MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

2011-2012 ANNUAL REPORT
(July 1, 2011 - June 30, 2012)

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
April 2013

2011-2012 ANNUAL REPORT
MPWMD MITIGATION PROGRAM
WATER ALLOCATION PROGRAM EIR

April 2013

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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 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).

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 several general 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 the 2012 mitigation plan.

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 2011-2012 Annual Report for the MPWMD Mitigation Program responds to these requirements. It covers the fiscal year period of July 1 through June 30. It is notable that hydrologic data and well reporting data 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 2011-2012 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 2011-2012 (July 1, 2011 through June 30, 2012, 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 mentioned 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 2011-2012 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

In general, the Carmel River environment is in better condition today than it was in 1990. 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 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 21 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 fish and frogs. 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. Stream bank 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, based on 2008 survey data. Usable storage in San Clemente Reservoir, 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 2012, DWR has seasonally required Cal-Am to lower the water level in San Clemente Reservoir from 525 feet to 514 feet elevation, which is too low for water-supply use. Cal-Am had proposed a dam seismic strengthening program. State and federal environmental agencies 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 now supports 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 is scheduled to begin in 2013 with construction of a new access road and placement of the river diversion pipeline.

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 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 on August 14, 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 to help reduce current 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 explored by various entities. These projects, now 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 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 2011-2012 included: (1) completion of the electrical facilities for the Phase 1 ASR Project at the Santa Margarita site; (2) construction of the second ASR well at the second (Phase 2 or Water Project 2) ASR site; (3) receiving permanent water right 20808C for Phase 2 of the ASR project; (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, District staff has noticed a period of general decline in the adult run from 2001 to 2012. 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, slightly above the 1994-2012 average of 431 adults.

Previous redd surveys below SCD confirm that the spawning habitat in the lower river has improved considerably over the last 21 years and adults are spawning in the lower river 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. The District deployed a DIDSON counting station, acquired from CDFW grant funding, during the 2011-2012 migration season in the lower river to help determine whether more adults are in fact spawning in the lower river.

At present, the exact reasons for this period of apparent decline in adult returns at SCD are not clear, but 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;

- 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;

- 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, 2009, 2010 and 2011 affecting subsequent adult populations;

- Variable ocean conditions; and the

Ongoing but limited impacts of legal fishing (i.e., approximately 0.5 - 1.5% incidental mortality associated with catch-and-release fishing for adults in the winter season, and fishing for juvenile steelhead from in the upper watershed during the spring/summer trout season may slightly reduce the adult spawning stock or the number of juvenile fish that reach the ocean), as well as illegal poaching activities.

- **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 2011-2012 reporting period, the average population density was well below the long-term average of 0.81 fpf for the Carmel River due primarily to low adult returns in 2009-2010.

  District staff believes the recovery and fluctuation of the juvenile steelhead population in the Carmel River Basin is directly related to the following 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 Cal-Am'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 23 years, now totaling 366,873 fish through 2011;

  - Rearing and releases of rescued fish from the SHSRF of nearly 82,000 juveniles and smolts back into the river and lagoon over the past 16 years, at sizes larger than the river-reared fish, which in theory should enhance their ocean survival;

  - 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;

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

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

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 possible removal of the dam. The most significant issue is the effect of released sediment from the reservoir on downstream river habitat, proper functioning of MPWMD's SHSRF, and downstream property owners (flood elevations). Major changes include:

- Lowering of the reservoir water level to address seismic safety concerns;
- Significant changes in the sediment regime in the Carmel River downstream of San Clemente as the dam fills with sediment; 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 Cal-Am engineers and environmental consultants, DWR/DSOD, CDFG, NMFS, U.S. Fish and Wildlife Service, and others involved in addressing the resource management issues associated with seismic retrofit of San Clemente Dam. 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, and Carmel Area Wastewater District, 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 the streamside area between the Rancho Cañada golf courses and Quail Lodge area has been consistently impacted by groundwater

extraction. In this reach, only irrigated areas are able to sustain a diversity of plant species. Plant stress in the late summer and fall is evident in non-irrigated portions of the riparian zone. 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.

