacent to the Dynegy Moss Landing Power Plant and easements to construct intake and/or outfall pipelines necessary to operate the Monterey Bay Regional Water Project (Project); and

- purchase from the City of Salinas sufficient electricity needed to operate the Project; and

- develop intake and outfall pipeline facilities, and data center components for the Project.

In early 2014, DW Desal evaluated financial numbers relating to a possible cost-sharing service to MPWMD and the Soquel Creek Water District (SCWD). In February 2014, District staff attended a presentation by the DW Desal team, along with many public agencies and water companies from the Monterey Bay area, where the cost-per-acre-foot of water was discussed. The District commented that such costs appeared attractive, but would all would be better served

if a third party review was conducted. In March 2014, the District was approached by SCWD asking to share costs for such a review. At its April 21, 2014 meeting, the District Board approved a cost-sharing agreement with SCWD for the third-party review of costs and cost of water from the DW Desal project ($12,400 commitment). On June 16, 2014, the project developers conducted a science symposium that educated the public about the proposed project. It is noted that litigation was filed against MPWMD by the rival People's Water Project challenging the District's agreement with DW Desal; this was not resolved as of June 30, 2014.

> **Groundwater Replenishment Goal**: **Enter into a cost-sharing agreement for GWR and advance CEQA and feasibility work.**
>
> ***July 2013 - June 2014 Action*: *The District approved a cost-sharing agreement with MRWPCA and worked closely with its team on project evaluation, water rights, source water negotiations and financing issues. Extensive negotiations with Salinas Valley interests regarding a source water sales agreement took place (but were not resolved), which delayed certain activities that depend on a secure source of intake water.***

The Groundwater Replenishment/Pure Water Monterey Project proposed by MRWPCA is identified as a component of the Cal-Am Monterey Peninsula Water Supply Project. In April 2012, the District Board approved a Memorandum of Understanding (MOU) between the District, MRWPCA, and Cal-Am regarding GWR. Details of the agreement approved by MPWMD are provided on the website at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120416/15/item15.htm
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120420/01/item1.htm

In May 2013, the District entered into a cost-sharing agreement with MRWPCA for GWR studies such as cost analysis, value of social benefits provided by GWR, and source water from Salinas Valley agricultural sources. Throughout 2013 and 2014, District and MRWPCA staff and consultants met every other Friday in order to track project progress, including environmental and source water feasibility studies. The District participated on the CEQA and feasibility team, issued a Request for Proposals for water rights analysis for reclamation ditch source water, achieved agreement with Cal-Am and other settling parties on GWR implementation steps, authorized expenditure of funds and began work on a water purchase agreement, evaluation of cost/benefit of project externalities, and debt equivalence.

A Notice of Preparation for an EIR was issued in May 2013. Engineering and technical evaluations were performed on a parallel track throughout 2013-2014, leading to an updated project description. As described more fully in next year's annual report, a NOP for a Supplement to the EIR was issued in December 2014 to reflect these refinements.

Throughout 2013-2014, extensive water rights negotiations took place regarding Salinas Valley sources, which are essential to maximize GWR production, reliability, and cost-effectiveness. District and MRWPCA staff worked jointly to develop business terms and conditions for source water agreements. District Counsel developed a draft memorandum of understanding for review by stakeholders on June 26, 2014 whereby the GWR project would provide water to growers in the Salinas Valley and potable water for the Monterey Peninsula. As of June 30, 2014, MRWPCA had not yet secured rights to source water due to concerns expressed by some Salinas

Valley grower representatives. Staff and Board members from both the District and MRWPCA believe that fundamental terms of agreement for source water can either be reached by July 31, 2014 or no agreement will be reached. Due to that uncertainty, the District Board determined not to authorize any work to proceed on FY 2014-15 budgeted services until there is demonstrated agreement on terms and conditions for source water.

In September 2013, the District authorized the General Manager to circulate a Request for Qualifications and hire a consultant to analyze "externalities" of the Pure Water Monterey groundwater replenishment project in an amount not to exceed $80,000. The statements of qualifications received on May 1, 2014 indicated an actual cost on the order of $200,000. The District Board chose to defer consideration of an increase the budgeted amount until there was a demonstrated agreement on terms and conditions for source water. "Externalities" (sometimes referred to as "social ROI" or return on investment) are water supply benefits that extend beyond simply cost to the ratepayer, but also include other factors that affect environmental and social policy goals, regionally and state-wide. The parties to the July 31, 2013 Settlement Agreements agreed that externalities should be quantified and considered in the decision to include or exclude GWR from the water supply mix. In this case, examples of externalities include:

- Timely construction and implementation
- Security of supply due to diversification of resources (reliability)
- Statewide Recycled Water Policy objectives
- Statewide Ocean Plan objectives
- Statewide AB-32 carbon objectives
- Regional and National Marine Sanctuary objectives

The District Engineer joined the MRWPCA team to meet with State Revolving Fund (SRF) staff on January 7, 2014. SRF staff responded very favorably to the prospect of funding the GWR project, and the project consultants were instructed to begin the loan application process.

As part of the May 2014 Association of California Water Agencies (ACWA) conference, the District and MRWPCA hosted a tour of the GWR pilot plant.

> **Aquifer Storage and Recovery Goal: Complete Water Project 1 (ASR Phase 1) at Santa Margarita site, including an enhanced back-flush pond; redefine easement and enter into agreements with City of Seaside and FORA; complete construction.**
>
> ***July 2013 - June 2014 Action: The District replaced the pump and motor for the ASR-1 well at the Santa Margarita site, and continued to work with FORA and the City of Seaside on property easements needed to install permanent pipelines connecting the Phase 1 and 2 sites and an expanded back-flush pit. The District constructed building facilities at the Seaside Middle School site and completed the ASR-4 Well.***

Phase 1 ASR/Santa Margarita Site: The District has pursued ASR in the Seaside Basin since 1996. The project concept entails diverting excess wet season flows (December through May) from the Carmel River Basin approximately six miles through existing Cal-Am distribution system pipelines to the hydrologically-separate Seaside Basin, where the water is injected into

specially-constructed ASR wells for later recovery during dry periods. Prior to injection, the diverted water is treated at Cal-Am's Begonia Iron Removal Plant in Carmel Valley so that it meets potable drinking water standards. In 1998, the District constructed a 460-foot deep pilot injection well, known as the Paso Robles Test Injection Well (PRTIW), in the northeastern portion of the City of Seaside, which was screened in the Paso Robles Formation aquifer. In 2002, the District constructed a larger injection test well, SMTIW No. 1 (now referred to as ASR-1), on the former Fort Ord Military Reservation, approximately 300 feet east of the PRTIW on a site known as the Phase 1 or Santa Margarita ASR facility. The ASR-1 Well is an 18 inch-diameter, 720 feet deep stainless steel well screened in the more productive Santa Margarita Sandstone aquifer. The ASR-2 Well was drilled in 2007 and equipped with permanent pump and motor in 2008. ASR-2 is larger and deeper, at 22 inches in diameter and 770 feet deep. The ASR-1 and ASR-2 wells work together as a couplet.

District and Cal-Am staff and consultants regularly met to coordinate roles, responsibilities and tasks needed to enable operation of Water Project 1 at full capacity, as feasible. District staff continued working with the City of Seaside and the Fort Ord Reuse Authority (FORA) in order to expand the Santa Margarita ASR site to incorporate needed space for pipelines, treatment equipment, and well capacity. By January 2014, the District had completed the replacement pump and motor on the ASR-1 Well, and completed the final concept design for an enhanced back-flush pond and roadway on the Santa Margarita ASR site. The District reached an agreement with the City of Seaside regarding the size and shape of the easement for these new facilities, but a mutually agreeable appraisal was not achieved as of June 30, 2014 (this effort continues). Though the City does not own the land, it will eventually receive it from FORA, which may require a 3-way agreement between the District, FORA, and Seaside. The lack of agreement delayed work on the backflush pond, undergrounding of pipes, paving, and landscaping in 2014. In related action, in April 2014, the District secured agreement with FORA for closure documentation required for obtaining a right of entry to the newly annexed portion of the site.

In June 2014, the District approved funding to repair the ASR-1 well due to an equipment failure in late 2013 while the well was in service to supply water to the Cal-Am system. The well pump's line shaft and bearings were replaced in summer 2014 to maximize the ability to extract water in the dry season. The original pumping equipment was test equipment not sized for full-scale operations, but served adequately through the end of the Water Year 2012. In August 2013, upgrades to the permanent pumping equipment were installed. However, in December 2013, MPWMD staff was notified by Cal-Am operators that the pump was experiencing irregular rotation stoppages (or "seizures") of the line shaft. An investigation determined that the source of water to the shaft bearings was interrupted, causing excessive wear of the shaft and bearings (normally, a continuous pressurized supply lubricates the pump). Due to the delicate hydraulic balance of competing facilities within the Cal-Am system, Cal-Am and MPWMD staffs agreed to closely monitor the water lube system and install a low-flow alarm system. This alarm system should prevent a similar line shaft water lubrication loss from damaging the well equipment during future operations.

Phase 2 ASR/Seaside Middle School Site: In 2008, the District began negotiations with the Monterey Peninsula Unified School District (MPUSD) for use of an unused portion of the Seaside Middle School property for a second ASR location ("Middle School" site). Installation

of dedicated monitor wells was completed in 2009. Since then, MPWMD and Cal-Am have been working jointly to obtain Carmel River water rights for diversions to storage at the site, and for land-use approval (final site easement was issued to Cal-Am in 2011). Similar to Phase 1, a set of two wells were constructed at the Middle School site. The ASR-3 Well was constructed in 2010 and appurtenant facilities were installed in 2011. Injection testing began in 2012. The ASR-3 Well is a 23 inch-diameter, 960-foot deep stainless steel well screened in the Santa Margarita Sandstone aquifer. Also in 2012, the District completed the necessary CEQA documentation (Addendum to the Phase 1 ASR Project EIR) for the permanent ASR Phase 2 site. The ASR-3 well is significant as it satisfies one of the components of SWRCB Order WR 2009-0060 (Cease and Desist Order) that requires Cal-Am to implement one or more "small projects" by the end of 2011 that produce at least 500 AFY to reduce unlawful diversions from the Carmel River.

In June 2012, the Board approved construction of the ASR-4 Well along with permanent utility pipelines, electrical facilities, and well controls. By easement restriction, the well construction was required to occur during the summer school break period to avoid disruption of school activities at the Seaside Middle School site. The ASR-4 Well was drilled in Summer 2013 and equipped with permanent pump and motor in Spring 2014. ASR-4 is is a 22 inch-diameter, 1,010-foot deep stainless steel well screened in the Santa Margarita Sandstone aquifer. Similar to Phase 1, the ASR-3 and ASR-4 wells work together as a couplet. There are no water treatment facilities at the Seaside Middle School ASR site; all water treatment prior to distribution into the Cal-Am system will occur at the Santa Margarita facility. The on-site facilities building construction activities occurred in Summer-Fall 2013.

By March 2014, the District had completed a final grading and paving plan, instrumentation testing, and finished the wellhead installations. Several project components remain to be completed at this site; an update will be provided in the subsequent annual report.

Water Rights: ASR Phase 1 is facilitated by Amended Permit #20808A, authorized by the SWRCB on November 30, 2007, which allows MPWMD and Cal-Am to divert an additional maximum of approximately 2,426 AFY, from the Carmel Valley Alluvial Aquifer for injection to the Seaside Basin from December 1 through May 31, subject to minimum instream flow requirements. Actual diversions depend on rainfall and Cal-Am operational limitations. ASR Phase 2 is facilitated by Amended Permit #20808C, authorized by the SWRCB on November 30, 2011, which allows MPWMD and Cal-am to divert an additional maximum of approximately 2,900 AFY. The Final EIR for ASR Phase 1 estimated 920 AFY as the long-term average project yield. The EIR Addendum for ASR Phase 2 expected to produce another 1,050 AFY on average. Thus, successful implementation of ASR Phase 1 and 2 could result in an average reduction of up to approximately 2,000 AFY in diversions from the Alluvial Aquifer during the low-flow dry season (June 1 – November 30). Please refer to **Section XV-B** for information on ASR diversion, injection and recovery in year 2013-2014.

Cal-Am Infrastructure: The capacity of the Cal-Am distribution system to deliver injection water simultaneously to both Phase 1 and 2 ASR wells continued to be the subject of coordination meetings between MPWMD and Cal-Am. Cal-Am has indicated that the needed infrastructure upgrades to deliver injection water at full build-out capacity at both sites may not be available until Cal-Am's "Monterey Pipeline" improvements are in place. In the meantime,

pipeline construction by Cal-Am in early 2011 in the City of Monterey helped improve the ability of Cal-Am to deliver injected and stored water from the Seaside Basin wells to a larger area and number of customers in the Cal-Am system.

> **Local Project Goal**: **Work with jurisdictions to advance planning and development of local supplies. Consider providing seed-level matching funding for local planning.**
>
> ***July 2013 - June 2014 Action*: *In July 2013, the District approved a $200,000 Grant Program to provide seed-level matching funding to advance local planning. Two projects were selected: (1) Pacific Grove's Local Water Supply project, and (2) the Monterey Peninsula Airport District's remediation wells. The District developed application criteria and evaluation processes, prepared grant agreement documents, and provided technical assistance to the recipients.***

MPWMD Grant Program: Local jurisdictions have discussed local water supply initiatives of their own to create additional water supply, especially if the regional desalination project is delayed. At its July 22, 2013 meeting, the District Board approved a Grant Program of up to $200,000 from the Water Supply Charge for development expenses for local water projects. The program purpose is to support new water supply that may be used to offset the existing unlawful Cal-Am diversions from the Carmel River, as affected by the SWRCB 2009 Cease and Desist Order, or may result in a new additional supply of water that may serve future needs of the Monterey Peninsula. The grant program requires matching by the local project sponsor. Each jurisdiction and other interested parties (potential Project Sponsors) are solicited annually to submit an application, due by September 1 of each year. They are then reviewed by District staff and the Water Supply Planning Committee, with funding recommendations brought back to the Board. The Grant Program and recipients are described at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130722/14/item14.htm, and
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130916/22/item22.htm.

Two applications were approved by the District Board at its September 16, 2013 meeting. The application from the City of Pacific Grove requested $100,000 for its Local Water Project. The application from the Monterey Peninsula Airport District requested up to $15,000 for a Phase 1 feasibility study for the Reuse of Existing Groundwater Remediation Wells. A third application was expected from the Pebble Beach Company with respect to developing a groundwater supply for the Del Monte Golf Course, but preliminary feasibility studies indicated a low likelihood of success.

Pacific Grove: The City of Pacific Grove has a shortage of potable water for domestic residential and commercial uses. The City currently uses 100 to 125 AFY of potable water for irrigation of the Pacific Grove Municipal Golf Links and the adjacent El Carmelo Cemetery as well as public irrigation in other areas throughout the city. Replacement of this irrigation demand with non-potable supplies will create a new offset of at least 100 to 125 AFY of potable water. The City's August 2013 proposal described a new satellite recycled water treatment facility to be constructed at the former Point Piños Wastewater Treatment Plant to deliver recycled water to irrigation sites throughout the City. The proposal also included initial stormwater capture efforts. More information is available at:

http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130916/22/item22_exh22a.pdf

Monterey Peninsula Airport District: MPAD is investigating the potential use of wells previously used for groundwater remediation by the U.S. Army Corps of Engineers. The most likely use would be non-potable irrigation or aircraft washing onsite. The grant would fund a Phase 1 feasibility analysis. More information is available at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130916/22/item22_exh22b.pdf

The District has also informally discussed possible projects with several entities, such as:

- Sawmill Gulch wells/springs in Del Monte Forest (Pebble Beach Co./PBCSD)
- well(s) on Del Monte Golf Course, Monterey Peninsula Country Club or Aguajito property (Pebble Beach Co.).
- well(s) on Monterey County Fairgrounds for non-potable supplies for bathroom use.
- perennial springs under the Harrison Memorial Library or Del Mar Avenue to irrigate Devendorf Park (Carmel) in order to free up potable water.
- purchase of recycled Reclamation Project water (Carmel)
- replacement supplies for the City of Seaside Municipal water system.

Odello East Property Water Right Goal: **Regulate and provide oversight to owners' proposal to de-link their water rights and transfer those rights to Cal-Am for community use, and transfer the agricultural property into open space public land.**

July 2013 - June 2014 Action: ***The District met with the Eastwood/Odello team to provide guidance on water rights and MPWMD's role in the proposal to transfer water rights to Cal-Am for community use, specifically through a new MPWMD ordinance that would facilitate water entitlements, similar to the Pebble Beach Reclamation Project. The District commented on the SWRCB Notice of Preparation of an EIR and hosted an SWRCB scoping hearing.***

The current owner of the parcel historically known as the "Odello East Artichoke Farm" is Clint Eastwood and the Margaret Eastwood Trust, who wish to help ease the effect of the current Cal-Am moratorium on the community. The Odello East parcel is associated with SWRCB License 13868 (issued November 2012) for a maximum annual diversion of 131.8 AFY and an instantaneous diversion rate of 0.45 cubic feet per second (cfs). In 2013-2014, the District met several times with the Eastwood team to discuss the ramifications of the water rights setting, possible limitations imposed by the SWRCB Order 95-10 and CDO, the District's Water Distribution System (WDS) regulations, and possible courses of action to achieve the end goal. Specifically, the District would need to amend its MPWMD Rules & Regulations by ordinance to facilitate the water transfer and entitlements, similar to current Rule 23.5.

In June 2013, the Eastwood team submitted a Change Petition to the SWRCB to split License 13868 into two new licenses and change the places of diversion and use as follows:

- Proposed License 13868A would entail a maximum of 85.6 AFA (0.37 cfs maximum diversion rate) from three Cal-Am wells upstream of the Odello well. Cal-Am would to serve customers on a subscription basis for existing lots of record within the Carmel

River Basin and a small portion of the City of Carmel that is outside of the Basin. This supply is viewed as an interim source of supply until the Regional Project is operational.

- Proposed License 13868B would permanently dedicate 46.2 AFY (0.08 cfs maximum diversion rate) to Carmel River instream use to preserve and enhance fish and wildlife resources. There would be no points of diversion or use besides the subterranean stream itself.

The SWRCB calls this application the "Eastwood/Odello Water Right" Change Petition, and issued a Public Notice on December 31, 2013. Several parties, including state and federal resource agencies, filed protests in early 2014, and settlement discussions with the Eastwood team ensued. On March 4, 2014, the SWRCB issued a Notice of Preparation for an EIR, followed by a CEQA scoping meeting hosted by the District on April 2, 2014; a field tour was conducted that same day. In a letter dated March 25, 2014, the District submitted written comments describing the WDS Permit process and the need for a new MPWMD Rule. As of June 2014, the EIR was in preparation. Preliminary legal discussions took place regarding a future ordinance, but this effort awaits completion of the water rights process.

3-Year Goal/Develop Strategy for SWRCB Permit 20808-B: Develop a comprehensive strategy for use of the remaining water rights from original New Los Padres Reservoir Permit #20808; work to refine between Permits 20808-A and 20808-C (ASR Phase 1 and 2) to facilitate consistency.

July 2013 - June 2014 Action: The District identified potential new injection and recovery sites, retained consultants and began work on the GSFLOW model and IFIM study, and identified water availability analysis requirements.

The District has successfully reassigned portions of the original New Los Padres Reservoir permit 20808 to Phases 1 and 2 of ASR (20808-A and 20808-C.) However, permit conditions for each are different, which can create consistency issues. The remainder permit (20808-B), without an approved extension, could be revoked by the SWRCB if water is not put to authorized use by the year 2020. Thus, a key goal is to develop and implement a strategy for the remainder. As described below, in the July 2013-June 2014 period, the District:

- Identified two potential new injection and recovery sites in the Seaside Basin and authorized the first phase of a consulting study of ASR opportunities in the Carmel Valley in July 2013;
- Developed a scope of work, authorized funding and retained a consultant to develop a linked surface-groundwater model using the USGS GS-Flow model;
- Identified requirements to perform a water availability analysis;
- Developed a scope of work and retained a consultant to develop a Request for Proposals to conduct an Instream Flow Incremental Methodology (IFIM) study that could provide data to update instream flow requirements and that would reflect changed conditions along the Carmel River;
- Determined that requests for refinements to Permit 20808-A and C should wait until model results are completed.

GSFLOW is a computer model that integrates a precipitation runoff model (PRMS) and a groundwater model (MODFLOW) to quantify the interaction of stream flow with groundwater to help with water supply planning. It can predict changes in aquifer storage, river flow (and in turn, steelhead habitat) at different Cal-Am and non-Cal-Am pumping rates; formulate best operational scenarios resulting in least harm; forecast flows available for ASR; compare the effects of different water supply projects on river flow and forecast effects of multi-year drought. The District approved retaining a consultant in August 2013, and work began in September 2013. For several months, staff provided extensive input files based on MPWMD well and streamflow records. As of June 2014, the MPWMD input files were being organized and formatted, and the calibration process was beginning. More information is available at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130819/05/item5.htm.

The GSFLOW model would be used in assessing water availability under a number of scenarios that include future changes in Cal-Am operations, diversions along the river, and different amounts of surface storage in the Carmel River Basin.

NMFS completed recommendations for maintaining instream flows in 2002. A modified version of those recommendations is currently being attached by SWRCB to all new permits issued for the Carmel River, including those issued to MPWMD. The 2002 NMFS study does not accurately reflect significant changes in river habitat conditions and Cal-Am operations over the past 25 years. District staff is currently working with a consultant to develop an updated instream flow analysis using the IFIM method. A workshop to discuss the IFIM study was held April 23, 2014. The study will likely take one to two years to complete. The IFIM can be used to evaluate how changes in flow affect steelhead habitat and fish passage, and are relevant to alternatives being considered at Los Padres Dam, especially in the "shoulder" seasons of late fall/early winter and late spring/early summer.