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. Areas that were repaired after the 1995 and 1998 floods are still developing these natural features. In part, the location and geometry of the projects constrain the rate of progress toward a fully restored stream channel (i.e., several are located in highly developed, narrow sections of the river impacted by groundwater extraction). Also, many of these projects relied heavily on the use of bank hardening (e.g., rip-rap) to stabilize banks, which can discourage plant vigor and diversity.

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

- Increased oversight of channel maintenance and restoration activities by Federal agencies,
- Groundwater extraction downstream of Schulte Road,
- Vegetation encroachment into the channel bottom,
- High avian species diversity values, and
- Maturing of previous restoration projects.

Carmel River Erosion Protection and Restoration

With the exception of the channel area between Via Mallorca Road and Rancho San Carlos Road, streambanks in the Carmel River main stem presently appear to be relatively stable during average water years.

As cited in previous reports, it is likely that the following trends will continue or develop in the near future:

- Permit applications by MPWMD for river maintenance and restoration work will come under greater scrutiny at all levels of governmental oversight. More stringent avoidance and mitigation requirements will 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, may be discouraged or denied permits. Activities that increase the amount of habitat or restore natural stream functions are more likely to be approved.
- Additional work to add instream features (such as large logs for steelhead refuge or backwater channel areas for frogs) will be necessary to restore and diversify aquatic habitat.
- Major restoration projects completed between 1992 and 1999 will require additional work to diversify plantings and to maintain irrigation systems during the establishment

period (which varies from 5 to 10 years, depending on environmental conditions and the availability of staff resources).

- Downstream of the Robinson Canyon Road Bridge, the river will continue to cut into the channel bottom and form a more complex system of pools, riffles and gravel bars.

A noticeable change to the channel bottom is the obvious continued degradation (i.e., the river channel is incising into floodplain deposits). Downcutting into channel deposits has both positive and negative aspects. On the plus side, it is clear that sand and fine material has been winnowed out in the past few years, exposing gravel and cobble layers that provide improved spawning habitat for steelhead and suitable substrate for the food web that steelhead depend on. However, a lack of a natural supply of sediment from the upper watershed (due to the presence of main stem dams) means that the river must remove material from the channel bottom and streambanks to make up for this deficit. The river system downstream of Los Padres Reservoir remains "sediment starved."

Because approximately 35% of the streambanks downstream of Carmel Valley Village have been altered or hardened over the past 40 years, most of the current sediment supply comes from scouring of the channel bottom, which results in exposing the base of streambanks, bridge piers and abutments. Eventually, without corrective measures to balance the sediment load with the flow of water, streambanks will begin to collapse and the integrity of bridges will be threatened.

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 with increasing summer low flows and in identifying areas where restoration of a natural meander pattern could be considered. Reversal, or at least halting, of channel incision may be possible if the supply of sediment is brought into balance with the transport capacity of the river. Although the supply of sediment to the lower portion of the river may increase as San Clemente Reservoir fills with sediment and sediment starts to flow down the river, it is likely that the supply of sediment downstream of the San Clemente Dam will increase slowly in the very near future, but may not be enough to halt the incision process.

The DWR and the U.S. Army Corps of Engineers finalized a combined EIR/EIS in January 2008 concerning alternatives to remediate the safety deficiencies that have been identified at San Clemente Dam. Cal-Am withdrew its application to the Department of Water Resources to buttress the dam and now supports an alternative in which the dam would be removed and the Carmel River would be rerouted around the existing reservoir sediment field. Funding for this alternative remains uncertain, but the collaborative public-private partnership between Cal-Am, the California Coastal Conservancy, and NOAA Fisheries has made significant steps toward full funding. Completion of this project in the next several years could affect the timing of the delivery of sediment to the lower river. In the interim, DWR has continued to direct Cal-Am to draw San Clemente Reservoir down and maintain it 10 feet lower than the spillway, except between February 1 and May 31 (to allow for downstream migration of steelhead).

Over the long term, an increase in sediment supply downstream of San Clemente Dam could help reduce streambank instability and erosion threats to public and private

infrastructure. However, reestablishing a natural supply of sediment and a natural meander pattern across the valley floor in the lower 15.5 miles of the river presents significant political, environmental, and fiscal challenges, and is not currently being considered as part of the Mitigation Program.

Vegetation Restoration and Irrigation

To the maximum extent possible, MPWMD-sponsored river restoration projects incorporate a functional floodplain that is inundated in relatively frequent storm events (i.e., 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. However, as pumping has increased in the lower Carmel Valley (pursuant to direction by the SWRCB and a Conservation Agreement between Cal-Am and NMFS) supplemental irrigation has been installed on engineered floodplains and on vulnerable banks.

Channel Vegetation Management

Another notable trend relating to the District's vegetation management program was the widening of the channel after the floods in 1995 and 1998. With relatively normal years following these floods, the channel has narrowed as vegetation recruits on the streambanks and gravel bars. Current Federal regulations such as the Endangered Species Act (ESA) "Section 4(d)" rules promulgated by NMFS to protect steelhead significantly restrict vegetation management activities. Currently, vegetation is slowly encroaching 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

To cope with the rising level of environmental analysis and documentation necessary to obtain permits, MPWMD sought and obtained a long-term permits from the Corps and the California Regional Water Quality Control Board for routine maintenance and restoration projects. The District operates under a Regional General Permit from the Corps (obtained in 2004). However, this permit expired November 1, 2010 and the District is currently in the process of renewing it. In addition, the District has a Routine Maintenance Agreement with CDFG (obtained in 2008).

Monitoring Program

Vegetative moisture stress fluctuates depending on the rainfall, proximate stream flow, 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 along the lower seven miles of the 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 during dry years. 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. However, they have rebounded in the last few years and have fluctuated within a normal range since monitoring began in 1992, indicating that the District mitigation program is preserving and improving riparian habitat.

Integrated Regional Water Management Plan

Consistent with the Mitigation Program goal of comprehensive resource management, the District is serving as the lead agency to update and implement the Integrated Regional Water Management Plan (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. This cooperative effort has resulted in increased state and federal grant funding for solutions to augment the Mitigation Program efforts. MPWMD secured a $496,957 grant from the California Department of Water Resources (DWR) for 2007 Plan, which cost a total of about $1,258,000 to prepare. In FY 2010-2011, MPWMD facilitated stakeholder meetings and prepared a grant application that was submitted to DWR. Subsequently, MPWMD was awarded an additional $995,000 to update the IRWM Plan to Proposition 84 standards. In FY 2011-2012, MPWMD facilitated stakeholder meetings and worked on: Project 1 – Update to the Canyon Del Rey Drainage Plan; Project 2 – Seaside Groundwater Basin Salt and Nutrient Management Plan; Project 3 – Assessment of Steelhead Passage Barriers in Portions of Four Tributaries to the Carmel River Main Stem; Project 4 – Geographic Information Systems Internet Mapping Site Development; Project 6 – Assessment for San Jose Creek Watershed; and Project 8 – Development of a Surface and Groundwater Model for the Carmel Valley Basin. 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 addition, MPWMD facilitated the expansion of the Regional Water Management Group (RWMG) to include the Marina Coast Water District (MCWD) in order to continue the development and implementation of the IRWM Plan in the Ord Community. The RWMG is comprised of representatives of the Big Sur Land Trust, City of Monterey, Monterey County Water Resources Agency, Monterey Regional Water Pollution Control Agency and MPWMD. The RWMG executed a Memorandum of Understanding concerning implementation of the IRWM Plan in 2008. The MOU was amended in 2012 to include MCWD as part of the RWMG.

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 ground water 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 17-year period to date, for example, there have been two Extremely Wet (1995, 1998), two Wet (2005, 2006), five Above Normal (1996, 1997, 2000, 2010, 2011), and five Normal Water Year types (1999, 2001, 2003, 2008, 2009), in terms of total annual runoff. Thus, the hydrology of the watershed has been wetter than average 53% of the time, and at least normal or better 82% of the time during that period. 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 draw-down effects on wetland dynamics. It is recommended that the annual 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 1994-2012 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.