The IFIM study results in habitat suitability criteria that quantify habitat value at different river flows, based on field assessments of habitat under a variety of flow situations. This information can be used to determine whether the minimum Carmel River flow requirements that are included in the ASR Phase 1 and Phase 2 water right permits are appropriate for the protection of steelhead habitat. If the existing instream flow requirements are higher than necessary, then the District could petition the SWRCB to change the existing instream flow requirements to enable more opportunities to divert wet-season flow without harming the steelhead habitat. The District approved funds to retain a consultant in June 2013, and work began in July 2013. As of June 2014, the District had completed a draft scope of work for the IFIM study and began outreach to stakeholders on the draft. More information is provided at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2013/20130617/04/item4_exh4a.pdf

3-Year Goal/Prepare for Allocation of "New Water": The District will develop fair and equitable mechanisms to allocate water from new water projects to the jurisdictions.

July 2013 - June 2014 Action: The District achieved agreement about the amount of water associated with legal lots of record, and updated the Technical Advisory Committee on how CEQA handles this type of future growth.

The 1990 Allocation EIR resulted in the District developing a process for the allocation of water to the jurisdictions that was very interactive. The District plans to be proactive to develop fair and equitable mechanisms for allocation of water from new regional and local projects to the jurisdictions. Actual allocation of water is many years away, and depends on approval, funding and construction of water supply facilities. In the July 2013-June 2014 period, the District:

- Achieved agreement with Cal-Am and other settling parties to incorporate almost 1,200 acre-feet of water supply for legal lots of record in the sizing of the Water Supply Project. As part of that agreement, the District has committed to engage the jurisdictions in the water allocation process. The District also agreed to coordinate an update and evaluation of the jurisdiction's future general plan water needs.
- Held discussion with the District's Technical Advisory Committee (TAC) on the alternate approaches under CEQA. Eric Zigas of ESA spoke to the TAC on treatment of water for legal lots of record in the EIR currently being prepared by the CPUC for the Cal-Am Monterey Peninsula Water Supply Project.

3-Year Goal/Establish a Long-Term Strategy for Los Padres Dam: Continue efforts to increase water supply capacity at Los Padres Dam through either a rubber dam on the existing spillway, or dredging.

July 2013 - June 2014 Action: The District commissioned and received a report on a long-term strategy for Los Padres Dam, and began work on several studies needed to make informed decision on the best alternative use of the dam.

Pursuant to previous direction of the Board, District staff pursued options for increasing storage at Los Padres Dam and Reservoir, which is owned by Cal-Am. This effort stalled when Cal-Am responded to District inquiries in an October 5, 2009 letter, which stated that Cal-Am has "no interest" in making modifications to the dam. Cal-Am confirmed its position in September 2010. In 2011 the District proposed increasing water supply capacity at Los Padres Dam through either a rubber dam on the existing spillway, or dredging. The District received a December 2011 letter from the National Marine Fisheries Service (NMFS) in response to the District's inquiry regarding options of either a new dam on the Carmel River or increased capacity to the existing Los Padres Dam and Reservoir. NMFS is not supportive of either proposal.

In 2012-2013, the District Water Supply Planning Committee directed staff to continue to explore the concept of dredging Los Padres Reservoir to regain lost storage capacity or increasing storage in spring with a temporary "rubber dam." A draft steelhead recovery plan by the National Marine Fisheries Service proposed removal of Los Padres Dam in order to improve fish passage at the dam and habitat downstream of the dam; however, District staff asserts that available data show an adverse effect on the Carmel River if there were no Los Padres Dam due to the beneficial effects of summer streamflow released from storage, which helps to offset some of the impacts from downstream diversions and other losses. Many fisheries experts believe that a regulated river would be a better long-term solution for the steelhead. The District, in its role to manage the watershed as an integrated whole, took a leadership position in determining the

long-term fate of Los Padres Dam. In the July 2013-June 2014 period, the District:

- Was successful in meeting with officials in Washington, D.C. to explain the importance of Los Padres Dam, which resulted in a modification to the Final Steelhead Recovery Plan concerning the fate of Los Padres Dam;
- Advanced the scope, authorized funds, retained consultants and began work to develop a GSFLOW model and an IFIM study; determined requirements to perform water availability analysis (see Strategy for SWRCB Permit 20808-B section above);
- Authorized funds, retained a consultant and received a report that helps outline potential alternatives and a method for how the Los Padres Dam alternatives should be viewed in the future.

In April 2013, NMFS directed Cal-Am to resolve fish passage issues and aquatic habitat degradation in the Carmel River associated with Los Padres Dam. In December 2013, NMFS released the final recovery plan for South Central Coast steelhead that included a critical recovery action to improve upstream passage at Los Padres Dam and address habitat degradation downstream of the dam, or analyze the effect of dam removal. In its 2015-17 General Rate Case application to the CPUC, Cal-Am requested $4.2 million to improve downstream fish passage at Los Padres Dam and $1 million to complete a detailed feasibility study to determine the ultimate fate of the dam. The District supported both requests, but recommended that MPWMD take the lead, with assistance by Cal-Am, on completing a feasibility study for Los Padres Dam.

If the CPUC approves Cal-Am's request for funds (pending as of February 2015), the feasibility study would be completed over a three-year period and would focus on evaluating options for improving upstream steelhead passage at Los Padres Dam, whether the Carmel River is better or worse with surface storage at Los Padres Dam, and what options exist to maintain or enhance physical existing surface storage in Los Padres Reservoir (e.g., by managing existing sediment and annual sediment inflow to the reservoir). Also included in the studies would be an analysis of the potential geomorphic effects of a resumption or increase of the natural flow of sediment.

In order to provide additional water supply to the Monterey Peninsula and develop a long-term strategy for Los Padres Dam, the MPWMD Water Supply Planning Committee requested an investigation by the Shibatani Group. The first draft of the "*Los Padres Dam and Reservoir Long-Term Strategic and Short-Term Tactical Plan*" (Los Padres Dam Plan) was reviewed by the Committee with Robert Shibatani on February 4, 2014. The Committee and staff provided comments, and a final draft of the plan was reviewed by the Committee at its July 14, 2014 meeting. At its July 21, 2014 meeting, the District Board received the plan, subject to further review and analysis by the Committee.

The Committee expressed several concerns about the alternative recommended by the Shibatani Group, which was to remove Los Padres Dam and build offstream storage. Committee members believe a new dam in the Carmel River watershed would not be feasible due to community concerns and potential environmental effects if a proposed dam would impact National Forest or Wilderness areas. The Committee focused on an alternative that would include preserving or enhancing the existing storage at Los Padres Reservoir in order to provide water for downstream

users and to benefit aquatic habitat downstream of the dam.

The Los Padres Dam Plan is one of several component studies and investigations that will be needed to fully evaluate options for Los Padres Dam. In addition to further review of that plan, studies needed to address the questions and recommendations made by NMFS and the Committee about Los Padres Dam include:

- Flow analyses associated with alternatives (coordinate with GSFLOW model);
- Update IFIM instream flow study;
- Steelhead counting device at Los Padres Dam;
- Yield and cost/benefit analysis;
- Sediment management.

Additional information on these issues and a link to the consultant report is provided at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2014/20140721/02/item2.htm

B. Near-Term Water Supply Projects

Description and Purpose

Section XV-A above describes long-term water supply alternatives, including the MPWMD ASR Phase 1 and Phase 2 Projects. This section focuses on annual ASR operations. Since 1996, the District has evaluated the feasibility of ASR at greater levels of detail. As of June 2014, the District had constructed five ASR wells in the Seaside Basin: (1) a shallower ASR pilot test well into the Paso Robles Formation (located at Mission Memorial Park in Seaside) in 1998; (2) a 720-foot deep, full-scale test well into the Santa Margarita Formation in 2002 (now ASR-1); (3) another full-scale ASR well at the Santa Margarita site (ASR-2) in 2007; a full-scale ASR well at the Seaside Middle School site (ASR-3) in 2012; and a second full-scale well at the Middle School site (ASR-4) in 2014. To comply with the SWRCB water rights permit conditions, MPWMD submits detailed annual reports to the SWRCB after each operational season.

Implementation and Activities During 2013-2014

In the 2013-2014 diversion season, no water was diverted and injected in the December-May season due inadequate streamflow resulting from the "exceptional" California drought. Thus, the cumulative injection total into the Seaside Basin from the program inception through May 2014 remains at 4,771. In Water Year 2014, a total of 0 AF ASR-stored water was extracted (recovered) and delivered to Cal-Am system customers.

In June 2014, District staff and consultants submitted the annual ASR operations reporting for WY 2013 (the previous year), which summarized operations and confirmed that diversions for the ASR projects have complied with regulatory requirements. The completion of this annual report is a requirement of the Central Coast Regional Water Quality Control Board (RWQCB) as part of their ongoing oversight of the ASR program in the Seaside Basin. The report is available at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2014/20140623/02/item2.htm

In addition, MPWMD completed reporting of river monitoring activities associated with the ASR project diversions, per monitoring required by the CEQA process for operation of the Phase 1 ASR Project. For reference, other documents related to ASR may be found at: http://www.mpwmd.dst.ca.us/WaterProject1.html.

Other Relevant Action

The District also has taken the lead in development of an Integrated Regional Water Management Plan (IRWMP) for the Monterey Peninsula, Carmel Bay, and South Monterey Bay Area, including grant applications and extensive coordination with local agencies and groups. These efforts culminated in a comprehensive planning grant application in September 2010.

In 2011, the District received a $995,000 Planning Grant to update the IRWM Plan from the California Department of Water Resources (DWR) from Proposition 84 funds for the Integrated Regional Water Management (IRWM) Grant Program. This is about 61% of the total cost of $1,634,010. The balance of the project costs ($639,000) will be from cash and in-kind services provided from the stakeholders in the planning region. The full Work Plan, Budget, and Schedule can be viewed or downloaded at the District's IRWM web site at: http://www.mpwmd.dst.ca.us/Mbay_IRWM/Mbay_IRWM.htm

In 2012-2013, the District hosted five stakeholder meetings on July 25, 2012; October 24, 2012; February 6, 2013; and February 7, 2013 (Ord Community inter-regional focus). The materials for stakeholder meetings in 2012-2013 are provided at: http://www.mpwmd.dst.ca.us/Mbay_IRWM/2010PG/Stakeholder-info-meetings/stakeholder.htm

At its June 23, 2014 meeting, the Board received the final IRWM Update Report and adopted the plan, which is described at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2014/20140623/20/item20.htm.

Also in June 2014, the Board authorized an application to the Department of Water Resources for funds from the 2014 IRWM Drought Round solicitation; however, the region was not awarded any funds from this round.

XVI. STEELHEAD FISHERY MITIGATION MEASURES

The Findings for Certification of the Water Allocation Program Final EIR (Findings Nos. 388-A through D) identified mitigation measures to reduce impacts to the Carmel River steelhead population, including: (a) expansion of the program to capture and transport smolts during spring, (b) prevent stranding of early fall and winter migrants, (c) rescue juveniles downstream of Robles del Rio during summer, and (d) implement an experimental smolt transport program at Los Padres Dam. Monitoring of adult returns and juvenile populations provides an indication of the overall success of the steelhead mitigation measures. The following sections briefly describe the purpose of each mitigation measure and activities during the reporting period.

A. Capture and Transport Emigrating Smolts during Spring

Description and Purpose

The goal of this program is to reduce disruption of the steelhead life cycle due to streamflow diversions. During spring months, when steelhead smolts are actively emigrating from freshwater to the ocean, the diversion of surface and groundwater from the river and alluvial aquifer sometimes interferes, and in some cases, blocks migration into the ocean. This threatens individual fish, reduces the number of smolts that successfully reach the ocean, and indirectly affects the number of adults that eventually return to freshwater. When streamflow is too low for natural emigration, or when smolts are at risk of being stranded, the Monterey Peninsula Water Management District (MPWMD or District) monitors streamflow, captures emigrating smolts, and transports them to the lagoon or ocean.

Implementation and Activities During 2013-2014

The Carmel River continued to have low-flow conditions for most of the July 2013 through June 2014 period. During the primary three-month smolt migration period, March-May 2014, there was no streamflow in the lower river and smolts were unable to migrate to the Carmel River Lagoon. Several small, short-lived flows of <3cubic feet per second (cfs) at the Highway 1 Gage were the result of local impervious surfaces (e.g., streets, parking lots) runoff **(Figure XVI-1)**.

On March 19, 2014 District staff set up the smolt box trap and weir near mid-valley to prevent fish from migrating farther downstream to the dry reach. This trap was last operated in 2013 when dry conditions occurred in the lower valley. The trap was operated for 52 days (over a 59-day time span) until the end of May when flows became too low to effectively catch fish and the number of smolts captured had dropped to zero. During trapping, 1,295 steelhead were captured, including 187 smolts that were transported to Carmel Bay, acclimated to seawater then released, along with 1,089 juveniles and four resident adults that were transported to permanent habitat upstream of the trap site **(Figure XVI-2).** Trapping mortality was very low at 15 fish (1.2%). Other animals captured and released below the trap site included sculpin, stickleback, hitch, crayfish, Western Pond Turtles, toads and bullfrogs. No Pacific Lamprey were captured this year.

In addition, due to the early season start of rescues in 2014, 873 smolts were captured downstream of the trap from March 3–April 18. These smolts were also acclimated and released in Carmel Bay.

B. Prevent Stranding of Fall/Winter Juvenile Migrants

Description and Purpose

As in other central California streams, juvenile steelhead in the Carmel River move downstream into lower reaches of the river well ahead of the peak emigration of smolts. Depending on river conditions and diversions during the previous dry season, there is some risk that pre-smolts and other juvenile steelhead will be stranded following early fall and winter storms, which increase flows and stimulate the fish to move downstream into habitats that are subsequently dewatered after the storm peak passes. This risk occurs primarily from October through February, although during severe droughts, the risk period may extend into March. The District mitigates this problem by capturing and transporting juveniles when necessary during the high-risk period. Currently, juveniles trapped during fall/winter months are transported upstream to viable habitats above the Narrows or held at the District's Sleepy Hollow Steelhead Rearing Facility (SHSRF).

Implementation and Activities During 2013-2014

District staff monitored river conditions during the fall and winter months of 2013-2014. Flow at the District's Highway 1 Gage dropped to zero cfs in June 2013 and the lower river remained essentially dry through June 2014 **(Figure XVI-1)**. Due to the extreme dry conditions, there was a high risk of fish stranding and conditions were carefully monitored throughout the fall and winter but no additional rescues were needed. **(Note: fish rescued through September 2013 are included in the following section and non-smolts rescued in March 2014 will be discussed in the 2015 mitigation report).**

C. Rescue Juveniles Downstream of Robles Del Rio during Summer

Description and Purpose

About 1.5 miles of habitat between Boronda Road and Robles del Rio Road, and up to nine miles of habitat below the Narrows, are seasonally subject to dewatering depending on the magnitude of streamflow releases at Los Padres Dam, seasonal air temperatures, and water demand. Beginning as early as April or May of each dry season, the District rescues juvenile steelhead from the habitat in these reaches. The goal of this program is to help maintain a viable steelhead population by transplanting juveniles to permanent river habitats downstream of San Clemente Dam (if it is available), and/or rearing juvenile steelhead at the SHSRF, located just downstream of San Clemente Dam, if existing habitat is not available or is already fully saturated with juvenile steelhead.

Implementation and Activities During 2013 Rescue and Rearing Season

- **MPWMD Annual Rescue Totals –** The surface flow of the Carmel River dropped to 10 cfs at the Highway 1 Bridge on April 16, 2013. In response to this decline, District staff began full-scale rescues on April 19. Rescues were conducted over a five-month period, April 19 –

September 12, 2013 between Highway 1 Bridge (RM 1.0) and Robinson Canyon Road Bridge (RM 8.5). An additional one-mile reach between Boronda Road Bridge and DeDampierre Park in Carmel Valley Village (RM 12.6-13.6) was also rescued in September as the drought worsened. During this period staff completed 82 rescue days, yielding a total of 42,805 steelhead including: 41,893 YOY, 650 yearlings (1+), 13 adults and 249 mortalities (0.58%) **(Table XVI-1a)**. This total translates to 5,036 fish-per-mile (fpm) or 0.95 fish-per-lineal-foot (fpf). Since 1989, District staff has rescued 417,837 steelhead from drying reaches in the mainstem Carmel River. Compared to previous rescue seasons, the rescue total in the 2013 dry season was two and a half times greater than the 1989-2013 average of 16,713 fish rescued **(Figure XVI-3)**.

- **2013 Dry Season, MPWMD Transplant Location –** During the 2013 dry season, a total of 42,556 juvenile and adult steelhead rescued by MPWMD were transported and released at 11 different locations within the Carmel River watershed **(Table XVI-1b)**. The majority of fish were released at the District's SHSRF (28,139), the Sleepy Hollow river reach (5,911), the Robles Del Rio area (4,264) and the Garzas Well/Garland Park reach (3,265).

- **Sleepy Hollow Steelhead Rearing Facility (SHSRF)** - The District's Water Allocation Mitigation Program includes construction and operation of a facility for rearing juvenile steelhead through the dry season. In early 1997, the District completed construction of the SHSRF, which includes: (1) a diversion and pump station, (2) two large circular tanks, (3) an 800-foot long rearing channel, (4) electrical, water, pressurized air and drainage systems, (5) an office/shop/lab building and (6) miscellaneous equipment.

Significant additional upgrades and modifications were made to the Facility between 2000 and 2003. These included: (a) a cooling tower, (b) large emergency generator, (c) upgraded impellers on the existing pumps, (d) purchases of an additional backup pump and a mobile emergency pump, and (e) installation of a centrifugal separator to reduce the buildup of coarse sediment in the cooling tower and rearing channel. In 2005 and 2006, new wooden weir boards were installed and waterproofed in the rearing channel to prevent fish movement between bays and add an additional backup mechanism. If the river pumps were to fail, the channel would hold more water longer, giving staff more time to correct the problem without fish loss. In 2007, eight, 250-gallon, insulated rearing troughs were installed. These rectangular, flow-through troughs replaced a defunct 22-foot diameter tank. These tanks are used to rear small rescued fish, for additional quarantine treatments, or for growth and survival experiments. In 2008, Tank 3, the 22-foot diameter holding tank, was outfitted with a large re-circulating pump, filtration, and UV sterilization system. This allows staff to hold fish into the winter season even during large storm events when the river's water quality is inadequate for fish survival or if the Facility's river pumps should fail.

Facility Modifications in Reporting Year 2014 – No major modifications were done at the Facility during the 2013 rearing season.

Summary of 2013 SHSRF Fish Stocking and Releases - Between May 28 and August 26, staff received approximately 28,142 rescued fish at the Facility. All fish brought into the facility go through a quarantine process, after which they are recounted and stocked into the rearing channel or rearing troughs. During this process there are some numerical differences between what is

brought in for quarantine from the field and what is stocked into the channel. The difference represents cannibalism during transport and quarantine and/or numerical counting errors in the field during rescue operations. The Quarantine Tank (QT) summary is shown in **Table XVI-2a**. The difference in counts from the number recorded during rescues brought to the Facility and the number from re-counts in the QT Tanks was (-) 1,794 (6%). Of the 26,348 recounted fish, 1,849 (7%) died in quarantine and an additional 821 (3%) fish were released back into the river to avoid adding them to the rearing channel during a disease outbreak. Hence, a total of 23,678 fish were stocked in the Facility after quarantine, including 23,386 young-of-the-year and 292 yearling and larger fish **(Table XVI-2b)**.

During the 2013 five-month rearing period, 46% (10,912) of the Facility's stocked fish died as a result of disease, stress, or general poor health (identified mortality), and 12% (2,770) were unaccounted-for mortalities, potentially through intraspecific predation (cannibalism). The "Dry" Water Year conditions in 2013 caused a much earlier start of rescues than normal, coinciding with an abundance of swim-up fry fresh out of the gravels. Fish stocked in the rearing troughs are sized at 70 millimeters (mm) or less and are much more fragile than the larger, older fish typically stocked in the rearing channel. During this season, 42% (9,927) of the quarantined fish were stocked in the rearing troughs. A confirmed outbreak of *Ichthyophthirius* "Ich" and the bacterial disease Columnaris wiped out 85% (8,408) of the fish stocked in the rearing troughs. Total survival in the rearing troughs was 13% (1,308). Conversely, the 13,751 larger (>70 mm) fish stocked in the Rearing Channel fared much better with a survival rate of 63%.

Due to the "nature-like" rearing channel habitat (riffles and pools, cobbled bottom, boulders, logs, etc.) and suboptimal water temperatures during the summer months, fish cannot be graded into different sizes once they are stocked in the channel. Because these are wild fish, not hatchery stock, individual fish can behave quite differently from each other. The original goal of the Facility is to match the size of the Facility fish to the size of fish reared naturally in the river. Facility fish are fed a diet of dry pelleted feed, frozen krill, and naturally occurring flying and benthic insects. **Figure XVI-4** compares the size distribution of Facility fish at release in September 2013 to the size distribution of fish sampled during the October 2013 juvenile population surveys. Facility fish exhibit a clear bimodal size distribution, with one group comparable in size to fish reared naturally in the river (40-100mm) and a second group that rapidly increased in size (130-180 mm). Recent studies in the Scott Creek watershed (Santa Cruz County) support past investigations that show ocean survival is size-dependent and that the larger a fish is at ocean entry the greater its chance of returning to spawn. This study indicated that optimum size for smolts at ocean entry in Scott Creek was 150-250 mm. Of the 704 Facility fish subsampled in September during release, 22% (152) measured in the 150-250 mm size range.

On September 19th, after consultation with the National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW), staff decided to initiate releases of the Facility's fish because projected flow releases from Los Padres Reservoir could not sustain the minimum 4 cfs needed to keep the intake operational through the fall.

Subsamples of fish from each rearing channel bay (pool) were measured for length and weight, and condition factor (K) was calculated from the data **(Table XVI-3)**. Most fish were in excellent physical condition, ranging in size from 1.7 to 14.2 inches (45 to 363 mm). The

smallest young-of-the-year reared in the troughs averaged 2.5 inches (62 mm), young-of-the-year reared in the channel averaged 4.5 inches (115 mm), yearlings averaged 8.0 inches (202 mm) and the larger yearling plus fish averaged 11.7 inches (330 mm).