Program Costs

Mitigation Program costs for FY 2011-2012 totaled approximately $4.59 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 2011-2012 were $1.25 million less than the prior fiscal year largely due to capital expenditures for ASR. However, the overall costs have remained fairly constant (average of $3 million per year) for last five years. More recently, expenditures have trended upward due to expenditures for the Aquifer Storage and Recovery Project. FY 2009-2010 expenditures were $3.27 million; and FY 2010-2011 expenditures were $5.84 million.

During FY 2011-2012, revenues totaled $3.31 million including mitigation program revenues, tax revenues, reimbursements, interest and miscellaneous revenues. The Mitigation Program Fund as of June 30, 2011 had a deficit balance of ($488,632).

Table I-1

SUMMARY OF COMPONENTS OF MPWMD MITIGATION PROGRAM
July 1, 2011 - June 30, 2012

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
- Build 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 are being implemented by CalTrans as part of a "mitigation banking" project.

Table I-2
Summary of MPWMD Mitigation Program Accomplishments in 2011-2012

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS IN FY 2011-2012
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 and computer-monitoring 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	Inspected about 1,320 properties, which will save an estimated 9.287 acre-feet of water per year (AFY) through required retrofits. The Rebate Program was suspended for lack of funding for fiscal year 2011-2012. From July 1, 2011, through June 30, 2012, a total of **39** applications for rebates were received, one application was approved with the use of rebate refund. Staff conducted public outreach for conservation program. Implemented Ordinance No. 109 enabling sale of water entitlements to properties within Del Monte Forest to fund expanded Pebble Beach reclamation program; implemented Ordinance No. 132 to allow expansion of the Cal-Am System to provide service and water-use permits for Sand City.
Monitor Water Usage	Complied with SWRCB Order 95-10 for Water Year 2012.
Augment Water Supply	Long-term efforts to augment supply included: (1) Continued participation in the CPUC rate hearing process to review elements of the Regional Water Project (RWP); (2) Participated in "alternative dispute resolution" meetings intended to resolve concerns about RWP construction, operations, financing, management and oversight; (3) Prepared written testimony opposing RWP Water Purchase Agreement due to lack of accountability to the public and participated in CPUC hearings; (4) Operated Aquifer Storage and Recovery (ASR) Phase 1 project from December 2011 through May 2012, and injected 132 AF; (5) drilled initial ASR Phase 2 test injection well Seaside Middle School site; (6) obtained a long-term easement

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS IN FY 2011-2012
	agreement with Monterey Peninsula Unified School District for extended production wells; (7) Held regular coordination meetings with Cal-Am regarding needed infrastructure upgrades to deliver water supply to the ASR Phase 2 wells at full capacity; (8) Completed feasibility analysis for Desal Plant located on the Naval Postgraduate School site. (9) Provided technical support to the Monterey Regional Water Pollution Control Agency (MRWPCA) for its Groundwater Replenishment Project (GRP) and received presentation by MRWPCA, (10) Participated in CPUC hearing process on Cal-Am related rate requests. Near-term water supply efforts included injecting 132 AF into Seaside Basin in 2011-2012 as part of ongoing ASR operations. 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	During the 2011 dry season, June through September, a total of 7,713 steelhead were rescued from five Carmel River tributaries by the Carmel River Steelhead Association (CRSA), including 7,480 YOY, 233 yearlings, with 218 (2.8%) mortalities. The majority of the rescued fish were from Cachagua/Finch Creeks (5,995), with lesser numbers from Garzas Cr (616), Robinson Canyon Cr. (363), Hitchcock Canyon Cr. (694), and Potrero Cr. (45). The CRSA did not do any mainstem rescues in 2011. District staff has noticed a period of general decline in the adult run from 2001 to 2012. However, in 2009 and 2010, the population underwent a dramatic reduction to 95 and 157 adults respectively. In 2012, the population rebounded again with 470 adults passing over SCD, slightly above the 1994-2012 average of 431 adults.

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). The District currently maintains precipitation, streamflow, storage, water level and water quality monitoring programs. These programs and the activities to implement them for Water Year 2012 (October 1, 2011 through September 30, 2012), are summarized below.

A. Precipitation Monitoring

Description and Purpose

During the period from October 1, 2011 through September 30, 2012, 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 (maintained by R.J. Renard). 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 2011-2012

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) 2012 is shown in **Figure II-1**. The average annual recorded precipitation at this site for the period from 1922 through 2012 is 21.37 inches. In WY 2012, 13.94 inches of precipitation were recorded at SCD, which is 65 percent of average.

Figure II-2 shows a comparison of WY 2012 rainfall at SCD and the average monthly rainfall at this site. As indicated in **Figure II-2,** below average rainfall occurred each of the four months over the November through February period. Rainfall over this four-month period was 39 percent of average which set the stage for a "dry" water year. Although March and April 2012 received above-average precipitation, the rainy season ended abruptly in mid-April, and ultimately classified as a "critically dry" rain year (85% exceedence, or total rainfall in WY 2012 would statistically be equaled or exceeded in 85

out of 100 years). It should be noted that, the December 2011 monthly rainfall total of 0.10 inches was the third driest on record at SCD. The highest daily rainfall total was 2.13 inches on January 21, 2012 as shown in **Figure II-1.**

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 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 ground water 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 2011-2012

During the 2011-2012 period, the District operated and maintained (O&M) 16 streamflow gaging stations within the Carmel River Basin/District Boundary. In addition, continuous water-level data were collected at both Los Padres and San Clemente Reservoirs, and at the Carmel River Lagoon. The District continuous recording gaging stations are listed below:

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

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 for the District sites for the WY 1992-2012 period, except for several tributary sites (WY 2009-2012) which have yet to be computed. In addition, **Table II-1** includes annual flow values for the two mainstem sites operated by the U.S. Geological Survey (USGS) for the 1992-2012 period.

During the 2011-2012 period, District staff continued to maintain the existing streamflow monitoring network. Streamflow within the Carmel River Basin during WY 2012 was classified as "dry". 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 2012, 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 gage locations:

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

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

- **Summary of Streamflow Conditions --** Streamflow during WY 2012 within the Carmel River (CR) Basin was classified as "dry". The highest peak streamflow event of the year along the CR occurred on April 13, 2012, and reached 231 cfs and 207 cfs at the CR at Don Juan Bridge and CR at Highway 1 Bridge gage sites, respectively.

During WY 2012, 20,025 acre-feet (AF) of unimpaired runoff were estimated at San Clemente Dam. This total represents 29% of the average annual runoff (68,800 AF) expected at San Clemente Dam. This runoff provided streamflow to the ocean for a brief one-week period from January 22 - February 1, 2012. Over the February 1 – March 18 period, and lagoon mouth was closed with the exception of three distinct openings lasting about one day each. As a consequence of the dry water year, a sustained period of open lagoon mouth conditions did not occur until mid-March. The lagoon mouth generally remained open (with a few periodic mouth closures) between March 18 and May 18, 2012, before it closed for the remainder of the dry season.

C. Carmel River Lagoon Water-Level Monitoring

Description and Purpose

Since 1987, the District has monitored the level of surface water in the Carmel River 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 Game, Monterey County Water Resources Agency (MCWRA), Monterey County Public Work Department 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 2011-2012

During the 2011-2012 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.

The monthly plot for March 2012 shown in **Figure II-4** illustrates the most significant lagoon opening of WY 2012. Although the first "storm driven" lagoon opening of the water year occurred on January 22, 2012, one week later on February 1, the lagoon mouth closed for the next six-weeks with only three brief one-day openings. On March 18,

2012, a 2-3 inch rainstorm in the Carmel River (CR) Basin prompted the Monterey County Public Works Department to open the lagoon mouth to the ocean, as storm runoff of approximately 100 cfs along the CR advanced toward the lagoon. Following the March 18 event, the lagoon mouth generally remained open to the ocean until May 18, 2012 when beach berm sands sealed off the lagoon mouth for the remainder of WY 2012.