A total of 10,817 fish were released from the Facility during 2013 season **(Table XVI-4)** including 9,996 fish from the rearing troughs and channel and 821 fish from QT tanks. Fish were released in three locations including: 1) between Stonepine and the Old Carmel Dam (8,722); 2) below Los Padres Dam (1,044); and 3) a group of 1,051 fish were taken to the NOAA Santa Cruz Lab as part of a tagging pilot study and later released below San Clemente Dam.

The overall survival rate of fish brought to the Facility during the 2013 rearing season was 41%, a 2% decrease from the Facility's 18-year average of 43%. The rearing channel had a 63% survival rate while the rearing troughs had a 13% survival rate. The disease outbreak in the rearing troughs accounted for approximately 54% of the Facility's overall mortality, significantly reducing the annual survival rate.

D. Monitoring of Steelhead Population

Description and Purpose

The District uses three primary techniques to monitor the health of the steelhead population: (1) counts of adult steelhead passing San Clemente Dam and Los Padres Dam, (2) surveys of winter steelhead redds, and (3) surveys of the juvenile steelhead population in freshwater at the end of the dry season in October.

Implementation and Activities during 2013-2014

● **Winter Steelhead Adult Run** - The fish counter and video monitoring equipment at San Clemente Dam was operated between February and March 2014 but no sea-run adults were counted since the river did not reach the ocean. The average run size for the 1994-2014 period is 401 fish **(Figure XVI-5)**. This was the first zero count since 1990.

The Los Padres Dam Fish Trap is operated and monitored by Cal-Am. The number of trapped adult steelhead reported during the 2014 migration season was zero **(Figure XVI-6)**. The 2014 run of zero fish was below the average run size of 109 fish for the 1991-2014 period. This was the first zero count since 1991.

● **Winter Steelhead Redd Surveys –** Since 1994, the District has periodically conducted winter steelhead redd (nest) surveys downstream of Los Padres Dam. Originally, these surveys were part of the District's spawning habitat restoration project to track how many adult fish actually spawned in the injected gravel between the dams and to record the downstream movement of the gravel itself. In 2001, the survey area was enlarged to include the Stonepine Resort area and several tributaries. In 2003 and 2004, complete mainstem surveys were conducted from Via Mallorca Road Bridge to Los Padres Dam. No redd surveys were conducted in the mainstem in 2005 and 2006 due to high river flows throughout much of the winter that precluded wading most river reaches and large late storms that effectively "erased" existing redds.

Due to time constraints and the existence of the adult fish counter at San Clemente Dam (SCD), staff discontinued regular redd surveys above SCD in 2007, and instead focused on the lower Carmel River. In each year during the spring of 2007, 2008 and 2009, one thorough survey pass was completed between the Highway 1 Bridge and San Clemente Dam. The survey goals were to: a) quantify the number of spawning redds (nests) and adult fish (including spawning pairs, singles, kelts, and carcasses) in the mainstem river below SCD, and compare those numbers to the fish passage counts at SCD in order to make a better estimate of the river's total steelhead run size; b) assess locations where adult steelhead may become stranded and need to be rescued as flows decrease; and c) assess the relative numbers of steelhead smolts that may be remaining in the river. No redd surveys were done during 2010 and 2011 due to high river flows throughout the entire migration period that precluded wading the lower river. In 2012, 58 redds were observed between Boronda Br. and the Rancho Cañada Golf Course (RCGC). In 2013, 54 redds were observed in three separate reaches.

No redd surveys were conducted in 2014 due to the extremely dry conditions and lack of an adult steelhead run.

- **Juvenile Population Surveys** - Since Fall 1990, the District has surveyed the juvenile steelhead population in the Carmel River below Los Padres Dam. This information is crucial to assess the success of adult reproduction and to determine whether or not freshwater habitats are adequately seeded with juveniles.

In 2013, due to much of the river being dry and the loss of the two San Clemente Delta sites from the dam removal project, only three of the usual 11 sites were sampled throughout the 17-mile reach between Red Rock in mid-Carmel Valley and Los Padres Dam. The juvenile steelhead population density at the three stations was consistent at 0.41 fpf of stream. The three sites surveyed were Scarlett Narrows (RM 8.7), Los Compadres (RM 20.7), and Cachagua (RM 24.7) **(Table XVI-5).**

The overall 2013 juvenile steelhead population density continued the trend of generally low juvenile densities since 2009 and well below the long-term (1990-2013) average density of 0.79 fpf **(Figure XVI-7).**

- **Constraints to Cal-Am Diversions from the Lower Aquifer** - During the 1992 SWRCB hearings on complaints against Cal-Am's diversions from the Carmel River, testimony was presented that outlined the potential benefits of a modified way of managing the sequence of pumping from Cal-Am well fields in the Carmel Valley Alluvial Aquifer. Pursuant to Condition No. 5 of SWRCB Order WR 95-10, Cal-Am is required to operate its Carmel Valley production wells beginning with the most downstream well, and moving upstream to other wells as needed to meet demand. The goal of this order is to maximize the length of viable stream and aquatic habitats in the lower Carmel Valley.

During the 2013 dry season, due to the ongoing severe drought, this mode of operation and flow releases from Los Padres Reservoir did not result in any additional viable aquatic habitat **(Figure XVI-8)**. Rescues were needed in several reaches above the Narrows and no juvenile population estimates could be completed in the lower river.

E. Other Activities Related to the Steelhead Resource

The District continues to carry out several activities that were not specifically identified as part of the original Allocation EIR Mitigation Program, but will improve habitat conditions, help restore the steelhead resource, or provide additional key data on the steelhead resource. These include: (a) rescue and transportation of kelts, (b) spawning habitat restoration and monitoring, (c) assessment of steelhead migration barriers, (d) assessment of the benthic macro-invertebrate (BMI) communities, (e) DIDSON grant, and (f) Carmel River habitat mapping.

Implementation and Activities in 2013-2014

- **Rescue and Transportation of Kelts** – "Kelts" are adult steelhead that have already spawned, typically from January through April, and begin to migrate back to the ocean in late spring and early summer. Under existing conditions, these fish are threatened by receding flows in most years, especially when the upstream migration of adults is delayed due to lack of early-season storms. District staff rescue and transport these fish to more stable waters, when needed.

In 2014, very low flow in the lower river necessitated early March trapping and rescues. Trapping results are discussed above in the Capture and Transport Emigrating Smolts section. Since there was no adult run in 2014, there were no kelts to capture.

- **Spawning Habitat Restoration Project** – Los Padres Dam has been trapping native gravel behind it for approximately 65 years. During that period, suitable spawning materials below the dam have become scarce as the existing gravel continued to move downstream during high flows. In an effort to increase local spawning habitat by at least 50%, in 2012-2013 the District applied for and was awarded a grant from the CDFW Fisheries Restoration Grants Program (FRGP) for $170,000 of funds toward a $213,000 spawning habitat restoration project below Los Padres Dam. The spawning gravel enhancement project involves injecting 1,500 tons of 1.5 - 4 inch gravel below the dam. Project design and permitting was completed in early 2014 with delivery and placement of the gravel scheduled for fall 2014. Project results will be discussed in the 2014-15 Annual Report.

- **Steelhead Passage Barrier Assessment Grant –** In late 2011, the District was awarded a Proposition 84 grant to complete work on several important Integrated Regional Water Management Plan (IRWM) projects. Assessing steelhead migration barriers on the tributaries was identified in the 2004 Carmel River Watershed Assessment Report as a recommended task and consequently was included as one of the IRWM projects. In 2012, staff met with land owners and started the reconnaissance and surveying of selected barriers. The final project report and recommendations was completed in 2014. Based on the findings, staff hopes to secure future grant funding for removal or modification of the worst barriers and improve steelhead access in the tributaries.

- **DIDSON Grant** - Staff obtained a grant from CDFW through the FRGP in order to test the use of a DIDSON in the Carmel River. In this study, a DIDSON camera (dual-frequency identification sonar system) was deployed in the lower river during the 2012 and 2013 migration seasons to assess its applicability as a future monitoring tool. The DIDSON pilot study report was submitted to CDFW in March 2014. The result of the study showed that it is possible to reliably

count adult steelhead moving upstream and downstream using the DIDSON camera in the Carmel River. Escapement estimates produced from DIDSON data are still being evaluated in coordination with CDFW.

- **Carmel River Habitat Mapping** - The Carmel River was habitat mapped from Los Padres Reservoir to Highway 1 during the fall 2013 and winter 2014. This data will be used for stream analysis and planning. The data identifies proportions of habitat types and stream characteristics. This data is a key piece of sample design for studies such as IFIM (Instream Flow Incremental Methodology), habitat distribution and availability, and population monitoring.

OBSERVED TRENDS, CONCLUSIONS AND/OR RECOMMENDATIONS:

- **Adult Steelhead**

Annual monitoring conducted by the District shows that the Carmel River steelhead population has recovered somewhat from the remnant levels of the last drought (1987 to 1991) and from past water-supply practices. Though overall fish populations have improved since the inception of the Mitigation Program in 1990, there was a period of general decline in the adult run from 2001 to 2011. Between 1992 and 2001, the spawning population recovered from a handful of fish to levels approaching 900 adults per year as counted at San Clemente Dam (SCD). Then the run experienced a six-year downward trend from 804 adults in 2001 to 222 adults in 2007, rebounding somewhat in 2008 to 412 adults. However, in 2009 and 2010, the population underwent a dramatic reduction to 95 and 157 adults, respectively. In 2011 and 2012, the population rebounded again with 452 and 470 adults passing over SCD, while in 2013 the number dropped again to 249, well below the 1994-2013 average of 421, likely due in part to the dry year. Drought conditions worsened in 2014 and the river failed to connect to the lagoon for the first time since 1990. Despite a lack of sea-run adults in 2014, some resident adults did spawn in the upper valley as evidenced by the appearance of fry during summer rescues. These adults may have been hold-over fish, resident adults or older juvenile fish reared and released from the SHSRF in the fall of 2013.

Previous redd surveys below SCD confirm that the spawning habitat in the lower river has improved considerably over the last 20 years and many adults are now spawning there instead of passing the SCD fish counting station. In addition, juvenile steelhead rescued by the District from the lower river that survive to adulthood are more likely to return to the lower river to spawn rather than migrate upstream past the SCD. In 2011-2012, The District deployed a DIDSON counting station, acquired from CDFW grant funding, in the lower river to help determine whether more adults are in fact spawning downstream of the dam. Staff downloaded and reviewed video data from the 2013 season and reported the preliminary results in 2014.

Variability of adult steelhead counts are likely the result of a combination of controlling and limiting factors including:

- improved spawning conditions in the lower Carmel River, encouraging fish to spawn before they reach the counter at the dam;

- variable lagoon conditions, caused by artificial manipulation of the sandbar and/or naturally occurring periods of low winter flows;

- impediments to adult and smolt migration routes, such as seasonal barriers, inadequate passage facilities, and intermittent periods of low flow creating critical riffles below the Narrows during the normal winter-spring migration season;

- low densities of juvenile fish in 2004, 2007, and 2009-2011 affecting subsequent adult populations; and

- variable ocean conditions.

- **Juvenile Steelhead**

Monitoring of the juvenile steelhead population at eleven sites along the mainstem Carmel River below Los Padres Dam shows that fish density continues to be quite variable both year to year and site to site from below 0.40 fish per foot (fpf) of stream to levels frequently ranging above 1.00 fpf, values that are typical of well-stocked steelhead streams. In this 2013-2014 reporting period, the average population density was much less than the long-term average of 0.79 fpf for the Carmel River likely due to the ongoing drought and poor habitat conditions in the lower river.

District staff believes the variability of the juvenile steelhead population in the Carmel River Basin is directly related to the following factors:

Positive Factors:

- improvements in streamflow patterns, due to favorable natural fluctuations, exemplified by relatively high base-flow conditions since 1995;

- District and SWRCB rules to actively manage the rate and distribution of groundwater extractions and direct surface diversions within the basin, coupled with changes to CAW's operations at San Clemente and Los Padres Dams, providing increased streamflow below San Clemente Dam;

- restoration and stabilization of the lower Carmel River's stream banks, providing improved riparian habitat (tree cover/shade along the stream and an increase in woody debris) while preventing erosion of silt/sand from filling gravel beds and pools;

- extensive juvenile steelhead rescues by the District over the last 25 years, now totaling 417,837 fish through 2013;

- rearing and releases of rescued fish from the SHSRF of nearly 97,300 juveniles and smolts back into the river and lagoon over the past 18 years (15 years of operation), at sizes generally larger than the river-reared fish, which in theory should enhance their ocean survival;

Negative Factors:

- variable lagoon conditions, including highly variable water surface elevation changes caused by mechanical breaching, chronic poor water quality (especially in the fall), and predation by birds and striped bass;

- barriers or seasonal impediments to juvenile and smolt emigration, such as the lack of juvenile passage facilities at Los Padres Dam and intermittent periods of low flow below the Narrows during the normal spring emigration season;

- spring flow variability such as low-flow conditions that could dewater redds prematurely or high flows that could either deposit sediment over redds or completely wash them out;

- chronic, and occasionally acute, fall temperature and hydrogen sulfide levels below LPD, and the increase in suspended sediment from the SCD summer draw-down;

- the potential for enhanced predation on smolts and YOY migrating through the sediment fields of LPD and SCD; and

- the recent drought conditions.

A recent challenge that may remain for some years is the potential effects of substantive physical and operational changes to San Clemente Dam required by DWR/DSOD, including the process of removal of the dam. The most significant issues are the effect of released sediment from the reservoir on downstream river habitat, proper functioning of MPWMD's SHSRF, and downstream property owners (flood elevations). The three-year dam removal project began in 2013 with the removal of vegetation and rechanneling the river through the reservoir reach. Major changes include:

- lowering of the reservoir water level and changes to the release flows and water quality;

- potentially significant changes in the sediment regime in the Carmel River downstream of San Clemente as the dam removal project progresses; and

- loss of reservoir storage, which, in the past, has helped maintain adequate river flows and cooler water in the lower Carmel River.

District staff continues to provide technical expertise and scientific data to CAW engineers and environmental consultants, DWR/DSOD, CDFW, NMFS, U.S. Fish and Wildlife Service, and others involved in addressing the resource management issues associated with both San Clemente and Los Padres Dams. District staff also continues to provide technical expertise and scientific data to California Department Parks and Recreation, Monterey County Water Resources Agency, Monterey County Public Works Department, California Coastal Commission, U. S. Army Corps of Engineers, Carmel Area Wastewater District, and other regulatory agencies and stakeholders involved in the management of the Carmel River, the Carmel River Lagoon and the barrier beach.

Figure XVI-1

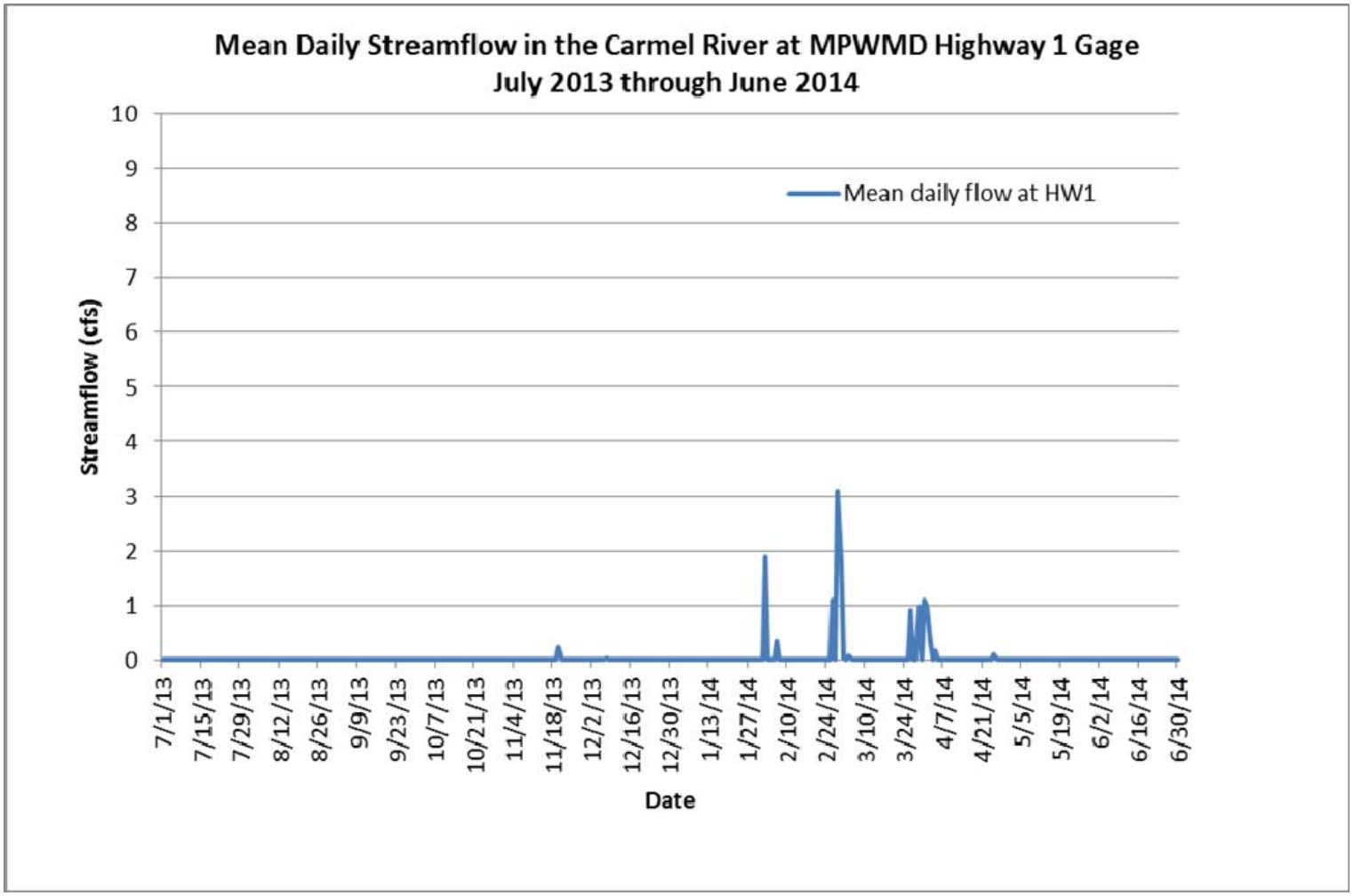

Mean Daily Streamflow in the Carmel River at MPWMD Highway 1 Gage
July 2013 through June 2014
Streamflow (cfs)
10
9
8
7
6
5
4
3
2
1
0
Mean daily flow at HW1
7/1/13
7/15/13
7/29/13
8/12/13
8/26/13
9/9/13
9/23/13
10/7/13
10/21/13
11/4/13
11/18/13
12/2/13
12/16/13
12/30/13
1/13/14
1/27/14
2/10/14
2/24/14
3/10/14
3/24/14
4/7/14
4/21/14
5/5/14
5/19/14
6/2/14
6/16/14
6/30/14
Date

Figure XVI-2

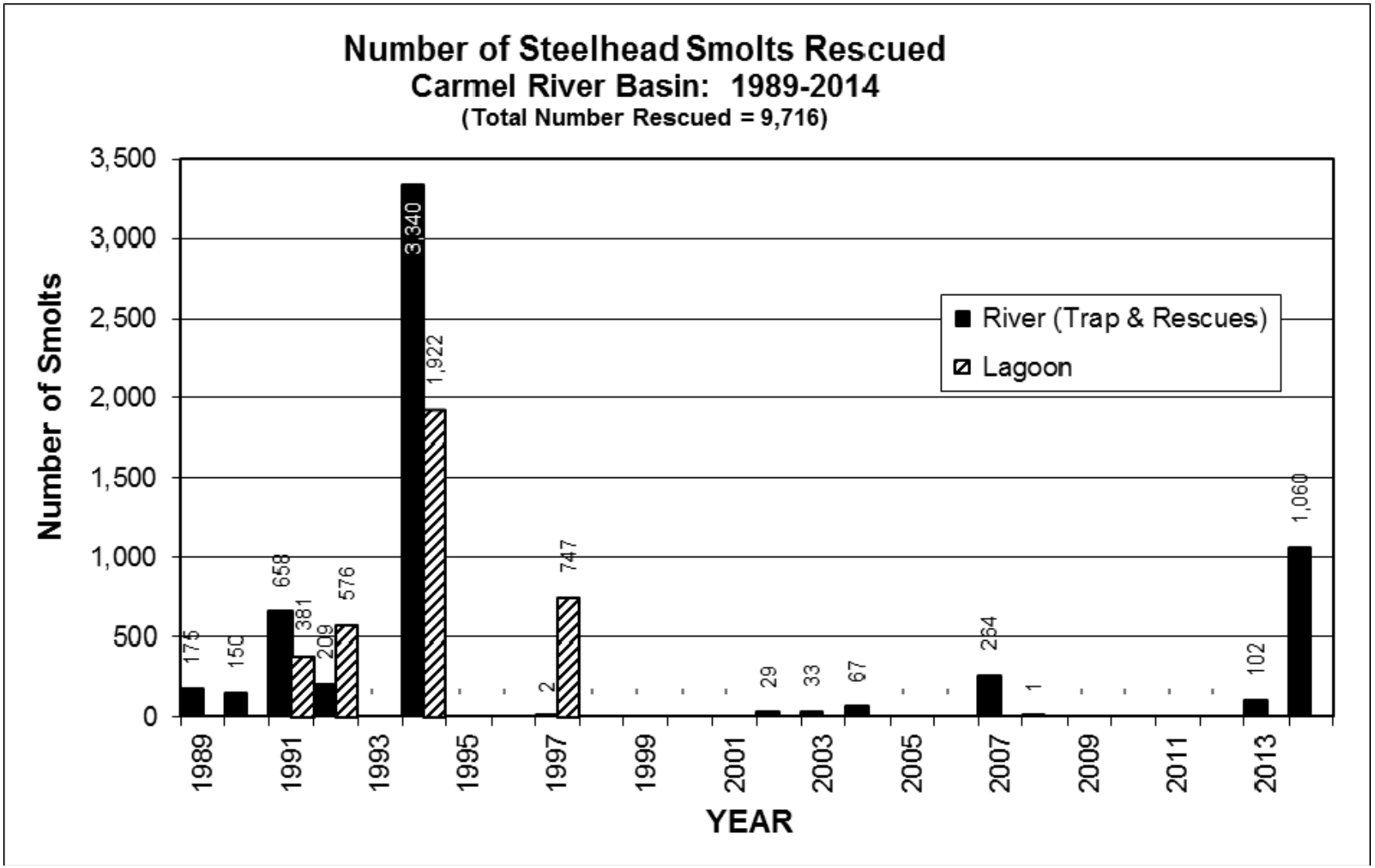

Number of Steelhead Smolts Rescued
Carmel River Basin: 1989-2014
(Total Number Rescued = 9,716)
Number of Smolts
3,500
3,000
2,500
2,000
1,500
1,000
500
0
River (Trap & Rescues)
Lagoon
175
150
658
381
209
576
3,340
1,922
2
747
29
33
67
264
1
102
1,060
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
YEAR

Figure XVI-3

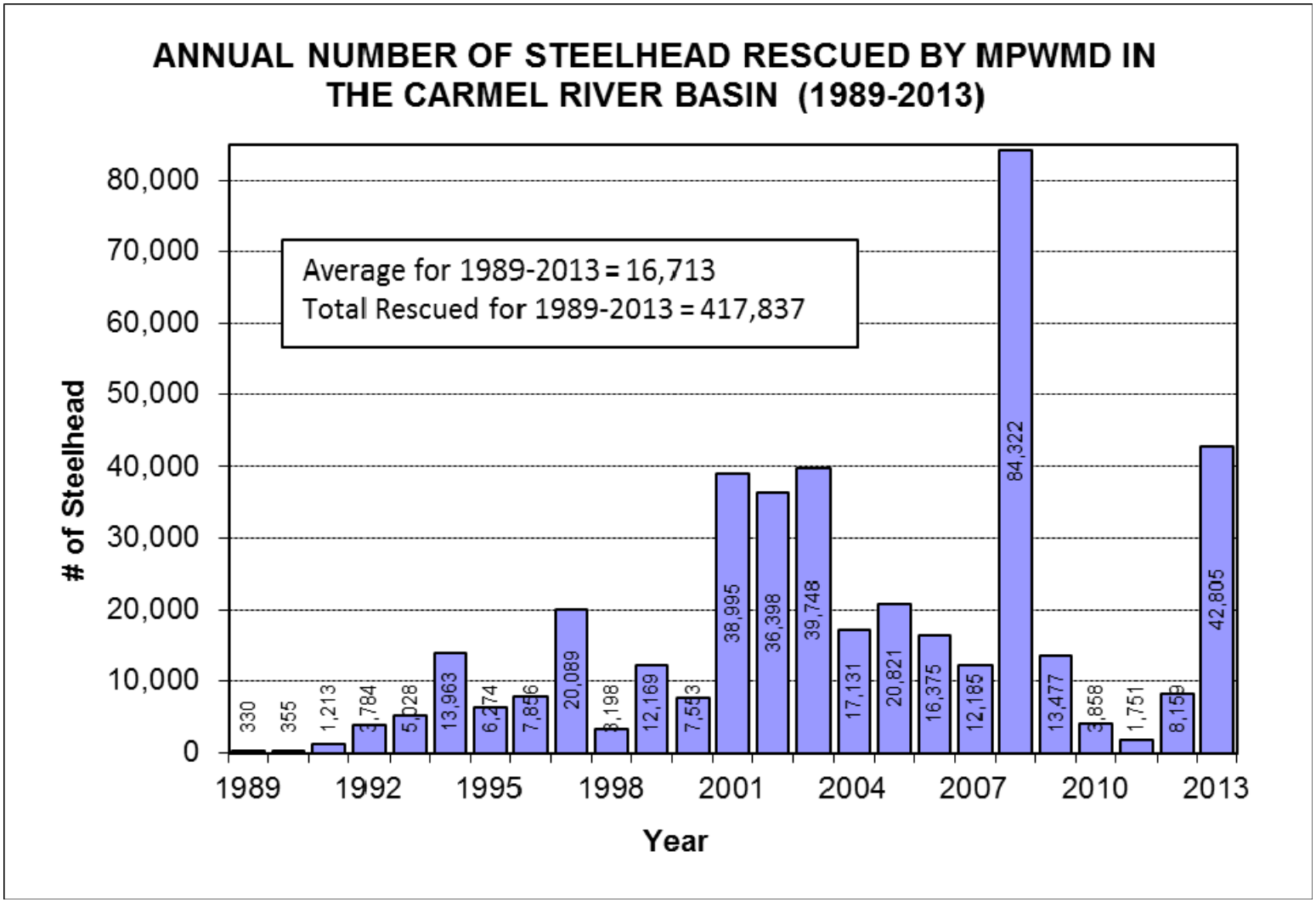

ANNUAL NUMBER OF STEELHEAD RESCUED BY MPWMD IN THE CARMEL RIVER BASIN (1989-2013)
Average for 1989-2013 = 16,713
Total Rescued for 1989-2013 = 417,837
# of Steelhead
Year
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
1989
1992
1995
1998
2001
2004
2007
2010
2013
330
355
1,213
3,784
5,028
13,963
6,274
7,896
20,089
3,198
12,169
7,553
38,995
36,398
39,748
17,131
20,821
16,375
12,185
84,322
13,477
3,858
1,751
8,159
42,805

Figure XVI-4

Fish Size Distribution, Carmel River vs. Sleepy Hollow Steelhead Rearing Facility at Release.

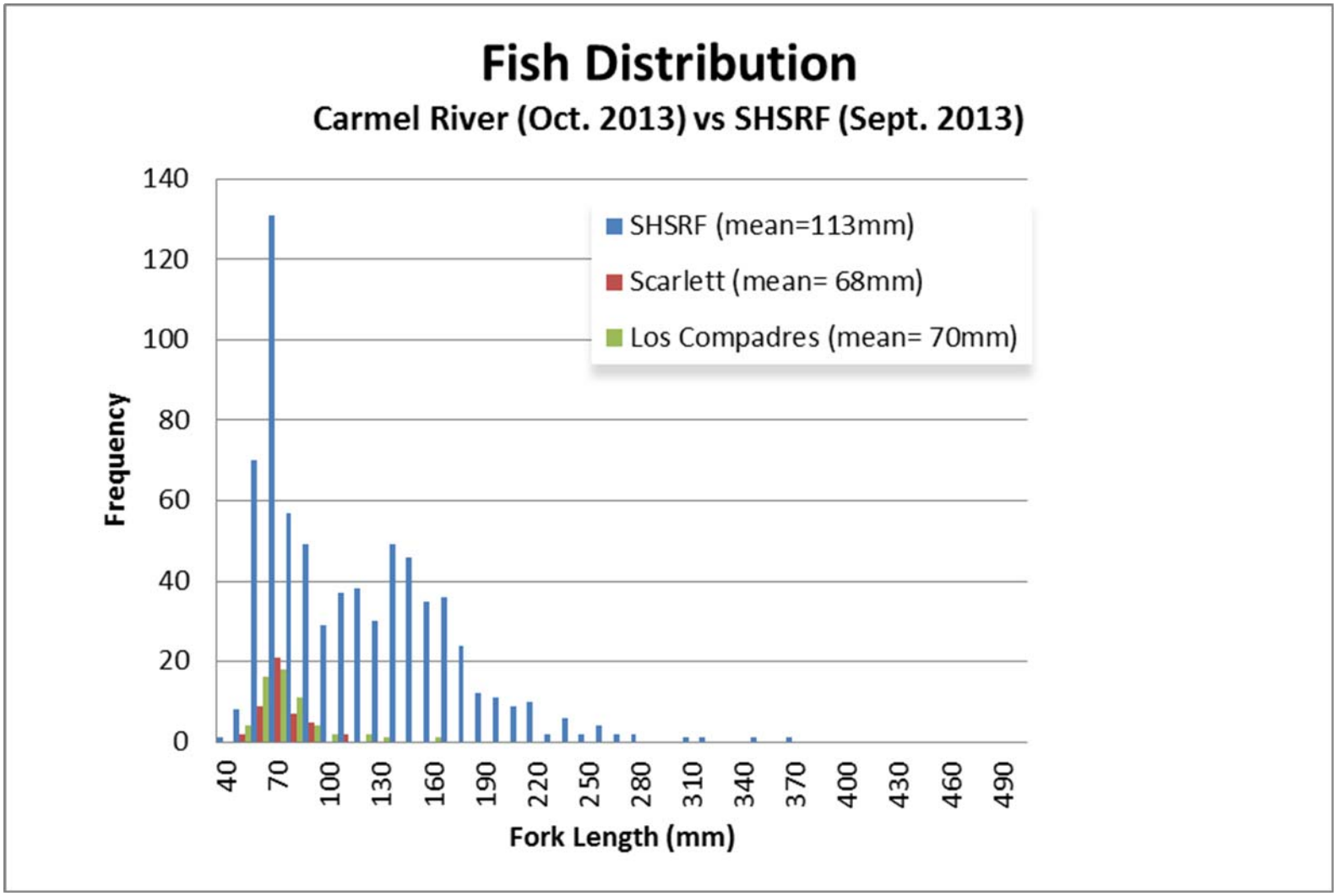
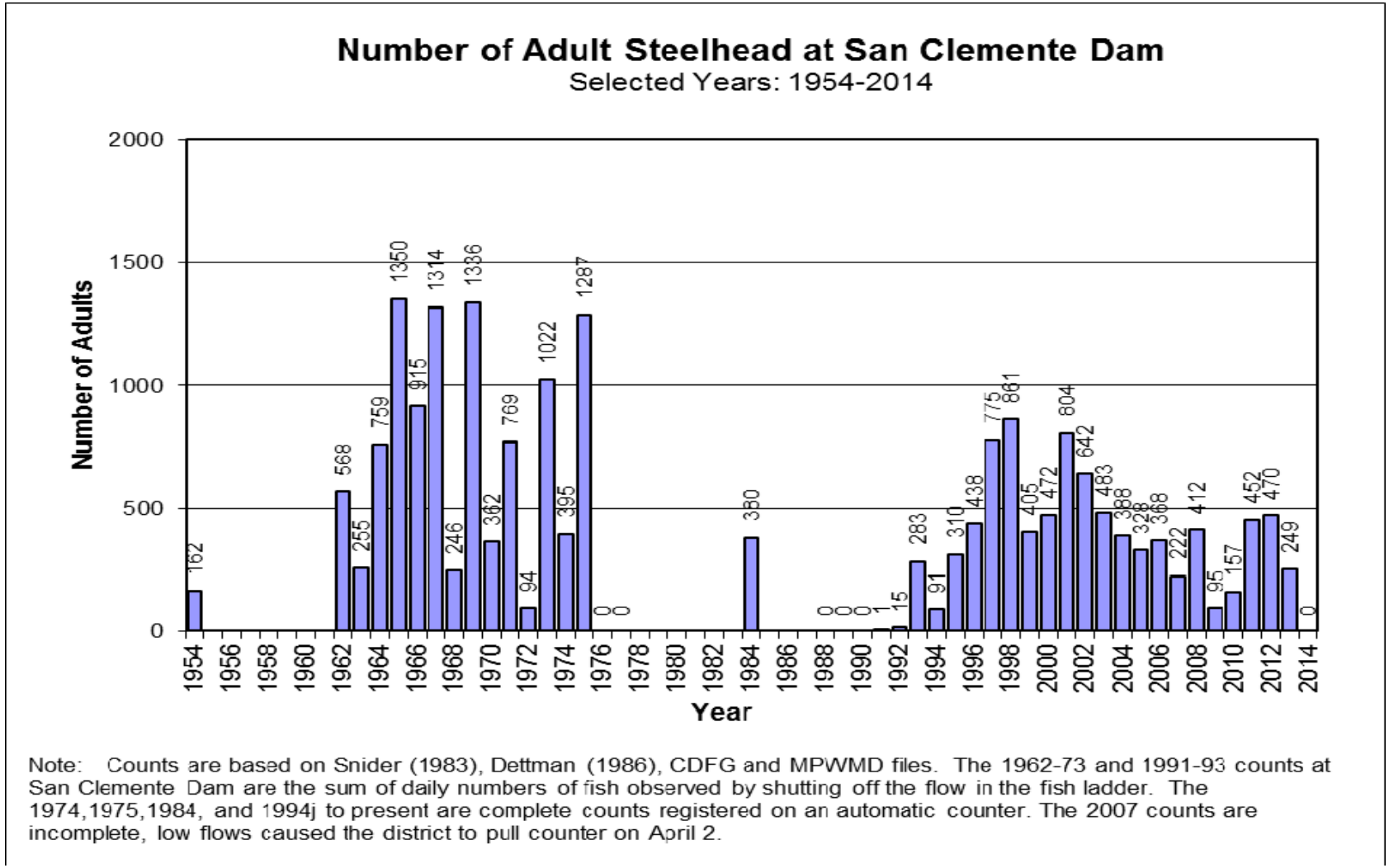


Figure XVI-5



Note: Counts are based on Snider (1983), Dettman (1986), CDFG and MPWMD files. The 1962-73 and 1991-93 counts at San Clemente Dam are the sum of daily numbers of fish observed by shutting off the flow in the fish ladder. The 1974,1975,1984, and 1994j to present are complete counts registered on an automatic counter. The 2007 counts are incomplete, low flows caused the district to pull counter on April 2.

Figure XVI-6

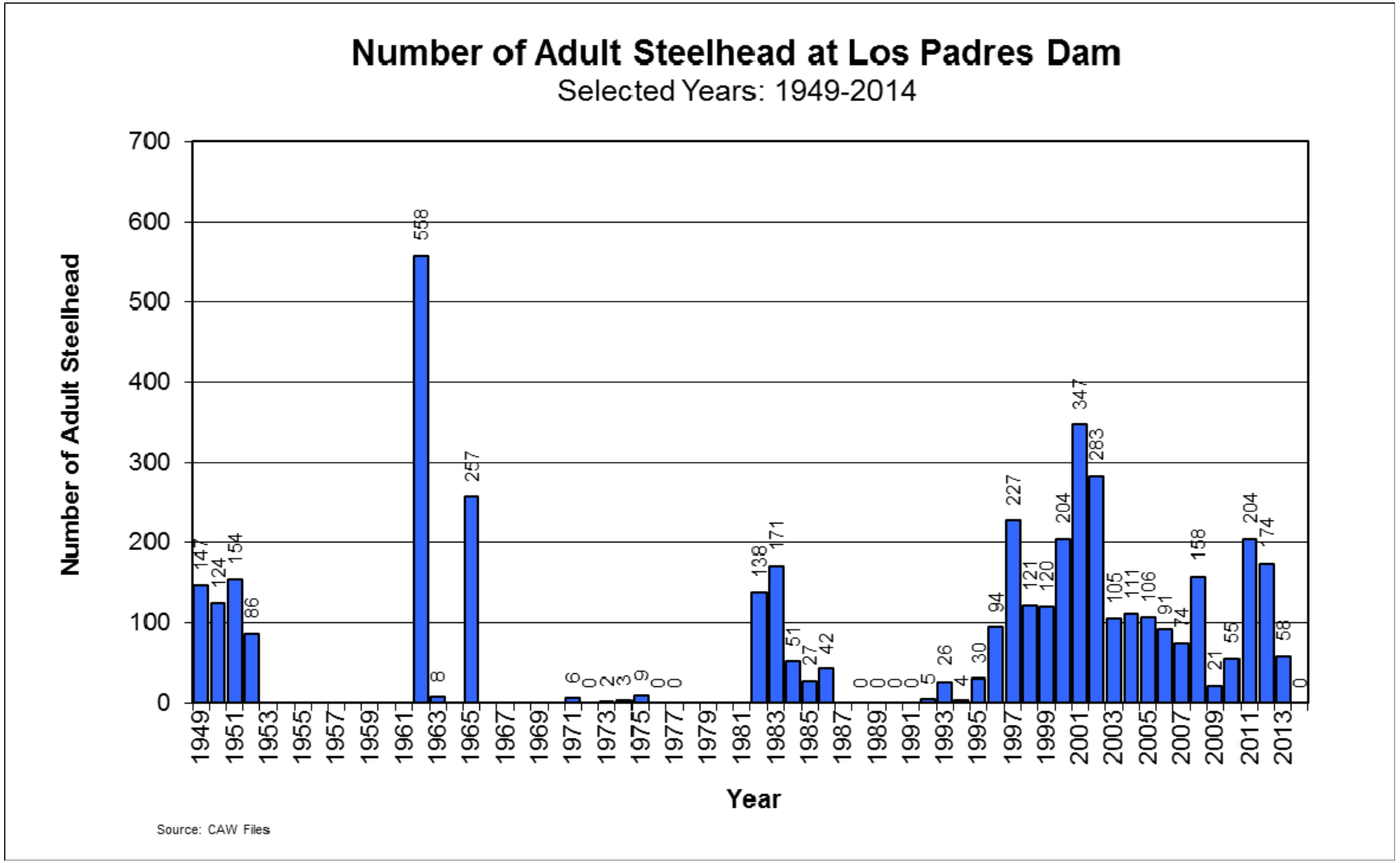

Number of Adult Steelhead at Los Padres Dam
Selected Years: 1949-2014
Number of Adult Steelhead
Year
Source: CAW Files
0
100
200
300
400
500
600
700
1949
1951
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
147
124
154
86
558
8
257
6
0
2
3
9
0
0
138
171
51
27
42
0
0
0
5
26
4
30
94
227
121
120
204
347
283
105
111
106
91
74
158
21
55
204
174
58
0

Figure XVI-7

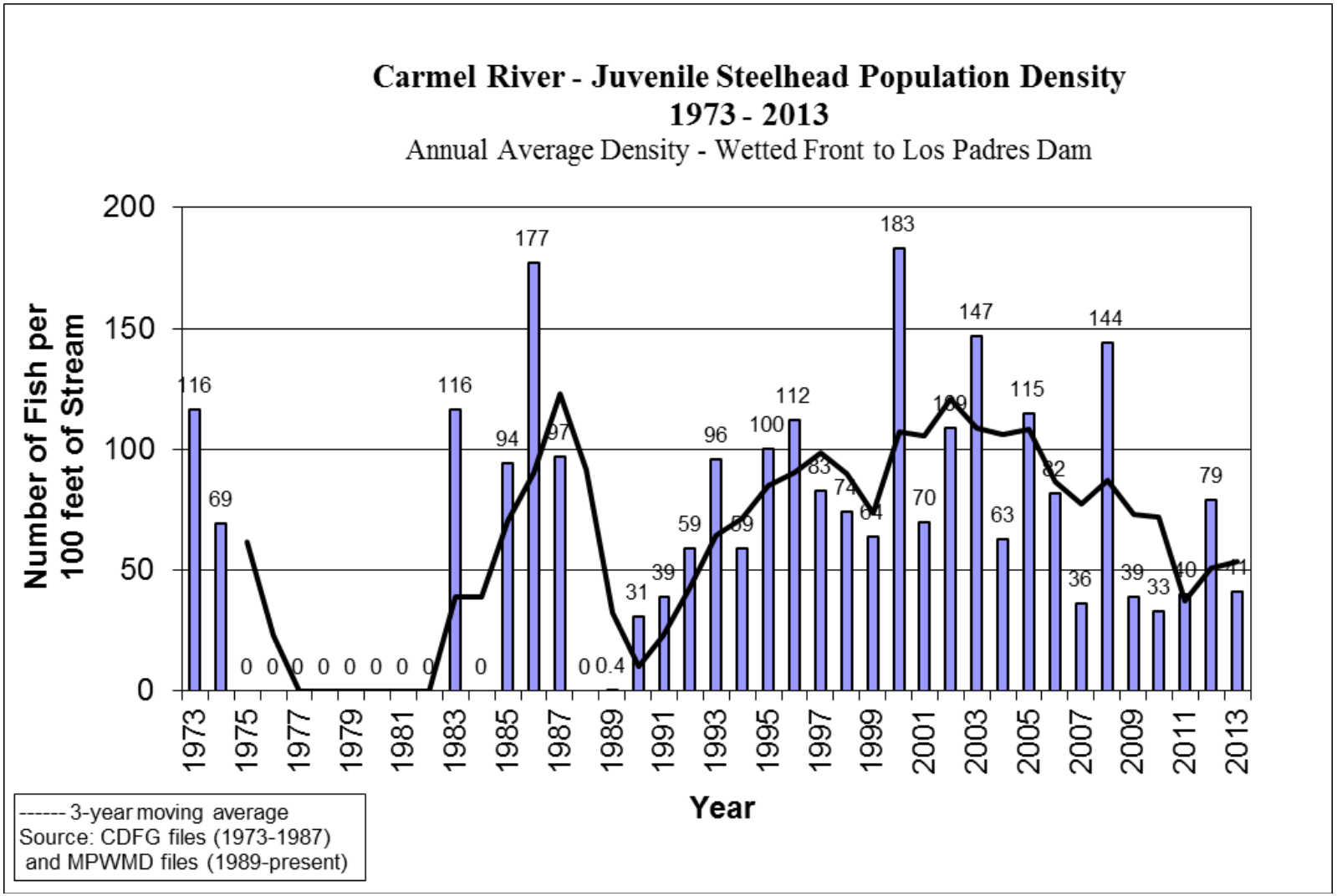

Carmel River - Juvenile Steelhead Population Density
1973 - 2013
Annual Average Density - Wetted Front to Los Padres Dam
Number of Fish per 100 feet of Stream
200
150
100
50
0
116
69
0 0 0 0 0 0 0 0 0
116
0
94
177
97
0 0.4
31
39
59
96
59
100
112
83
74
64
183
70
109
147
63
115
82
36
144
39
33
40
79
41
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
Year
------ 3-year moving average
Source: CDFG files (1973-1987)
and MPWMD files (1989-present)

Figure XVI-8

Estimated Number of Juvenile Steelhead Reared Below San Clemente Dam (1990-2012).