U:\mpwmd\Allocation\RY11\RY 11 Report - Place your Files in This folder\II Precipitation, Streamflow, Lagoon Water Level Monitoring

Figure II-1
San Clemente Reservoir Daily Rainfall: Water Year 2012

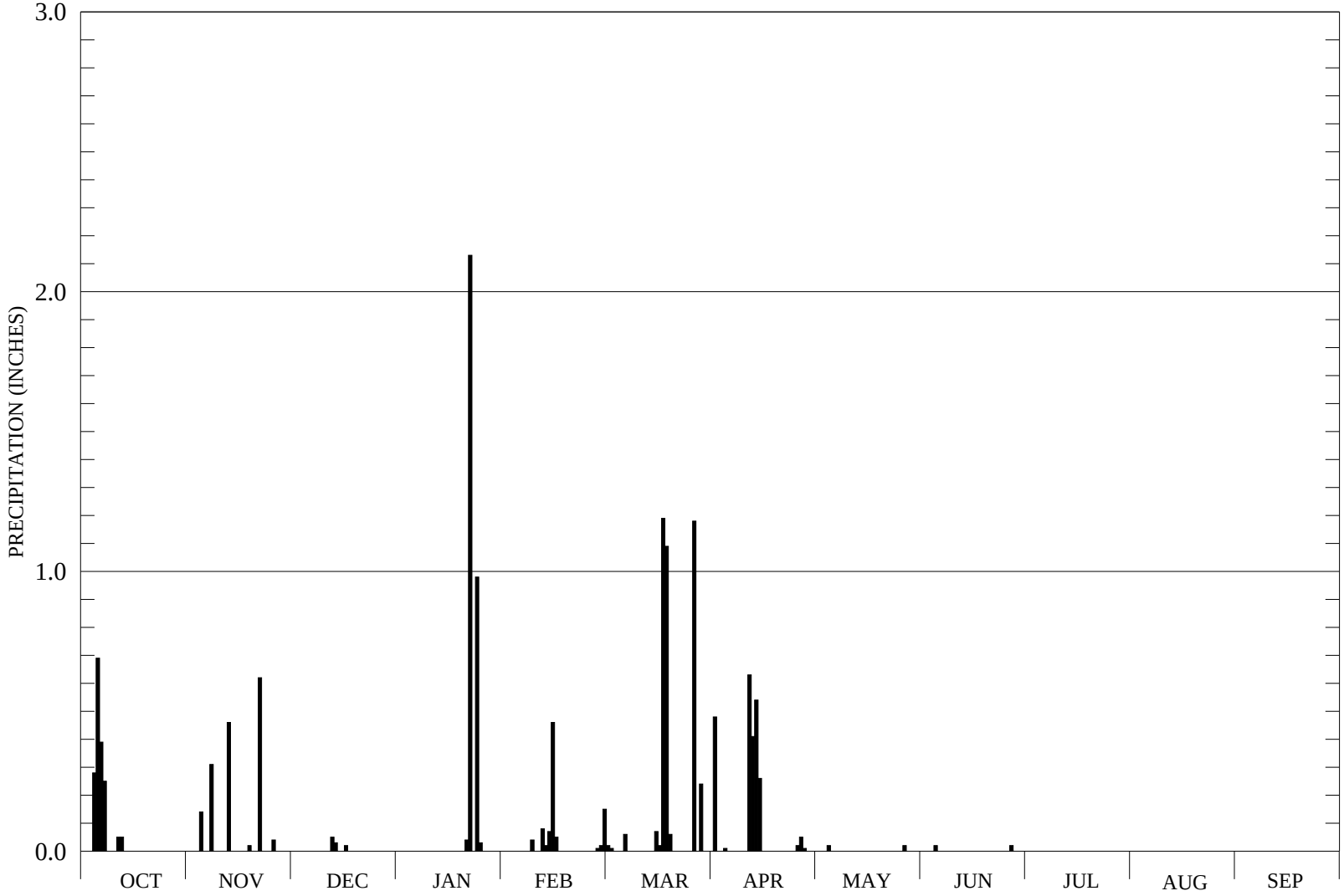


Figure II-2
Monthly Distribution of Rainfall at San Clemente Reservoir
Water Year 2012 Compared to 1922-2012 Long-Term Average