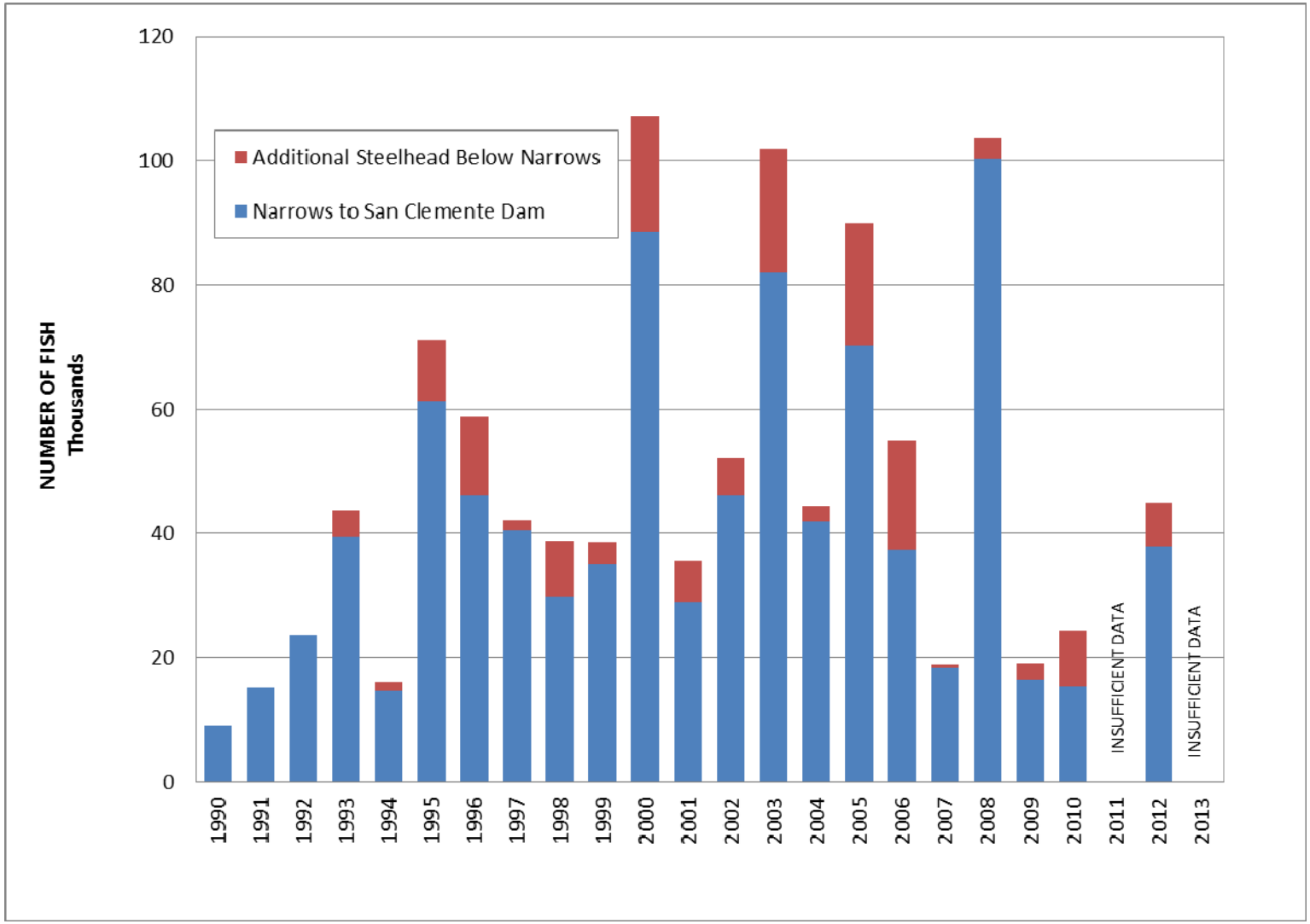


Table XVI-1a

Number of Juvenile Steelhead Rescued in the Mainstem Carmel River, by Age Group and General Location, Rescue Year 2013.

Age Group	General Location	MPWMD 2013	
Young-of-the-Year	Mainstem	41,893	
Age 1+	Mainstem	650	
Smolts	Lower River	0	
Adults	Mainstem	13	
Mortalities	Mainstem	249	
Totals		**42,805**	
Percentage Mortality		0.58	

Table XVI-1b

Transplant Locations of Steelhead Rescued in the Mainstem Carmel River - Rescue Year 2013.

2013 Rescued Fish Release Locations

Release Location	River Mile	# of Transplanted Fish
Sleepy Hollow Area/Ford	17.4	5,915
SHSRF	17.3	28,139
Filter Plant	16.4	367
Russell Wells	16.2	254
Stonepine	15.6	342
Robles Del Rio	15.1	2,027
Hitchcock Cr. Conf	14.6	1,159
Rosies Br.	14.4	1,078
Garzas Well	12.1	1,501
Garland Park	10.8	1,764
Stewarts Cove	0	10
Total		**42,556**

NOTE: River miles are approximations.

Table XVI-2a

Quarantine Tank Summary

QT Tanks	# Fish	% of Total
Rescued fish to Facility	28,142	100
Counting Differences	-1,794	6
Number of fish known	26,348	94
QT Tank Mortalities	1,849	7
Released in River	821	3
Stocked in Facility	23,678	84

Table XVI-2b

SLEEPY HOLLOW STEELHEAD REARING FACILITY

Fish Rearing Summary: May 28, 2013 to October 3, 2013

Holding Location	# Fish Stocked [1]	# Morts (Disease)[2]	# Morts (Unaccounted for) [3]	Total # Released	% Survival	Mean Fork Length (mm) at release	Mean Condition Factor (K) at release	# by Release Location	Notes
Rearing Troughs 8 Troughs (smallest YOY)	9,927	8,408	211	1,308	13%	62 (n=154)	1.09 (n=154)	SHSRF Area (1,308)	Smallest YOY. less than 70mm
Rearing Channel 8 Pools (YOY)	13,459	2,375	2,545	8,539	63%	115 (n=480)	1.15 (n=473)	OCD - SHSRF (4,646) Russell Wells (1,788) NOAA SC (1,051) LFD Area (1,044) Stonepine (10)	Young-of-year (YOY) fish rescued. 70 to 125mm size range
Rearing Channel 2 Pools (medium size)	285	126	14	145	51%	202 (n=66)	1.15 (n=66)	Stonepine (75) OCD (70)	Fish in the 125 to 225mm size range
Rearing Channel 1 Pool (large size)	7	3	0	4	57%	330 (n=4)	N/A	Stonepine (4)	Fish greater than 300mm size
Totals	23,678	10,912	2,770	9,996	42%				

Notes:

1. Fish were segregated in separate RC pools by size/age at the start of the rearing season.
2. Disease was bacterial infection (Flavobacterium columnare) and Ich (Ichthyophthirius multifilis). High concentration salt baths were used throughout the season to treat for infections.
3. Unaccounted-for-fish [# fish stocked - (# of morts + # released)] were likely due to predation by larger fish.

Morts refer to mortalities. FL refers to fork length - the length of the fish from snout to the fork in its tail.

Condition Factor refers to a mathematical formula for determining the physiological state of a fish, including its reproductive capacity. It is calculated by dividing fish weight by length cubed (W/L^3). The heavier a fish for a given length, the higher its condition factor (K). ($\times 10^{-4}$).

Table XVI-3

Sleepy Hollow Steelhead Rearing Facility, Fish Rearing Summary - 2013.

Sleepy Hollow Steelhead Rearing Facility- 2013 Rearing Season						
Pool #	**Number Sampled**	**Avg Fork Length (mm)**	**Avg Weight (g)**	**Avg K Factor**	**Fish Age (at stocking)**	**Date Sampled**
1	4	330.5	N/A	N/A	Yearling +	9/30/2013
2	30	204.6	107.6	1.16	Yearling	9/30/2013
4	60	140.5	36.1	1.12	YOY	9/26/2013
5-7	60	128.2	32.3	1.19	YOY	9/25/2013
8	60	122.7	28.8	1.17	YOY	9/24/2013
9	60	134.4	31.5	1.15	YOY	9/23/2013
10	60	113.2	21.2	1.18	YOY	9/22/2013
11	60	106.9	18.2	1.14	YOY	9/21/2013
12	60	89.4	11.7	1.10	YOY	9/20/2013
13	60	84.9	9.3	1.18	YOY	9/20/2013
16	36	199	102.5	1.15	Yearling	9/19/2013
RT-1	34	62.1	2.9	1.20	YOY	9/20/2013
RT-5	60	64	2.8	1.06	YOY	9/19/2013
RT-6	60	60.8	2.5	1.06	YOY	9/19/2013
Overall-Avg YOY in Rearing Channel (Pool 4-13)	480	115	23.6	1.15	YOY	
Overall- Avg YOY in Rearing Troughs (RT-1-6)	154	62	3	1.09	YOY-Smallest	
Overall- Avg Yearling (Pool 2 and 16)	66	202	105	1.15	Yearling	
Overall-Avg Yearling + (Pool 1)	4	331	N/A	N/A	Yearling +	

Table XVI-4

Sleepy Hollow Steelhead Rearing Facility
Fish Release Location Summary - 2013.

Release Location	RiverMile	# released	% total
OCD-SHSRF	18.3-17.0	6,845	63
Russel Well area	16.3	1,788	17
Stonepine	15.8	89	1
Los Padres area	23.8	1,044	10
NOAA Santa Cruz		1,051	10
Total		10,817	

NOTE: includes fish released from QT Tanks (821) + fish released from rearing troughs and channel (9,996).

Table XVI-5

Carmel River Juvenile Steelhead Annual Population Survey [1]

Lineal Population Density at Survey Stations (numbers per foot of stream) [2, 3]

	Valley Greens Br.	Red Rock (Mid Valley)	Scarlett Narrows	Garland Park	Boronda	DeDamp Park	Stonepine Resort	Sleepy Hollow	SCR Lower Delta	SCR Upper Delta	Los Compadres	Cachagua	**Overall Annual Average**	
YEAR	RM 4.8	RM 7.7	RM 8.7	RM 10.8	RM 12.7	RM 13.7	RM 15.8	RM 17.5	RM 19.0	RM 19.6	RM 20.7	RM 24.7	**(nos./ft)**	**(nos./mi)**
1990					ND		0.50	0.27			0.26	0.22	**0.31**	**1,650**
1991					0.12		0.74	0.39			0.09	0.62	**0.39**	**2,070**
1992				0.67	0.36		0.96	0.30			0.40	0.83	**0.59**	**3,098**
1993			0.62	0.91	0.92	0.82	0.84	0.52			1.22	1.84	**0.96**	**5,075**
1994		ND	0.44	0.23	0.43	ND	0.50	0.29			1.51	0.71	**0.59**	**3,100**
1995		0.49	0.65	1.01	1.61	ND	1.42	0.69			0.50	1.63	**1.00**	**5,281**
1996		0.24	1.52	0.82	1.05	**2.03**	1.22	0.29			0.95	1.92	**1.12**	**5,890**
1997		0.02	0.22	1.02	1.74	1.15	0.50	0.22			1.15	1.41	**0.83**	**4,359**
1998		0.19	0.30	0.67	0.34	1.50	0.27	0.60			0.54	**2.24**	**0.74**	**3,901**
1999		0.17	0.26	0.50	0.32	0.62	1.67	0.45			0.46	1.35	**0.64**	**3,403**
2000		0.91	1.03	0.64	1.38	**5.66**	1.71	1.46			1.41	**2.30**	**1.83**	**9,680**
2001		ND	0.48	0.35	0.63	0.68	1.08	0.32			0.47	1.62	**0.70**	**3,716**
2002		ND	0.68	0.85	1.67	0.83	1.07	0.50	0.33	0.68	1.52	**2.73**	**1.09**	**5,734**
2003		1.53	0.82	**2.16**	1.86	1.45	1.55	1.23	0.58	1.09	1.69	**2.16**	**1.47**	**7,738**
2004		0.25	0.46	0.78	1.21	0.43	1.24	0.55	0.21	0.41	0.45	0.89	**0.63**	**3,302**
2005		1.23	0.60	1.34	1.16	0.91	1.62	1.63	0.21	0.85	0.98	**2.10**	**1.15**	**6,062**
2006		1.13	0.64	0.86	0.87	0.47	0.37	0.95	1.65	0.28	0.82	1.00	**0.82**	**4,339**
2007		ND	0.15	0.50	0.77	0.06	0.33	0.16	0.36	0.25	0.49	0.50	**0.36**	**1,885**
2008		ND	0.90	**2.61**	**3.64**	1.11	1.19	1.38	0.17	0.71	1.13	1.56	**1.44**	**7,603**
2009		0.24	ND	0.25	ND	0.27	ND	0.48	ND	ND	ND	0.72	**0.39**	**2,070**
2010	0.19	0.06	ND	0.30	0.38	0.17	0.31	0.32	0.26	0.11	0.60	0.78	**0.33**	**1,737**
2011	0.11	0.17	ND	0.36	ND	ND	ND	1.07	ND	ND	ND	0.27	**0.40**	**2,091**
2012	ND	0.67	0.47	1.01	1.58	0.35	0.59	0.37	**1.31**	0.74	0.82	0.83	**0.79**	**4,195**
2013	ND	ND	0.41	ND	ND	ND	ND	ND	ND	ND	0.40	0.41	**0.41**	**2,147**
Station Ave (#/ft)	**0.15**	**0.52**	**0.59**	**0.85**	**1.10**	**1.09**	**0.94**	**0.63**	**0.56**	**0.57**	**0.81**	**1.28**	**0.79**	**4,172**
Station Ave (#/mile)	**792**	**2,753**	**3,125**	**4,485**	**5,819**	**5,749**	**4,948**	**3,315**	**2,980**	**3,004**	**4,286**	**6,741**		
Overall Station Averages:													**0.76**	**4,000**

[1] Surveys completed in October and results based on repetitive 3-pass removal method using an electrofisher.

[2] RM; indicates miles from rivermouth

[3] ND indicates stream was dry at sampling station or that site was not sampled that year. Blanks = site not added yet. 2009 - huge storm mid-Oct and river got too high to sample. 2013 - much of river dry. SCR under construction.

u/beverly/excel/popsurvey/stat linial density1990_12 updated 101713

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XVII. RIPARIAN HABITAT MITIGATION MEASURES

The Findings of Adoption of the 1990 Water Allocation Program Final EIR identified four mitigation measures to reduce impacts to the Carmel River riparian corridor, which includes wildlife that is dependent on streamside habitat (Finding Nos. 389-A through D, and 391). The measures are: (a) conservation and water-distribution management to retain water in the river; (b) prepare and oversee a Riparian Corridor Management Plan; (c) implement the Riparian Corridor Management Program; and (d) expand the existing monitoring program for soil moisture and vegetative stress.

Consistent with the goal of comprehensive resource management, the Monterey Peninsula Water Management District (MPWMD or District) is serving as the lead agency to implement an updated Integrated Regional Water Management Plan (IRWM Plan) for a region consisting of coastal watershed areas in Carmel Bay and south Monterey Bay between Pt. Lobos on the south and the Fort Ord Dunes State Park on the north – a 38.3-mile stretch of the Pacific coast. The area encompasses the six Monterey Peninsula cities of Carmel-by-the Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, Seaside, and extends into portions of the unincorporated area of Monterey County in the Carmel Highlands, Pebble Beach and the inland areas of Carmel Valley and the Laguna Seca area. MPWMD adopted an IRWM Plan in 2007. Subsequently, MPWMD was successful in 2011 in obtaining a $995,000 grant from the Department of Water Resources to update the IRWM Plan to Proposition 84 standards. The plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation. In Fiscal Year (FY) 2013-2014, MPWMD and its sub-grantees completed the 10 planning projects, including an update to the 2007 plan and several planning projects to benefit local jurisdictions. The total cost of the project, including local agency match, was about $1.6 million. A final report on the grant will be completed in 2015.

Additional information is contained at the end of this chapter.

A. Conservation and Water Distribution Management to Retain Water in the Carmel River

The purpose of this measure is to reduce pumping impacts on riparian vegetation, particularly in the region of Aquifer Subunit 2 (Scarlett Narrows to Carmel Valley Village). Activities to further this goal during 2013-2014 are summarized above in **Section II** (Hydrologic Monitoring), **Section V** (Annual Low Flow MOA), **Section VI** (Quarterly Budget), and **Section VIII** (Water Efficiency and Conservation).

B. Oversee Riparian Corridor Management Program

Riparian habitat mitigation measures proposed in the Water Allocation Program Final EIR have formed the basis for riparian corridor management activities undertaken since the Board of Directors certified the EIR in November 1990. The Riparian Corridor Management Program (RCMP) integrates the District's many riparian mitigation and management activities into one program. Components of the RCMP include the Carmel River Erosion Protection and Restoration Program; continued irrigation around Cal-Am production wells in the lower Carmel Valley and around existing District restoration projects; in-channel vegetation management; public education; enforcement of District rules and regulations; and monitoring of wildlife, vegetation and soil.

C. Implement Riparian Corridor Management Program

The goal of the Riparian Corridor Management Program is the rehabilitation, restoration, enhancement and preservation of the streamside corridor along the Carmel River. As described below, several major sub-programs are carried out to achieve this goal.

Implementation and Activities During 2013-2014

During FY 2013-2014, MPWMD accomplished the following:

- continued revegetation efforts at exposed banks with little or no vegetation located in Aquifer Subunits 2 and 3 (Via Mallorca Rd. to Esquiline Rd.);
- operated under a Routine Maintenance Agreement with California Department of Fish and Wildlife and r a Regional General Permit with the U.S. Army Corps of Engineers for maintenance activities associated with vegetation encroachment and restoration projects;
- made public presentations showing MPWMD-sponsored restoration work since 1984 and presented recent documentation of Carmel River State Beach, lagoon, and Scenic Road concerns;
- diversified restoration projects and experimented with planting techniques that allow trees to mature more quickly and depend less on irrigation;
- continued long-term monitoring of physical and biological processes along the river in order to evaluate the District's river management activities;
- continued the annual inspections of the Carmel River from the upstream end of the lagoon at River Mile (RM) 0.5 to Camp Steffani at RM 15.5 (staff members responsible for vegetation management and erosion prevention annually walk the entire river to observe and record erosion damage, conditions that could cause erosion [e.g., in-channel vegetation or debris], riparian ordinance infractions, presence of deleterious material, and the overall condition of the riparian corridor);
- carried out vegetation management activities at two sites (Quail Eight and west of Highway One);

The following sections describe MPWMD's work in more detail.

- **Carmel River Erosion Protection and Restoration**

Lower San Carlos Restoration Project: During the spring of 2006 and 2007, the District coordinated emergency streambank repairs to the north streambank along a portion of the Carmel River between Rancho San Carlos Road Bridge and the Via Mallorca Road Bridge. Continued channel incision has been documented in this reach and there is evidence that previous stabilization efforts are being undercut. During the spring of 2011, additional erosion of the north streambank occurred immediately downstream of the Rancho San Carlos Road Bridge. In FY 2013-2014, MPWMD staff inspected the site; however, no work to restore the bank was carried out.

Riparian Ordinance Enforcement Action: MPWMD continues to work with private property owners on how to protect the riparian corridor. Recent actions included coordination with a mid-valley property on a trail easement next to the riparian corridor and adjustments to a drainage system that needed improvements to prevent erosion.

San Clemente Dam Removal and Carmel River Reroute: MPWMD engaged in efforts with state, local, and federal scientists interested in pre- and post-construction monitoring of the Carmel River.

- **Vegetation Restoration --** Various techniques for vegetation installation were employed at District restoration projects in FY 2013-2014. Planting techniques involved either rooted seedlings or cuttings sustained by irrigation, or deeper plantings set to tap summer groundwater without supplemental water applications. The District continued to diversify streambanks by planting with willows, black cottonwoods, and sycamores

The primary objectives of the District's restoration planting effort are to stabilize eroded stream banks with native vegetation and to enhance habitat values near the stream, on adjacent floodplains, and terrace areas. One of the goals of the habitat enhancement program is to diversify restoration plantings by identifying microhabitat areas and vegetating them with species typical of those riparian habitat sites. District staff provided riparian plants to several private property owners. Rooted seedlings are obtained from cuttings and seeds collected from along the Carmel River and propagated by a local nursery.

- **Irrigation Program --** Established riparian vegetation has proven to be an effective deterrent to stream erosion; the mat-like roots of most riparian species bind together loose channel banks and foliage tends to slow the velocity of high river flows. The District selectively irrigates mature streamside vegetation and newly established restoration plantings in order to maintain a healthy, vigorous riparian corridor both for erosion protection and habitat enhancement.

Table XVII-1 and **Figure XVII-1** shows water use at various restoration and riparian mitigation sites for calendar year 2014. A total of 14.85 acre-feet (AF) of water were applied in 2014. In calendar year 2013, 13.26 AF were used to irrigate riparian vegetation. The irrigation season

typically begins in April and continues through the end of November.

- **Vegetation Management --** Since Fall 1990, the District has carried out annual vegetation management projects along portions of the Carmel River to reduce potential obstructions to river flow and to reduce the potential for bank erosion. In the past, the District has removed in-channel debris and vegetation that could deflect high water onto adjacent stream banks, thereby inducing erosion and degrading streamside habitat.

Carmel River Inspection - Annually, staff assesses the lower 15.5 miles from the lagoon to Camp Stephani in order to determine if and where clearing should occur. At sites where debris and/or live vegetation is judged to be a potential hazard, staff balances the goals of conserving aquatic and streamside habitat with reducing the potential for erosion of private and public property and infrastructure. Only woody plant material representing a bank erosion threat is treated by notching or partially cutting through the trunk and large limbs.

During the fall of 2013, two areas with virtually 100% vegetation encroachment in the channel bottom were selected for vegetation removal:

1. Highway One Bridge Area (area approximately 1000 feet^2): beginning approximately 300 feet downstream of Highway One Bridge at River Mile (RM) 1 to just downstream of the Carmel Area Wastewater District (CAWD) pipe casing. Encroaching vegetation was trimmed back at 5 patches each equaling 200 square feet. In addition, a very large black cottonwood (2 feet in diameter) had fallen completely across the channel downstream of the CAWD pipe. This tree had its crown branches removed to allow debris to pass and several sections of the trunk were cut and left in place for large wood habitat.

2. Quail 8 Condominium Area (area approximately 500 feet^2): beginning approximately RM 4.2 at the Quail 8 condominiums and extending 100 feet downstream; trees extending out and blocking the channel were trimmed back. Some branches were placed in the channel for habitat and the rest was and removed offsite and chipped.

A total of approximately 1,500 square feet of stream cover encompassing approximately 0.03 acres in the channel bottom was affected by vegetation management activities.

In addition to erosion hazard reduction, vegetation management objectives include removing trash and inorganic debris from the river channel. During FY 2013-2014, trash such as plastic, paper, cans, bottles and car parts were removed from the channel and disposed by the District.

In general, the health of the riparian corridor along the lower 15.5 miles of the river appeared to be good with continued development of naturally recruited species, such as black cottonwoods and sycamores, on some of the engineered floodplains as well as natural gravel bars. While most of the stream channel remained clear of major obstructions, District staff documented increases in vegetation encroachment into the channel bottom that will likely require continued monitoring and may require vegetation management activities in the future. District staff believes that continued selective removal of encroaching vegetation will be necessary during the summer of 2015. Without such a program, it is possible that unauthorized vegetation removal by property

owners along the river may increase and lead to a decline in the health and stability of the riparian corridor.

- **Public Information and Partnerships**

MPWMD continued its outreach program with presentations to freshman biology classes from Robert Louis Stevenson, 5th graders from the International School of Monterey, and graduate students at California State University Monterey Bay. Topics included information on the Monterey Peninsula Water Resource System, proposed water supply projects within the region, MPWMD's Environmental Protection Program, the Carmel River steelhead life cycle, and specific issues related to the Carmel River watershed.

D. Expand Monitoring Programs for Soil Moisture and Vegetative Stress

This mitigation measure involves implementing a soil moisture and vegetation monitoring program to better assess plant water stress and related irrigation needs in the riparian zone. Data from soil-moisture and plant water-stress tests facilitate the identification and location of impacts resulting from the prolonged depression or rapid drawdown of the water table. Soil and plant monitoring also documents the beneficial results of riparian mitigations, and provides a statistical foundation for determining trends in conditions over time.

In calendar year 2014, staff collected bi-monthly canopy ratings of individual trees at four study sites in mid and lower Carmel Valley (Rancho Cañada, San Carlos, Schulte Restoration Project, and the Valley Hills Restoration Project). Canopy ratings are used to determine the amount of defoliation that is occurring in riparian trees due to moisture stress associated with a falling water table. **Figure XVII-2** shows average canopy ratings for both willows and cottonwoods. Results showed that willows and cottonwoods were healthy and vigorous during the beginning of the monitoring season and then began exhibiting signs of moisture stress (defoliation) as the water table dropped. It should be noted, that many trees are irrigated in the vicinity of large production wells to offset impacts associated with water extraction. Monitoring results help District staff determine irrigation requirements for portions of the riparian corridor that are under the influence of groundwater extraction. In addition, soil moisture was evaluated bi-monthly with tensiometers at the same monitoring sites. Photo documentation and measurements of foliage volume occurs in other areas as well, depending on river flow conditions and depth to groundwater.

In addition to vegetation and soil moisture monitoring, avian (bird) species diversity monitoring has been carried out from 1992 to the summer of 2010. Data collected by Dr. David Mullen and the BSOL since 1992 compares habitat values at permanent monitoring stations and provides an indication of changing patterns of avian use in District restoration projects. The information collected on avian species diversity has helped document the response of populations to habitat enhancements implemented by the District. Since 1992, the avian monitoring work has shown healthy avian species diversity along river reaches where the District has implemented restoration projects, while diversity-index readings in control sites with established riparian vegetation seem to fluctuate depending on the presence of flow in the river channel, the quality of the habitat, and off site conditions during migration. The avian monitoring program is

currently on hold because of budget constraints.

OBSERVED TRENDS, CONCLUSIONS AND/OR RECOMMENDATIONS:

The Carmel River continues to show many signs of recovery and stabilization after a combination of increased groundwater extraction, extreme drought and flood events occurred during the 1970s, 1980s and 1990s that impacted property owners, threatened species and degraded riparian habitat. In many reaches of the river, fine material (silt and sand) that entered the main stem during periods of instability has been washed out of the system leaving behind a more complex channel with improved steelhead spawning substrate, diverse habitat, and a richer riparian community. Areas with perennial or near perennial flow (upstream of Schulte Bridge) or a high groundwater table, such as downstream of Highway 1, have experienced vigorous natural recruitment in the channel bottom, which has helped to stabilize streambanks and diversify aquatic habitat.

In these areas, natural recruitment has led to vegetation encroachment that, in some areas, may constrict high flows and threaten bank stability. MPWMD continues to monitor these areas closely and to develop a management strategy to balance protection of native habitat with the need to reduce erosion potential. Environmental review of proposed projects and the process of securing permits is quite complex and requires an exhaustive review of potential impacts.

In contrast to areas with perennial flow, the recovery of streamside areas subjected to annual dewatering requires monitoring. Plant stress in the late summer and fall is evident in portions of the river that go dry. In these areas, streambanks exhibit unstable characteristics during high flows, such as sudden bank collapse, because of the lack of healthy vegetation that would ordinarily provide stability. In addition, due to the presence of main stem reservoirs, there is a lack of sediment delivery from the upper watershed that continues to result in channel degradation (incision of the stream into the valley floor). Thus, pools become deeper and when combined with scour along the outside of streambanks this creates “cut” banks. Although this leads to a more complex and dynamic channel, which is a desirable condition, continued degradation can result in bank collapses and trigger an episode of erosion along the river. District staff continues to document degradation in the river bed including at the Carmel Area Wastewater District pipe across the river downstream of Highway 1 and at bridge infrastructure in the active channel.

Restoration project areas sponsored by MPWMD since 1984 continue to mature and exhibit more features of relatively undisturbed reaches, such as plant diversity and vigor, complex floodplain topography, and a variety of in-channel features such as large wood, extensive vegetative cover, pools, riffles, and cut banks.

As cited in previous reports, the most significant trends continue to include the following:

- increased encroachment of vegetation into the active channel bottom,
- effects to areas with groundwater extraction downstream of Schulte Road,
- channel scour due to a lack of sediment from upstream and from bank erosion,

- healthy avian species diversity, and
- maturing of previous restoration projects.

Carmel River Erosion Protection and Restoration

With the exception of the channel area between the Via Mallorca Road bridge and the Rancho San Carlos Road bridge, streambanks in the main stem appear to be relatively stable during average water years with "frequent flow" storm events (flows with a return magnitude of less than five years). The program begun by MPWMD in 1984 (and later subsumed into the Mitigation Program) to stabilize streambanks appears to be achieving the goals that were initially set out, i.e., to reduce bank erosion during high flow events up to a 10-year return flow, restore vegetation along the streamside, and improve fisheries habitat.

Consistent with previous reports, it is likely that the following trends will continue:

- State and Federal agencies consider the Carmel River watershed to be a high priority area for restoration, as evidenced by the interest in addressing water supply issues, the removal of San Clemente Dam, impacts to the Carmel Bay Area of Special Biological Significance, and management of threatened species. Stringent avoidance and mitigation requirements will continue to be placed on activities that could have negative impacts on sensitive aquatic species or their habitats.
- Activities that interrupt or curtail natural stream functions, such as lining streambanks with riprap, have come under increasing scrutiny and now require significant mitigation offsets. Approximately 35% to 40% of the streambanks downstream of Carmel Valley Village have been altered or hardened since the late 1950s. Activities that increase the amount of habitat or restore natural stream functions are more likely to be approved or funded through State and Federal grant programs.
- Additional work to add instream features (such as large logs for steelhead refuge or backwater channel areas for frogs) can restore and diversify aquatic habitat.
- Major restoration projects completed between 1987 and 1999 have had extensive and successful work to diversify plantings. However, maintenance of irrigation systems is ongoing and requires extensive work in water years classified as below normal, dry and critically dry.
- Downstream of the Robinson Canyon Road bridge, the river continues to cut into the channel bottom and form a more complex system of pools, riffles and gravel bars.

Between the mouth of the river and Robinson Canyon Road bridge, many areas of the river appear to be deeper than at any previous time since measurements have been recorded (i.e., beginning in 1978), with many reaches showing several feet of downcutting. This trend, which was identified as a concern in the 1984 Carmel River Management Program EIR, appears to have accelerated in the period from 1998 to 2014. This was a period of exceptional stability (for the Carmel River) as streambanks hardened with structural protection over the past several decades resisted erosion and the force of the river during high flows was directed into the channel bottom. This condition has resulted in the undermining of rip-rap protection and bridge infrastructure in some reaches. To assess the impact of scour and degradation in the bottom of the channel, the District budgeted funds in Fiscal Year 2014-15 to carry out a thalweg survey

(survey along the bottom of the channel), which will be compared to similar surveys dating back to 1984.

In the spring of 2010, the Carmel Area Wastewater District's concrete-encased pipe across the bottom of the river was exposed for the first time since it was constructed in 1973. When the pipe encasement was installed, the top was buried two feet below the riverbed. In 2012, District staff measured a maximum of 4.5 feet of scour from the top of the encasement, which is approximately five feet wide and five feet high (see **Figure XVII-3**). In September 2013, District staff measured between 4.0 and 4.25 feet of scour. It is possible that high flows are passing under the pipe encasement. In addition, the pipe encasement appears to be causing the river to create a large deep pool on the downstream side, while on the upstream side the encasement causes the river bottom to be flat and wide for an extended length. At certain low flow periods with the lagoon open, the encasement may be creating a temporary barrier to steelhead migration.

In the spring of 2011, the river migrated into the north streambank at the Rancho San Carlos Road Bridge (see **Figure XVII-4**). If no work to stabilize the streambank is carried out, it is likely that the river will continue to migrate toward homes along the north streambank.

Eventually, without corrective measures to balance the sediment load with the flow of water or to mitigate for the effect of the downcutting, streambanks will begin to collapse and the integrity of bridges and other infrastructure in the active channel of the river may be threatened.

Vegetation Restoration and Irrigation

To the maximum extent possible, MPWMD-sponsored river restoration projects incorporate a functional floodplain that is intended to be inundated in relatively frequent storm events (those expected every 1-2 years). For example, low benches at the Red Rock and All Saints Projects have served as natural recruitment areas and are currently being colonized by black cottonwoods, sycamores and willows. In addition, willow and cottonwood pole plantings in these areas were installed with a backhoe, which allows them to tap into the water table. These techniques have been successful and have reduced the need for supplemental irrigation.

Channel Vegetation Management

Another notable trend relating to the District's vegetation management program was the widening of the channel after floods in 1995 and 1998. With relatively normal years following these floods, the channel has narrowed as vegetation recruits on the channel bottom and gravel bars. Current Federal regulations such as the Endangered Species Act (ESA) "Section 4(d)" rules promulgated by NOAA Fisheries to protect steelhead significantly restrict vegetation management activities. Because of these restrictions, the District can carry out activities only on the most critical channel restrictions and erosion hazards in the lower 15 miles of the river. In the absence of high winter flows capable of scouring vegetation out of the channel bottom, encroaching vegetation may significantly restrict the channel. As vegetation in the river channel recovers from the high flows of 1995 and 1998 and matures in the channel bottom, more conflicts are likely to arise between preserving habitat and reducing the potential for property

damage during high flows. MPWMD will continue to balance the need to treat erosion hazards in the river yet maintain features that contribute to aquatic habitat quality.

Permits for Channel Restoration and Vegetation Management

In 2012, MPWMD renewed its long-term permits with the U.S. Army Corps of Engineers and the California Regional Water Quality Control Board for routine maintenance and restoration work. In 2014, the District also renewed a long-term Routine Maintenance Agreement (RMA) with the California Department of Fish and Wildlife to conduct regular maintenance and restoration activities in the Carmel River.

Monitoring Program

Vegetative moisture stress fluctuates depending on the rainfall, proximate stream flow, depth to groundwater, and average daily temperatures, and tends to be much lower in above-normal rainfall years. Typical trends for a single season start with little to no vegetative moisture stress in the spring, when the soil is moist and the river is flowing. As the river begins to dry up in lower Carmel Valley (normally around June) and temperatures begin to increase, an overall increase in vegetative moisture stress occurs. For much of the riparian corridor in the lower seven miles of the Carmel River, this stress has been mitigated by supplemental irrigation, thereby preventing the die off of large areas of riparian habitat. However, many recruiting trees experience high levels of stress or mortality in areas difficult to irrigate. Riparian vegetation exposed to rapid or substantial lowering of groundwater levels (i.e., below the root zones of the plants) will continue to require monitoring and irrigation during the dry season.

With respect to riparian songbird diversity, populations dropped after major floods in 1995 and 1998 because of the loss of streamside habitat. Since 1998, species diversity recovered and now fluctuates depending on habitat conditions. Values indicate that the District mitigation program is preserving and improving riparian habitat.

Strategies for the future

A comprehensive long-term solution to overall environmental degradation requires a significant increase in dry-season water flows in the lower river, a reversal of the incision process, and reestablishment of a natural meander pattern. Of these, MPWMD has made progress on increasing summer low flows and groundwater levels by aggressively pursuing a water conservation program, implementing the first and second phases of the Seaside Groundwater Basin Aquifer Storage and Recovery Project, and recommending an increase in summer releases from Los Padres Reservoir.

Reversal, or at least a slowing, of channel incision may be possible if the supply of sediment is brought into better balance with the sediment transport forces. Additional sediment from the tributary watersheds between San Clemente Dam and Los Padres Dam may pass into the lower river in the foreseeable future with the removal of San Clemente Dam in 2015. However, any increase in the sediment supply may not reach the lowest portion of the river for many years.

In January 2009, CAW agreed to proceed with the removal of San Clemente Dam and reroute of the Carmel River main stem around the sediment field. MPWMD supported this dam removal and re-route project proposed by the California Coastal Conservancy. The project began in the summer of 2013 and is scheduled to be completed in 2015. In addition to a significant improvement in fish passage, removal of San Clemente Dam would likely reduce the time it takes for sand and gravel from the upper watershed to move through the river bottom and replenish the Carmel River State Beach at the mouth of the river.

Over the long term, an increase in sediment supply could help reduce streambank instability and erosion threats to public and private infrastructure. However, reestablishing a natural supply of sediment and restoring the natural river meander pattern through the lower 15.5 miles of the Carmel Valley presents significant political, environmental, and fiscal challenges, and is not currently being considered as part of the Mitigation Program.

Integrated Regional Water Management (IRWM) Grant Program

The IRWM program promoted by the California Department of Water Resources (DWR) encourages planning and management of water resources on a regional scale and promotes projects that incorporate multiple objectives and strategies. In addition, the IRWM process brings stakeholders together and encourages cooperation among agencies in developing mutually beneficial solutions to resource problems.

In November 2007, the District adopted the final IRWM Plan for a region encompassing Monterey Peninsula areas within the District boundary, the area in the Carmel River watershed outside of the MPWMD boundary, Carmel Bay and the Southern Monterey Bay. The Plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation.

Subsequently, MPWMD was successful in 2011 in obtaining a $995,000 grant from the DWR to update the IRWM Plan to Proposition 84 standards. The Plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation. In FY 2011-2012, MPWMD entered into a grant agreement with DWR and initiated work on 10 planning projects, including an update to the 2007 plan and several planning projects to benefit local jurisdictions. During FY 2012-2013, additional agreements were signed to work on all 10 planning projects. During FY 2013-14, the IRWM Plan was updated and adopted by the MWPMD Board and the other nine planning projects were completed. The total cost of the project, including local agency match, was about $1.6 million. A final report on the grant will be completed in 2015.

Funding from the IRWM grant program and other programs requiring an adopted IRWM Plan could provide the incentive to undertake a set of projects that would continue to improve the Carmel River environment and engage a larger number of organizations in helping to develop and implement a comprehensive solution to water resource problems in the planning region.

More information about the IRWM Plan and the group of stakeholders in the planning region can

be found at the following web site:

http://www.mpirwm.org

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Table XVII-1

Monthly Irrigation Water Use During 2014
(Values in Acre-Feet)

Project Site	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Total
DeDampierre	0.010	0.002	0.002	0.010	0.014	0.015	0.021	0.016	0.019	0.024	0.011	0.000	**0.144**
Trail and Saddle	0.193	0.009	0.037	0.204	0.165	0.163	0.303	0.223	0.181	0.275	0.096	0.000	**1.849**
Begonia	0.033	0.006	0.006	0.040	0.030	0.026	0.035	0.027	0.031	0.037	0.022	0.000	**0.293**
Reimers	0.153	0.000	0.000	0.021	0.043	0.082	0.407	0.718	0.513	0.219	0.090	0.000	**2.246**
Schulte Bridge	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.036	0.018	0.051	0.004	0.000	**0.178**
All Saints	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.005	0.004	0.000	0.000	**0.018**
Cypress	0.465	0.100	0.000	0.000	0.000	0.394	0.912	1.405	1.475	0.712	0.188	0.000	**5.651**
San Carlos	0.000	0.000	0.000	0.000	0.000	0.000	1.221	1.242	0.470	0.000	0.000	0.000	**2.933**
San Carlos (Dow)	0.192	0.000	0.000	0.025	0.184	0.259	0.342	0.160	0.372	0.000	0.000	0.000	**1.534**
TOTAL WATER USE IN ACRE-FEET FOR DISTRICT RESTORATION PROJECTS IN 2014 =													**14.846**

Figure XVII-1

Riparian Irrigation Totals

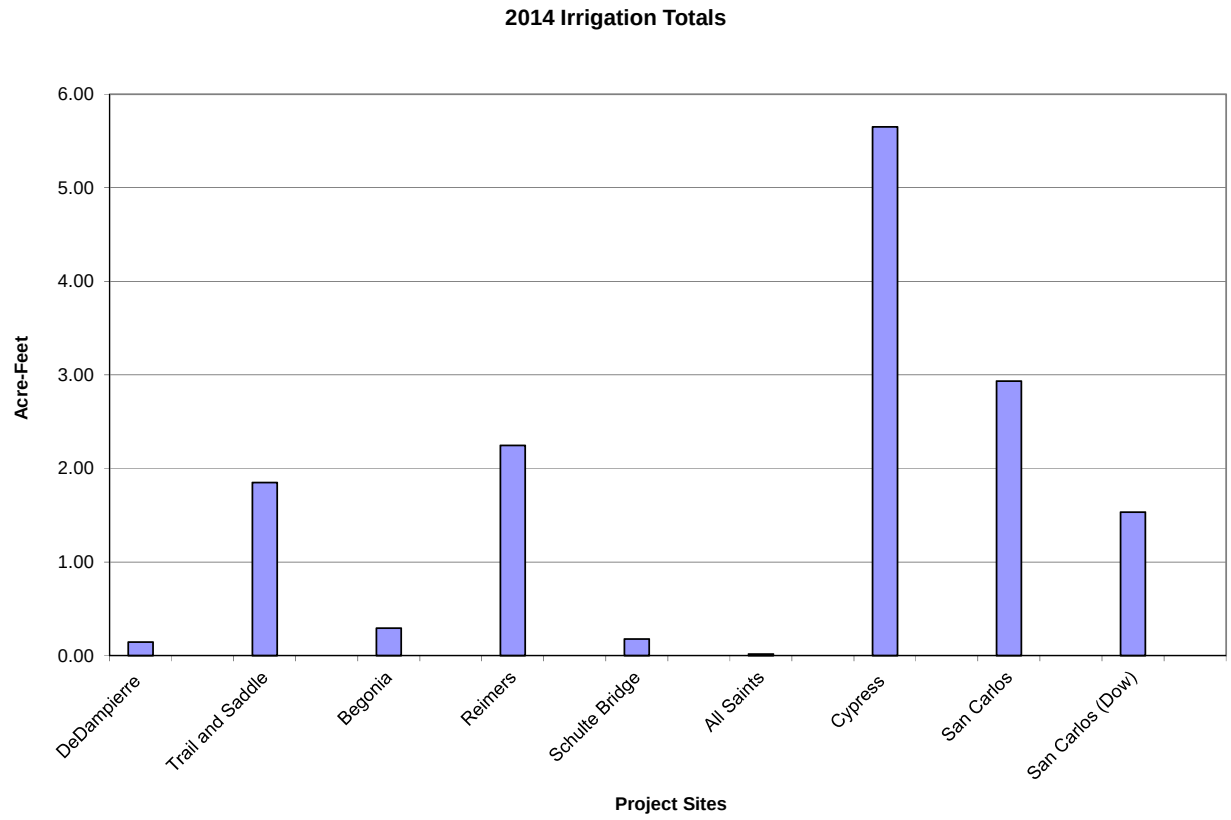
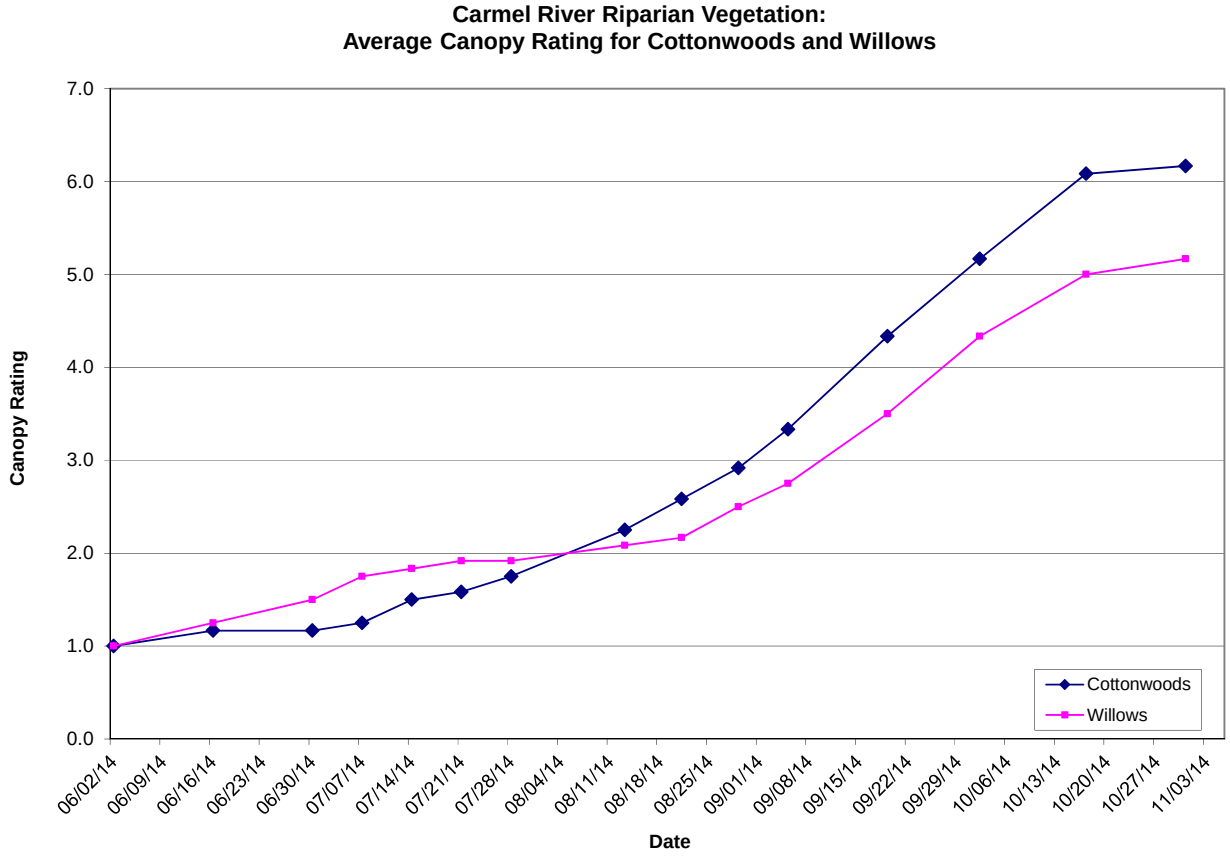