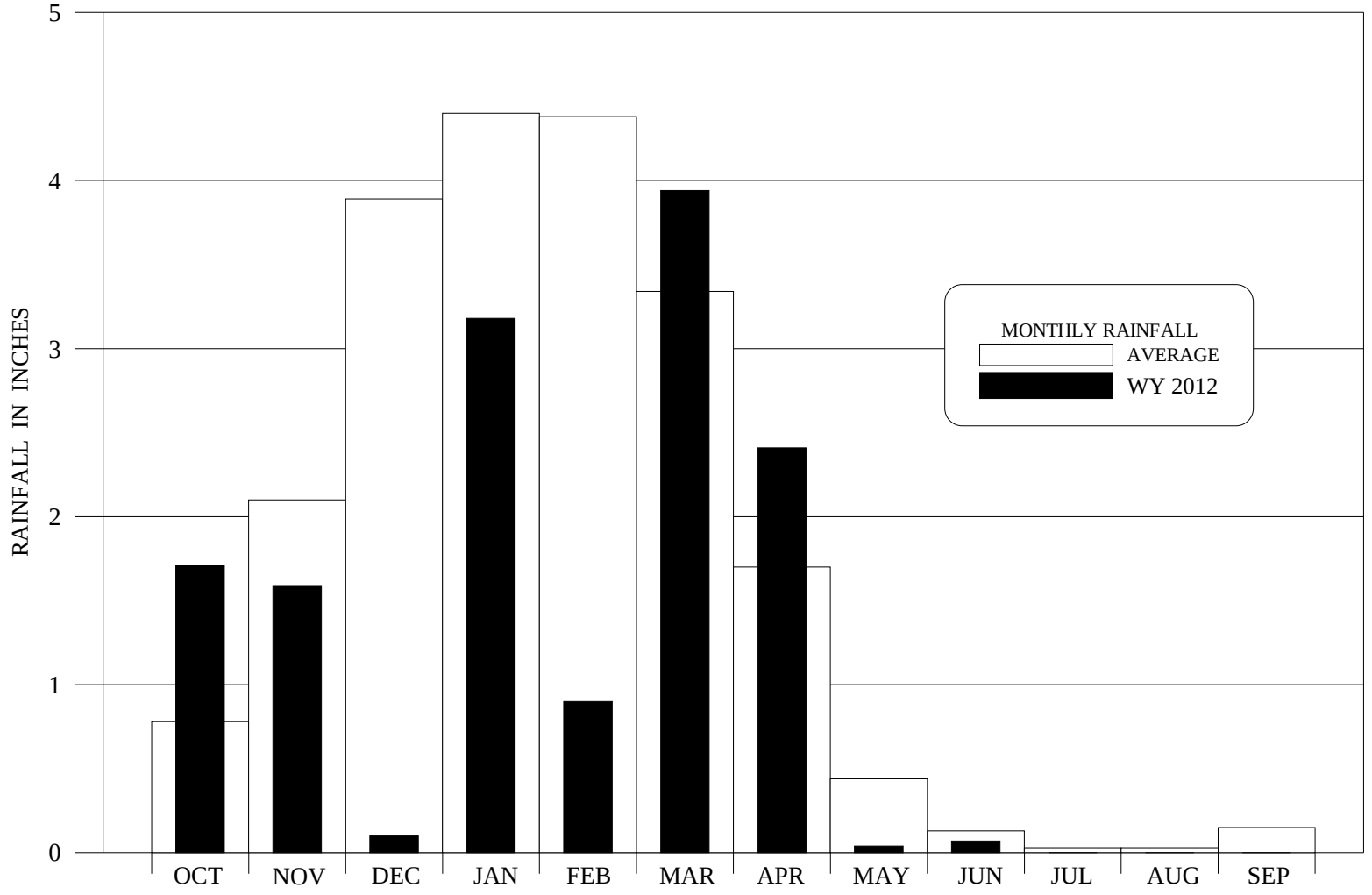


Figure II-3
Carmel River Basin