Figure XVII-2

2014 Average Canopy Rating for Cottonwoods and Willows



Canopy Rating Scale		Stress Level
1=	Green, obviously vigorous	none, no irrigation required
2=	Some visible yellowing	low, occasional irrigation required
3=	Leaves mostly yellowing	moderate, regular irrigation required
4=	< 10% Defoliated	moderate, regular irrigation required
5=	Defoliated 10% to 30%	moderate, regular irrigation required
6=	Defoliated 30% to 50%	moderate to high, additional measures required
7=	Defoliated 50% to 70%	high stress, risk of mortality or canopy dieback
8=	Defoliated 70% to 90%	high stress, risk of mortality or canopy dieback
9=	> 90% Defoliated	high stress, risk of mortality or canopy dieback
10=	Dead	consider replanting

Figure XVII-3
Carmel Area Wastewater District Pipe Encasement, Carmel River

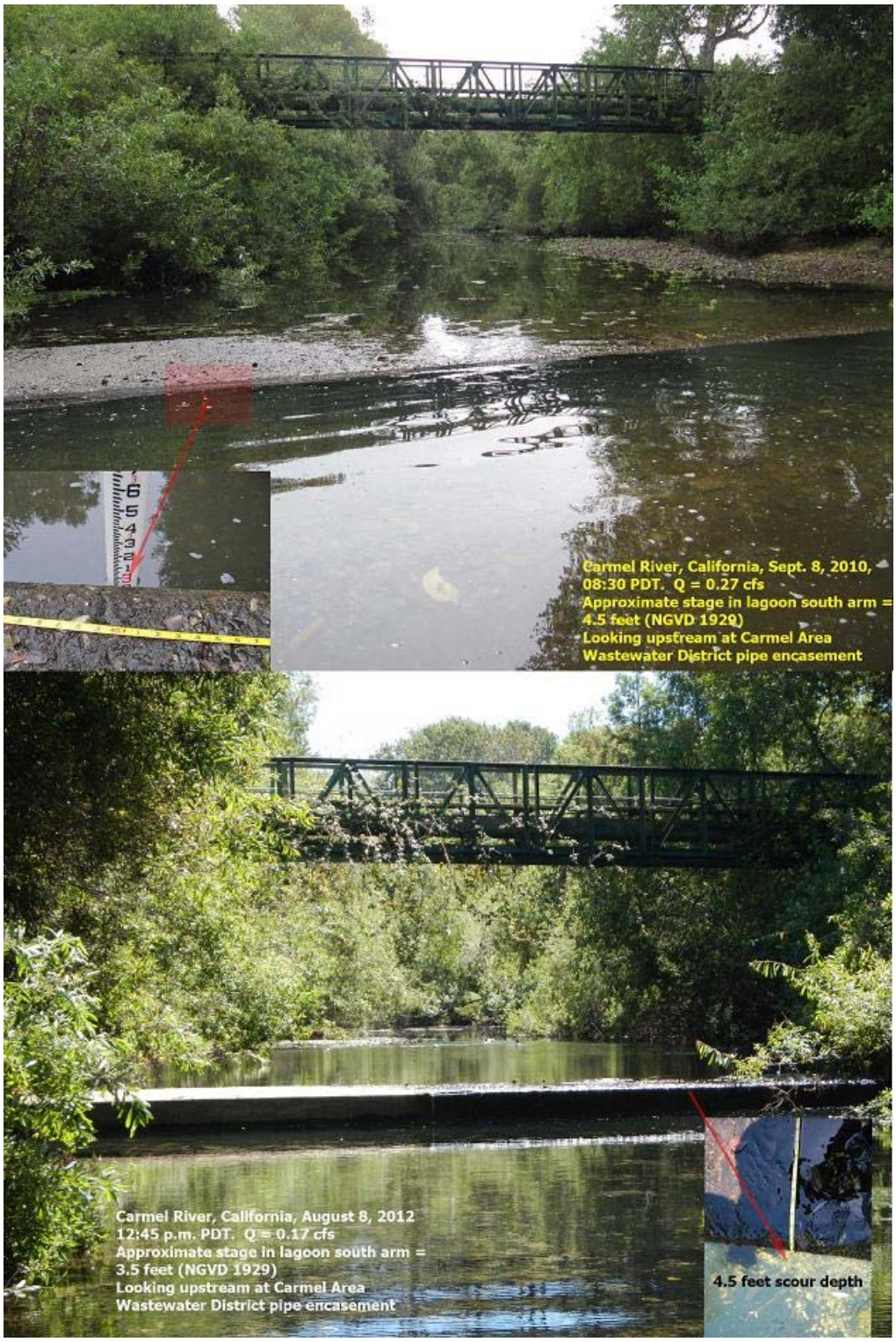


Figure XVII-4
Streambank Erosion at Rancho San Carlos Road Bridge, Carmel River

XVIII. LAGOON HABITAT MITIGATION MEASURES

The Findings for Adoption of the Water Allocation Program Final EIR identified three mitigation measures to reduce impacts to the Carmel River Lagoon, including wildlife that is dependent on it (Finding Nos. 390-A through C, and 392). They include: (a) assist with lagoon enhancement plan investigations, (b) expand long-term monitoring program, and (c) identify feasible alternatives to maintain adequate lagoon volume. This section briefly describes the purpose of these three programs and summarizes the mitigation activities from July 1, 2013 through June 30, 2014.

A. Assist with Lagoon Enhancement Plan Investigations

Description and Purpose

The Monterey Peninsula Water Management District (MPWMD or District), Monterey County Water Resources Agency (MCWRA), California Department of Parks and Recreation (CDPR), and the California Coastal Conservancy (Conservancy) co-funded the Carmel River Lagoon Enhancement Plan, which was prepared by Philip Williams & Associates. A key aspect of the Lagoon Enhancement Plan was to identify alternative means to restore and enhance the lagoon environment. District staff participated on a plan review committee, which met on an as-needed basis, and contributed staff expertise for enhancement plan investigations. District staff reviewed and provided comments on the Draft Lagoon Enhancement Plan document. These comments, as well as comments from other reviewing agencies, were incorporated into the Final Plan dated December 1992.

Implementation and Activities during 2013-2014

During this period, the CDPR continued their native riparian plant re-vegetation efforts at a reduced level within the 100-acre portion of the "Odello West" property that is now part of the Carmel River State Beach. The re-vegetation work is ongoing, though the formal monitoring program and its reporting ended after five years in 2009.

One of the ongoing goals of the Carmel Area Wastewater District (CAWD) is to cease discharges to Carmel Bay by finding methods to recycle treated wastewater back to beneficial uses within the community. District staff provide hydrological data to the CAWD to aid them in evaluating and monitoring their efforts to augment flow to the lagoon using recycled water. No treated wastewater from the CAWD plant was released into the restoration area for percolation into the lagoon during this Reporting Year (RY). CAWD was exploring the potential to release recycled water directly to the lagoon or to wetlands for percolation as part of their discharge permit renewal from the Central Coast Regional Water Quality Control Board (CC-RWQCB). The CC-RWQCB staff required further studies to characterize the background levels of trace metal concentrations in the lagoon's receiving waters before direct discharges to surface water would be permitted. Those studies include baseline monitoring of treatment plant effluent and lagoon water quality for specific metals, which might be elevated above acceptable limits for receiving waters by releases of CAWD's recycled water. The tertiary-treated CAWD discharges continue to meet water-quality standards for surface irrigation, which would allow their release

onto surrounding habitat to irrigate vegetation, but not directly into the lagoon. CAWD completed its baseline monitoring for metals on September 6, 2011. CAWD acquired funding from CDFW to undertake these studies in 2011-2013, but there were no progress or technical reports released during the last three RYs. The contract was suspended by CDFW in May 2013, and the work will not resume. For now this effort to develop an alternative water source to help sustain lagoon volume during the dry season is suspended indefinitely.

District staff monitored receiving water quality and continued to provide expertise to representatives from numerous state, federal and local agencies, as well as members of the public. The lagoon water-quality data for both surface and subsurface profiles are presented in Section III. During many months in the summer and fall, there is usually no natural surface flow to the lagoon, and the lagoon has historically experienced poor water quality and low water levels that could have contributed to fish mortality. The river never reached the lagoon in this RY. The lowest geographic point of annual surface flow occurred at River Mile (RM) 3.0, just below Cal-Am's Cañada Well and about two tenths of a mile above Rancho Cañada's easternmost golf cart bridge. Thus, the lagoon experienced no surface inflow year round for this RY.

During this RY, CAWD did not release any tertiary treated wastewater for the purpose of percolating it into the soil adjacent to the lagoon in an attempt to improve lagoon water quantity and quality. The CDPR did not utilize what is known as its "Cal-Trans" well to any irrigation water for its demonstration organic farm and riparian restoration areas adjacent to the south arm of the lagoon. A significant portion of this irrigation water is normally consumed by evapotranspiration from the crops or riparian vegetation, although some water percolates into the aquifer adjacent to the lagoon. CDPR staff has opined (Dave Dixon, pers. comm.) that significant lagoon recharge from these sources is unlikely as the demonstration farm is on drip irrigation, and the restoration area is watered during the dry season only two hours a week. Specifically, CDPR produced a total of 0.000 acre-feet of groundwater between July 2013 and June 2014 from their "Cal-Trans" well to serve the organic demonstration farm and irrigate the riparian restoration area. CDPR pumped water from their "Highway 1" well at CRSA's behest into the South arm of the Lagoon for a total of 174.95 acre-feet of water during this RY, which was 17% more than what was produced the year before.

District staff did not provide any ongoing support to the Carmel River Lagoon Technical Advisory Committee (CRL-TAC) in this RY, regarding Monterey County Resource Management Agency (MCRMA), Public Works (RMA-PW) management of the sandbar that forms each year between the lagoon and the ocean. The CRL-TAC remains operational in concept, but no further meetings were held during the last three RYs. Lagoon water levels can fall to less than two feet elevation (NGVD 1929, measured in the south arm) when the beach breaches in the middle. NMFS and CDFW have indicated that an elevation of from four to ten feet, depending on the time of year and life cycle needs of steelhead, would be an optimal management target to benefit steelhead rearing.

The lagoon was last connected to the ocean on a continuous basis during the two RYs ago on April 9, 2013, when RMA-PW closed it mechanically. Lagoon elevations remained above the minimum target of four feet only through June 17, 2013. Lagoon levels never got lower than

approximately 2.5 feet throughout the summer and fall. Wave over-wash events raised lagoon levels five times beginning on September 21 November 28, December 16 and 30, 2013, and February 26, 2014 by approximately 1.5 to 2.25 feet, each time. Lagoon volume then peaked at around 5.5 feet on a number of occasions between December 31, 2013 and April 3, 2014. RMA-PW never took any action in this RY to manage the lagoon, as the lack of inflow and magnitude of wave over-wash made it unnecessary to do so. During the remainder of the current RY, the lagoon's water volume gradually declined from April through June 29, 2014. This was followed by an approximately 1-foot increase on June 30, 2014, that then went back into decline towards approximately 2.75 feet by the end of July 2014.

The lagoon was closed 100% of the time in this RY. There were not any winter rainstorms sufficient for flow to reach the lagoon and open it in this RY. Flows at the MPWMD Highway 1 Gage (RM 1.09) remained at 0 cubic feet per second (cfs) throughout the year, except for seventeen days scattered throughout the winter and spring (November – April), when local surface runoff, not connected river flow, created flow measurements between 0.3 – 3.1 cfs for no more than 2 consecutive days, usually less. The USGS Near Carmel Gage (RM3.24) had its first flows with the first winter storm of the RY for the three day period of March 2 to 4, 2014, reaching a peak instantaneous flow of 25 cfs on March 2, 2015. The second winter storms brought flows up to only 16 cfs on April 5 and 6, 2014, and sustained flow only 42 days from April 2 to May 12, 2014. Thus flows during this RY occurred for a total of only 45 days 3.24 miles away from the ocean at the USGS Near Carmel Gage.

The District continues to seek another participating agency to take over leadership of the CRL-TAC and chair the meetings, but the District will continue to provide the same level of staff support. The CRL-TAC meets as needed concerning management of the Carmel River lagoon and beach. As described above, the CRL-TAC did not meet during the last three RYs. The District General Manager continued to work with other local agency managers and community representatives to pursue State funding to implement *Final Study Plan for the Long-Term Adaptive Management of the Carmel River State Beach and Lagoon* (April 17, 2007), but no applicable source of funding was secured during this RY.

The MCRMA is the parent county agency for RMA-PW. MCRMA continues to seek the funding necessary to develop the information needed to pursue separate long-term State and Federal permit applications for lagoon breaching by RMA-PW. This is the fourth RY where MCRMA/RMA-PW had Federal permits for all their actions. During the 2008-2009 RY, CDPR finalized its *Mitigated Negative Declaration for the Carmel River Lagoon Water Elevation Adaptive Management*, and acquired separate State and Federal permits for the closure of the lagoon in the spring to maximize habitat volume. However, due to State budgetary constraints, CDPR is no longer able to implement the permitted actions, and has not for the last five RYs. CDPR continues to recommend that another agency with appropriate jurisdiction and funding take over the lagoon closure process, and the MCRMA/RMA-PW have in effect informally done so.

B. Expand Long-Term Monitoring Program

Description and Purpose

Long-term monitoring of the lagoon and its associated plant communities provides data that can be used to evaluate the wetlands' response to groundwater pumping. The purpose of the monitoring is to: (1) determine if changes in hydrology or plant species distribution and coverage are occurring due to the removal of groundwater upstream, and (2) implement additional mitigations if pumping-induced changes to hydrologic characteristics or vegetation are identified. The Mitigation Program calls for extensive studies such as vegetation mapping and soil surveys to occur every five years. In practice, lagoon vegetation has been monitored annually from 1995 through 2005, and nearly every other year thereafter, except 2011 when lagoon water levels were too high in summer to do so. This monitoring resumed in 2012. Saturation-paste conductivity of soils in the vicinity of the vegetation-monitoring stations was measured annually from 1995 through 2004. Wildlife surveys have not been conducted since 2010. Bathymetric surveys continue to be conducted each year.

Implementation and Activities during 2013-2014

The District has historically conducted three types of long-term lagoon monitoring activities, only two of which were completed this RY:

- Vegetation Surveys
- Topographic Surveys and hydrology
- Wildlife Surveys [last completed in 2010]

● **Vegetation Monitoring –** The same monitoring stations that were established in 1995 were sampled annually between 1995 and 2005, and then every other year until 2009, as the Allocation EIR only called for this monitoring to occur every two years. In July and August of 2011 the water level in the lagoon was too high to monitor the stations, except for very brief intermittent periods early in July. Therefore, vegetation monitoring did not occur in 2010 or 2011, but resumed in July 2012 and August 2014. Although monitoring occurred after the period covered in this report, results for August 2014 are discussed below.

The report, *Biologic Assessment of the Carmel River Lagoon Wetlands*, prepared for the District by the Habitat Restoration Group in 1995, provides a detailed description of the methodology employed. Ten pairs of quadrats were intentionally located along transects at lower elevations of the wetlands because it is anticipated that changes in the vegetative community would first become apparent in these habitat types. The north side was emphasized because of disturbances on the south side associated with the creation of the Cal-Trans Carmel River Mitigation Bank and subsequent restoration of the former Odello artichoke field.

No dramatic changes in vegetation were observed between the summers of 1995 and 2009, although the drier conditions experienced from Water Year 2012 through 2014 have produced a different gestalt in portions of the wetlands. Subtle differences in vegetative cover between years may be explained by slightly different sampling dates each year, made necessary by variations in the hydrologic regime from one year to the next, rendering some low-lying quadrats inaccessible until later in the season. The timing, magnitude and direction of wave action,

runoff, and breaching of the sand bar at the mouth of the lagoon affect the duration of standing water in some of the lower-lying monitoring sites. The diversity and abundance of forbs in some lower lying quadrats and transects noticeably dropped from 2009 to 2014, while more salt-tolerant species such as salt-grass appear to becoming more dominant. However, there were exceptions, and it is too early to draw conclusions based on the limited data available. For example, some Obligate Wetland plants have declined in along some transects, while increasing along other transects. Emergent species, such as pickleweed and silverweed take a while to appear following extended periods of inundation. They were missing from Transect #1 in 2012, which was monitored less a week after inundation, but showed up again during vegetation monitoring in 2014 at a time when the transects had not been inundated for nearly three months. Pale spikerush, an obligate wetland species categorized as a freshwater marsh plant, dropped out of four quadrats in 2014, but reappeared in one other quadrat where it was missing in 2012. Salt grass, a facultative wetland species characteristic of salt marshes, noticeably spread in three quadrats, decreased in abundance in two others, and completely dropped out of two other quadrats from 2012 to 2014.

A more detailed discussion of the results of past vegetation monitoring is presented in the 2005 Mitigation Report. Data gathered thus far suggest that factors favoring freshwater species over salt tolerant species may be occurring. Determining whether changes are attributable to water management practices upstream as opposed to the timing of monitoring, beach breaching, changes in hydrologic regime or global weather dynamics are more complex questions. Review of the available data has not identified significant changes from one monitoring event to the next. Nor have strong relationships between species composition or distribution and water management practices been identified. Staff anticipates continued monitoring of the wetlands every other year in the future to provide evaluation of long-term trends.

- **Topographic Surveys and Hydrologic Monitoring --** During the period covered in this report, District staff surveyed four cross sections to track the movement of sediment in the lagoon, continued to maintain a water-level recorder and Automated Local Evaluation in Real Time (ALERT) station at the south arm, and measured groundwater elevations in three wetland piezometers that were installed in May 1996. There is a good correlation between surface-water elevation and water elevation in the piezometers. Staff also continues to track surface discharge into the lagoon at the Highway 1 gaging station, and water production upstream of the lagoon.

- **Wildlife Monitoring –** Birds are often used as indicators of the suitability of an area for wildlife because they tend to be easier to identify and count than other creatures. By tracking the species diversity index at a specific location over time, scientists are able to infer if changes have occurred that may affect the area's dependent wildlife. In the past, District staff contracted with the Ventana Wilderness Society and Big Sur Ornithology Lab (BSOL) to conduct avian point count surveys in the riparian corridor of the Carmel River at sites from Carmel Valley Village to a point just upstream of the lagoon (**Section XVII-C**). The District carried out this program from 1992 through 2010. However, due to budget constraints the avian point counts have not been conducted since spring 2010.

Avian monitoring specific to the lagoon was last carried out by the District at sites near the lagoon at the mouth of the Carmel River in the summer of 2004. Sampling in the vicinity of the

lagoon was subsequently carried out by the CDPR from 2005-2008, when monitoring ceased due to ongoing budget constraints.

Special Studies during 2013-2014

- **Steelhead Population Monitoring**

MPWMD applied for and acquired ESA Section 7 coverage starting in 2009 to conduct a mark-recapture study as part of its semi-annual renewal of staff Scientific Collecting Permits from CDFW. These have been renewed annually through 2016. No population censuses were conducted this RY due to the drought conditions creating low lagoon levels, sometimes with poor water quality, where the sampling may have had an extremely detrimental effect on any steelhead remaining in the lagoon.

C. Identify Feasible Alternatives to Maintain Adequate Lagoon Volume

Description and Purpose

The purpose of this mitigation measure is to determine the volume required to keep the lagoon in a stable condition that can adequately support plants and wildlife. It is envisioned that alternative means to achieve and maintain the desired volume will be compared, and the most cost-effective means selected. One alternative that may achieve these goals is the development of a water supply project that can reliably provide more water to the Monterey Peninsula and result in reduced diversions from the Carmel River; however, few other feasible alternatives have materialized in spite of extensive evaluation. MPWMD staff previously estimated that approximately 8 cfs, or about 16 acre feet per day (AFD), can percolate through the barrier beach when the outlet is closed and lagoon water levels are stable at relatively high elevations (8 – 9 feet). This seepage rate was determined utilizing continuous streamflow data from the Carmel River at Highway 1 Bridge gaging station and the 1997 lagoon stage volume relationship over the 1991-2005 period. However, in May and June 2009, following the manual lagoon mouth closure on May 18, 2009, streamflow and lagoon storage data showed that 12 cfs or 24 AFD percolated through the beach berm and into the surrounding wetlands (based on an updated 2007 lagoon storage table). It is postulated that increased infiltration capacity of the lagoon may be due to a combination of the excavation of an outlet channel to the south, the two South Arm excavations in 2004 and 2007, and that the manual lagoon mouth closure results in a higher water surface elevation than was typical of the 1991-2005 period. A higher water surface elevation likely results in flow through the outlet channel that then percolates into the beach. This volume of water passing through the beach is significant, and is equivalent to about two-thirds of the daily Carmel River diversions historically needed to meet a portion of the municipal demand of the Monterey Peninsula during the summer. No treated water from the CAWD was added to the lagoon in this RY. There were concerns about the effects the recycled CAWD water might have on water quality in the lagoon that might affect both juvenile steelhead and red-legged frog habitat values so the action has ceased until impact evaluations could be completed. Those studies have been suspended indefinitely (see **Section XVIII-A** above). However, some water from an existing agricultural well (i.e., 174.95 acre-feet) was added to the lagoon in this RY. Determination of desirable lagoon volume will be conducted in conjunction

with the monitoring studies noted above and the findings of the Lagoon Enhancement Plan. Development of feasible alternative means to provide adequate volume to sustain healthy lagoon habitat throughout the dry season continues to be sought by the District.

Implementation and Activities During 2013-2014

District staff continued the annual survey of four key lagoon cross sections (**Figure XVIII-1**) to track changes in the volume of sand in the active portion of the lagoon over time. An initial survey of the four cross sections was conducted in January 1988. Subsequent annual surveys have been conducted beginning in September 1994 through the present. Sedimentation in the lagoon is a concern because the Carmel River as a whole has taken on an increased load of sand from Tularcitos Creek and other drainages following the El Niño winter of 1998. However, it appears at this time, the majority of the sediment deposited along the Carmel River in 1998 has washed through the Carmel River system and lagoon, and has subsequently reached the ocean. These four key cross sections provide a quantitative means to evaluate whether or not lagoon volume is changing significantly over time. The dynamic nature of the lagoon substrate is evident in **Figure XVIII-2**, which shows the results of the annual surveys conducted since 1994.

In September 2014, staff completed the annual surveys of cross sections (XS) 1-4, despite the fact that Carmel River mainstem flow did not reach the lagoon in Water Year (WY) 2014. It should be noted that prior to WY 2014, Carmel River streamflow had reached the lagoon for 23 consecutive years since WY 1991. As would be expected, there was no change in lagoon substrate elevation at the four cross sections from the previous year's (September 2013) surveys (**Figure XVIII-3**).

The highest peak streamflow of WY 2014 was 25 cfs on March 2, 2014, recorded at the USGS Carmel River (CR) near Carmel streamflow gaging station (river mile 3.2). Carmel River mainstem flow did not reach the CR at Highway 1 Bridge gage, although minor local runoff was recorded at the gage primarily due to runoff from impervious surfaces within the vicinity of the Crossroads Shopping Center during rainfall events.

Review of the entire cross sectional data set (**Figure XVIII-2**) shows that the September 2014 lagoon substrate elevations for XS 1-3 (consistent with the September 2013 results) are well within the range of previous surveys, indicating no clear trend of either sand depletion or accumulation at the cross sections. However, XS 4 data indicate that the substrate elevation is close to the lowest ever since 1994. This is consistent with the steady loss of streambed material at the Highway 1 Bridge gaging station (and along reaches for several miles upstream) that has been occurring since 2006, suggesting a limited sand supply in the Lower Carmel River at this time. In addition, it should be noted that at elevation 10-feet the lagoon backwater zone now extends approximately one quarter mile upstream of the Highway 1 Bridge to the eastern margin of the Crossroads Shopping Center as a result of continued down-cutting of the stream channel.

OBSERVED TRENDS, CONCLUSIONS AND/OR RECOMMENDATIONS:

The District continues to support and encourage the ongoing habitat restoration efforts in the wetlands and riparian areas surrounding the Carmel River Lagoon. These efforts are consistent

with goals that were identified in the Carmel River Lagoon Enhancement Plan, which was partially funded by the District. The District continues to work with various agencies and landowners to implement ongoing restoration of the Odello West property and future restoration of the Odello East property across the highway. Because of the restoration activities on the south side of the lagoon, the District has concentrated its monitoring efforts on the relatively undisturbed north side. Staff have also continue to meet and discuss with other agencies the ongoing use of an existing CDPR agricultural well and potential future use of treated water from the CAWD Plant to augment the lagoon during periods of low water.

The District expanded its long-term monitoring around the lagoon in 1995 in an attempt to determine if the reduction in freshwater flows due to groundwater pumping upstream might change the size or ecological character of the wetlands. Demonstrable changes have not been identified. Because of the complexity of the estuarine system, a variety of parameters are monitored, including vegetative cover in transects and quadrats, water conductivity, and hydrology. It is notable that due to the number of factors affecting this system, it would be premature to attribute any observed changes solely to groundwater pumping. During the 20-year period to date, for example, there have been two ***Extremely Wet*** (1995 and 1998), two ***Wet*** (2005, 2006), five ***Above Normal*** (1996, 1997, 2000, 2010 and 2011), five ***Normal*** (1999, 2001, 2003, 2008 and 2009), two ***Dry*** (2012 and 2013), and two ***Critically Dry*** (2007 and 2014) Water Year types in terms of total annual runoff. Thus, the hydrology of the watershed has been wetter than average 45% of the time, and at least normal or better 70% of the time during that period. However, monitoring in 2014 occurred during a Critically Dry Water Year that followed two consecutive Dry Water Years. Other natural factors that affect the wetlands include introduction of salt water into the system as waves overtop the sandbar in autumn and winter, tidal fluctuations, and long-term global climatic change. When the District initiated the long-term lagoon monitoring component of the Mitigation Program, it was with the understanding that it would be necessary to gather data for an extended period in order to draw conclusions about well production drawdown effects on wetland dynamics. It is recommended that the current vegetation, conductivity, topographical and wildlife monitoring be continued in order to provide a robust data set for continued analysis of potential changes around the lagoon.

Lagoon bathymetric cross sectional surveys, initially conducted in 1988, have been completed annually during the dry season since 1994. These data are useful in assessing changes in the sand supply within the main body of the lagoon and are necessary to answer to questions concerning whether or not the lagoon is filling up with sand, thus losing valuable habitat. As indicated in the survey plots, the sandy bed of the lagoon can vary significantly from year to year. In general, no major trends indicating sand accumulation or depletion at the lagoon cross sections have been identified based on available data, with the exception of the upstream-most cross section number 4, which exhibits an overall loss in sand volume over the 1994-2013 period. The sand loss or down-cutting observed at cross section 4 is consistent with the pervasive down-cutting that has occurred along the thalweg of the Lower Carmel River (LCR) upstream of the Highway 1 Bridge for several miles. The trend of LCR streambed scour appears to have begun in Water Year 2006. In addition, now that annual cross-sectional data have been collected in two Critically Dry years (WY 2007 and 2014) and two Dry years (WY 2012 and 2013), it is concluded that substrate elevations at the cross sections generally do not change in these low-flow years, despite the regular occurrence of major lagoon mouth breaches in all of

these years, except WY 2014. Accordingly, the multi-year cross-sectional data set (21 years) indicates quantity of streamflow as the primary factor that controls substrate changes at the key cross sections.

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Figure XVIII-1
Map of Monitoring Transects and Stations at Carmel River Lagoon.

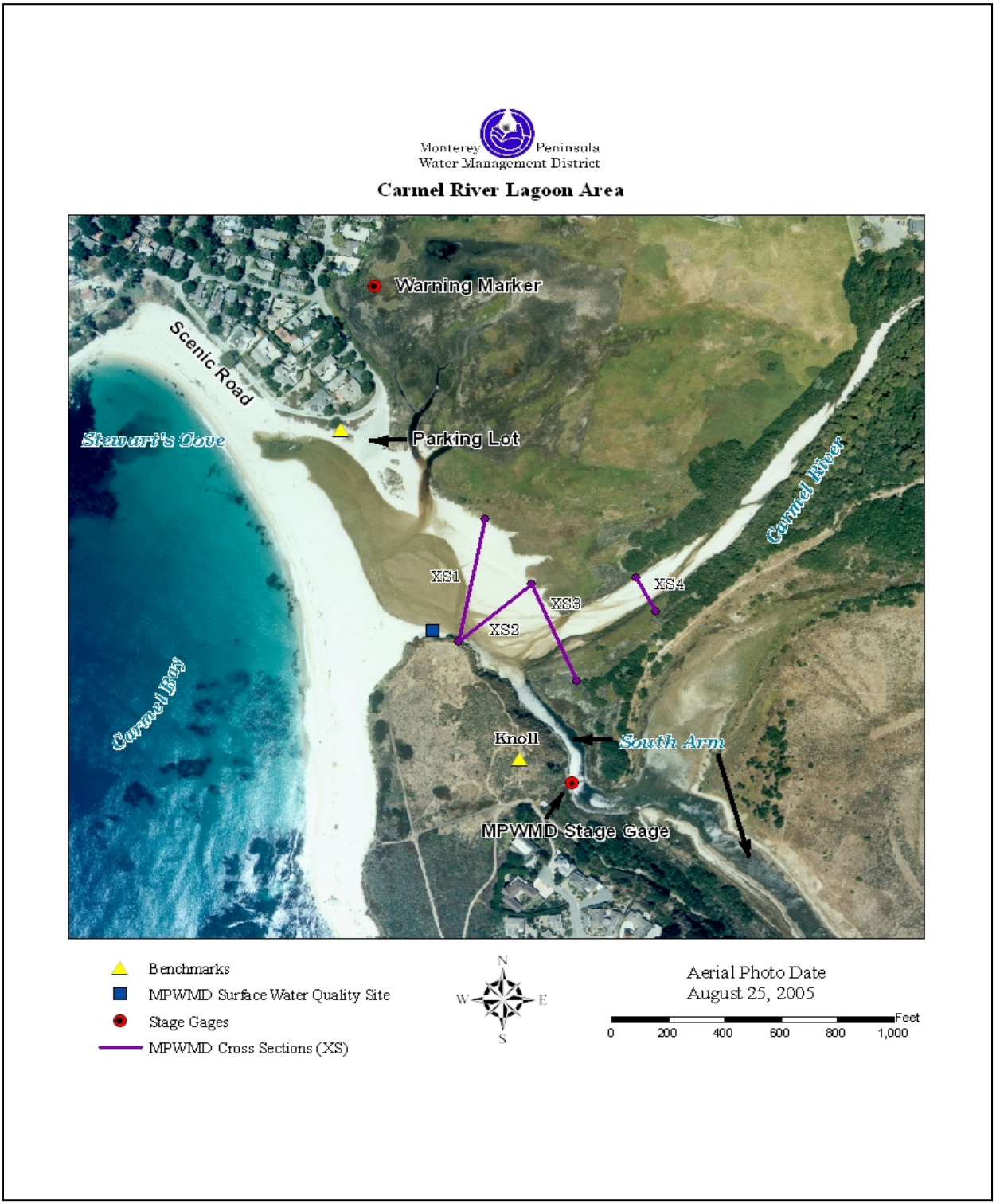


Figure XVIII-2
Carmel River Lagoon Cross Sections 1 through 4, based on Annual Surveys 1994-2014.

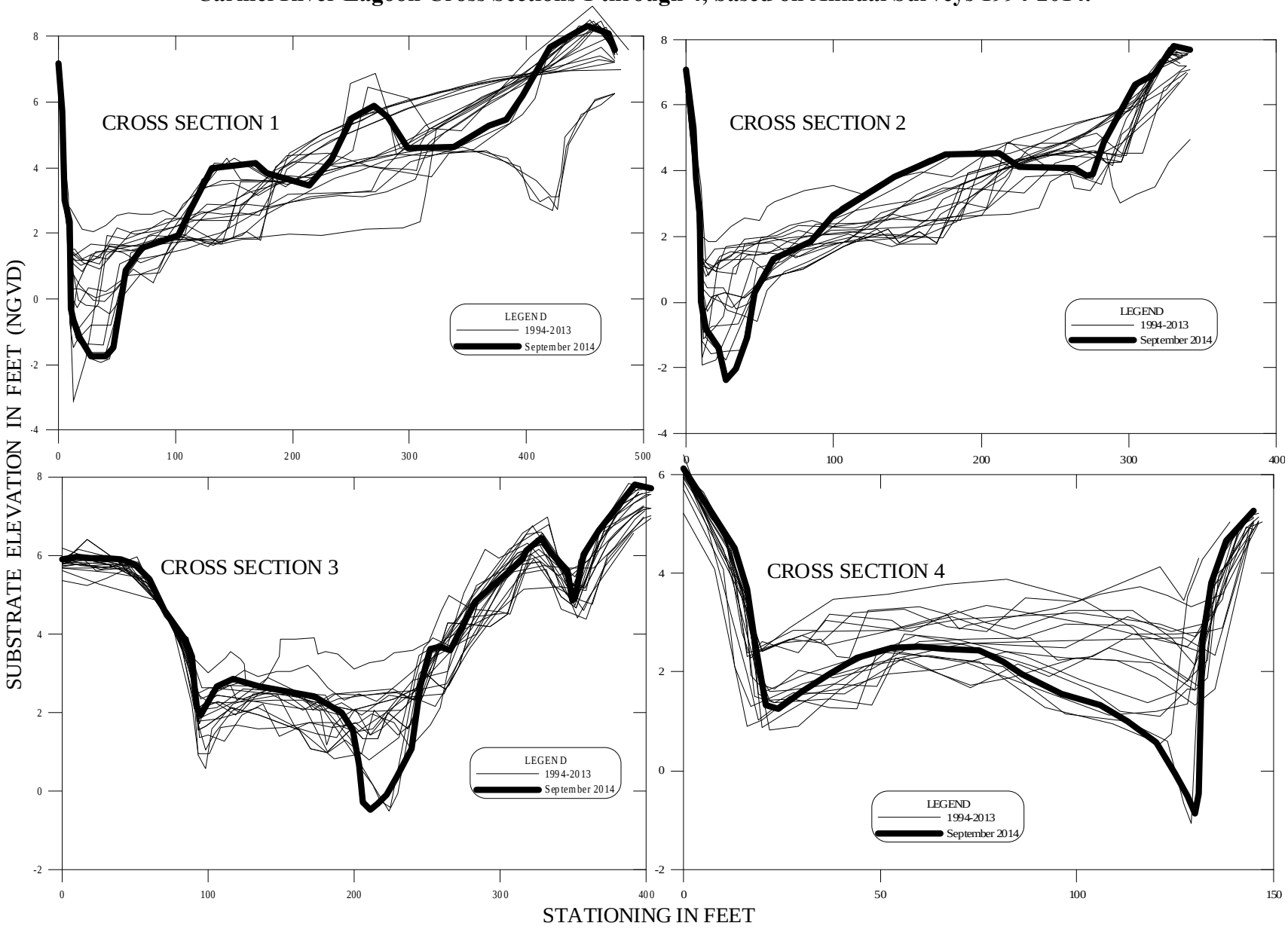
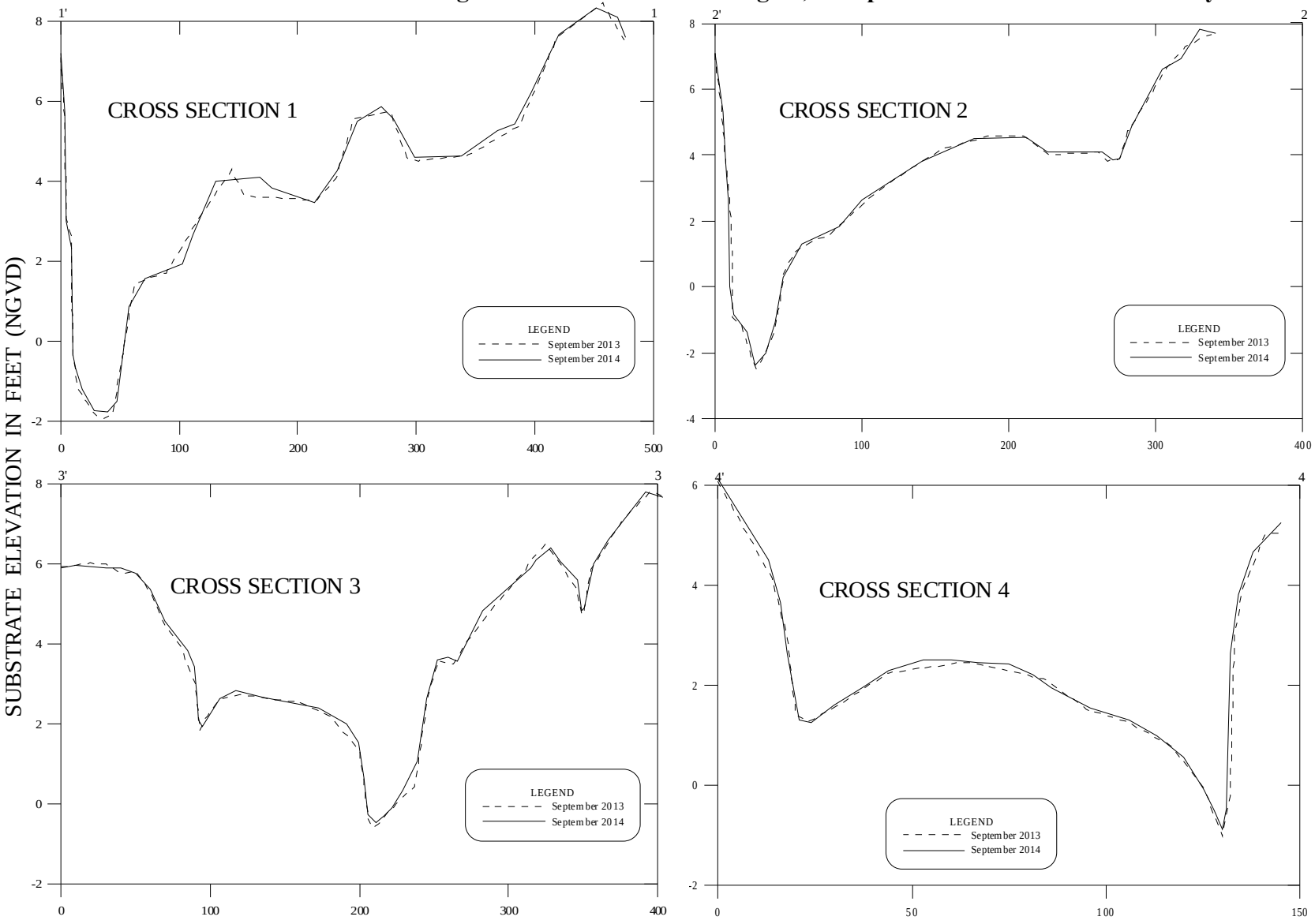


Figure XVIII-3
Carmel River Lagoon Cross Sections 1 through 4, Comparison of 2013 and 2014 Surveys.



XIX. AESTHETIC MITIGATION MEASURES

The Findings for Adoption of the Water Allocation Program Final EIR identified one mitigation measure to reduce aesthetic impacts along the Carmel River associated with riparian vegetation – that is, to implement the riparian habitat mitigation measures described above in Finding No. 393. Accordingly, please refer to **Section XVII** for information on riparian mitigation activities during the period from July 2013 through June 2014.

XX. SUMMARY OF COSTS FOR MITIGATION PROGRAM, JULY 2013 THROUGH JUNE 2014

Mitigation Program costs for FY 2013-2014 totaled approximately $2.41 million including direct personnel expenses, operating costs, project expenditures, capital equipment, and fixed asset purchases. The annual cost of mitigation efforts varies because several mitigation measures are weather dependent. Expenditures in FY 2013-2014 were $0.19 million more than the prior fiscal year due to increases in Mitigation Program costs. However, the overall costs have remained fairly constant (average of $3 million per year) for last five years. In the past, expenditures had trended upward due to expenditures for the Aquifer Storage Recovery (ASR) Project. ASR Project costs are no longer captured under Mitigation Program Costs. FY 2011-2012 expenditures were $4.59 million; and FY 2012-2013 expenditures were $2.22 million.

During FY 2013-2014, revenues totaled $2.72 million including mitigation program revenues, tax revenues, investment income and miscellaneous revenues. The Mitigation Program Fund Balance as of June 30, 2014 was $331,973.

Table XX-1

Mitigation Program Cost Breakdown for the Period July 2013 through June 2014

EXPENDITURES	Data Collection	Riparian	Fish	Lagoon	Water Supply	IRGWMP	Admin	Total
Personnel Costs	$184,928	$232,868	$337,771	$117,787	$134,268	$10,794	$478,878	$1,497,293
Operating Expenses	38,537	48,528	70,388	24,546	27,980	2,249	99,794	312,023
Project Expenses	4,986	15,617	171,444	220	0	341,136	22,961	556,364
Fixed Asset Acquisitions	5,708	17,617	8,043	2,805	3,197	257	11,403	49,030
TOTAL EXPENDITURES	**$234,160**	**$314,629**	**$587,646**	**$145,358**	**$165,445**	**$354,436**	**$613,035**	**$2,414,710**

REVENUES	
Permit Fees	$65,056
Mitigation Revenue	1,801,800
User Fees	87,064
Tax Revenues	148,624
Grant Receipts	602,499
Investment Income	3,530
Miscellaneous	7,141
TOTAL REVENUE	**$2,715,714**
REVENUE OVER EXPENDITURES	**$301,004**

XXI. REFERENCES

The following selected references provide additional information about the subjects described in this Annual Report. References are organized by section.

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Section XX. Summary of Costs

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