Principal Streamflow Gaging Stations

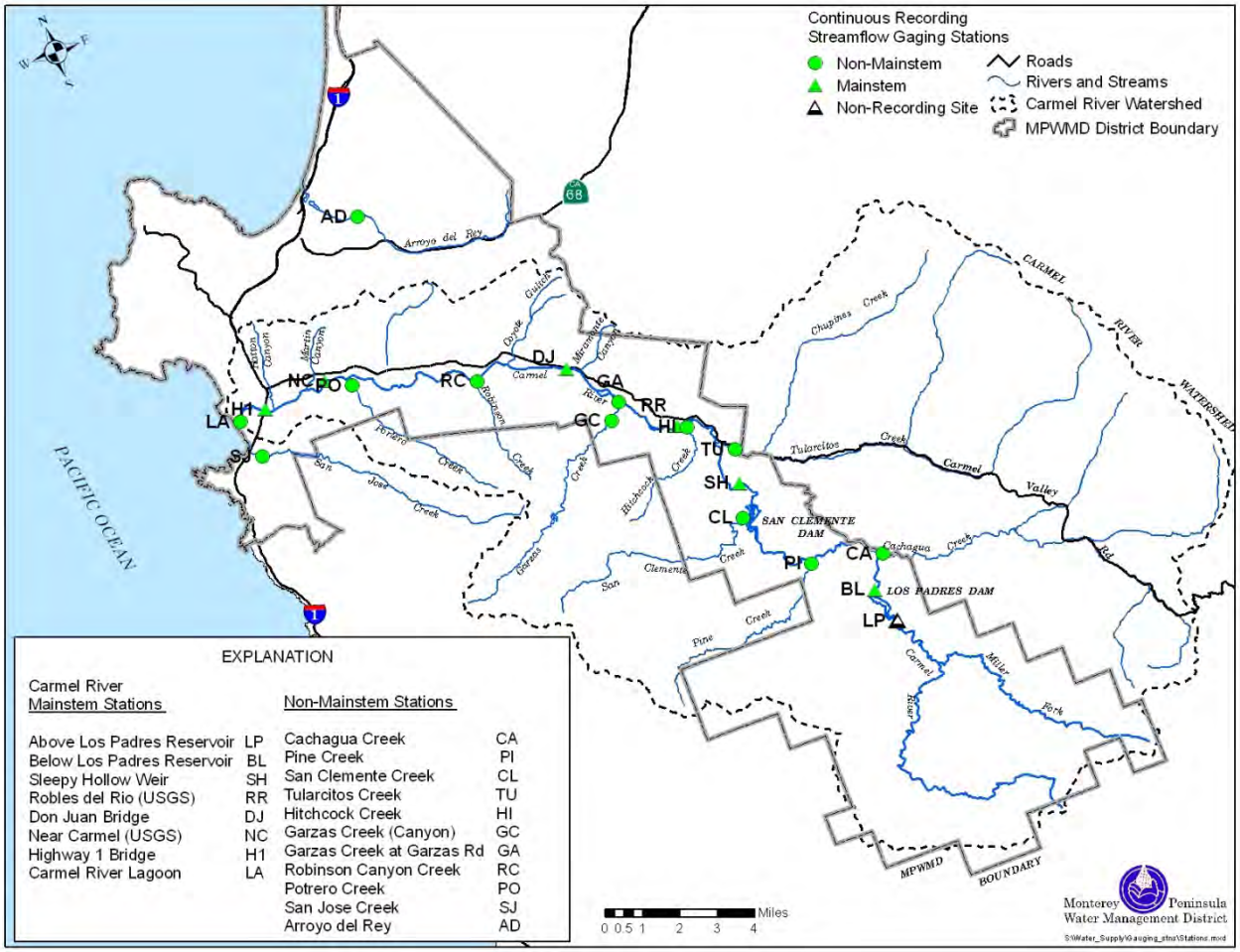
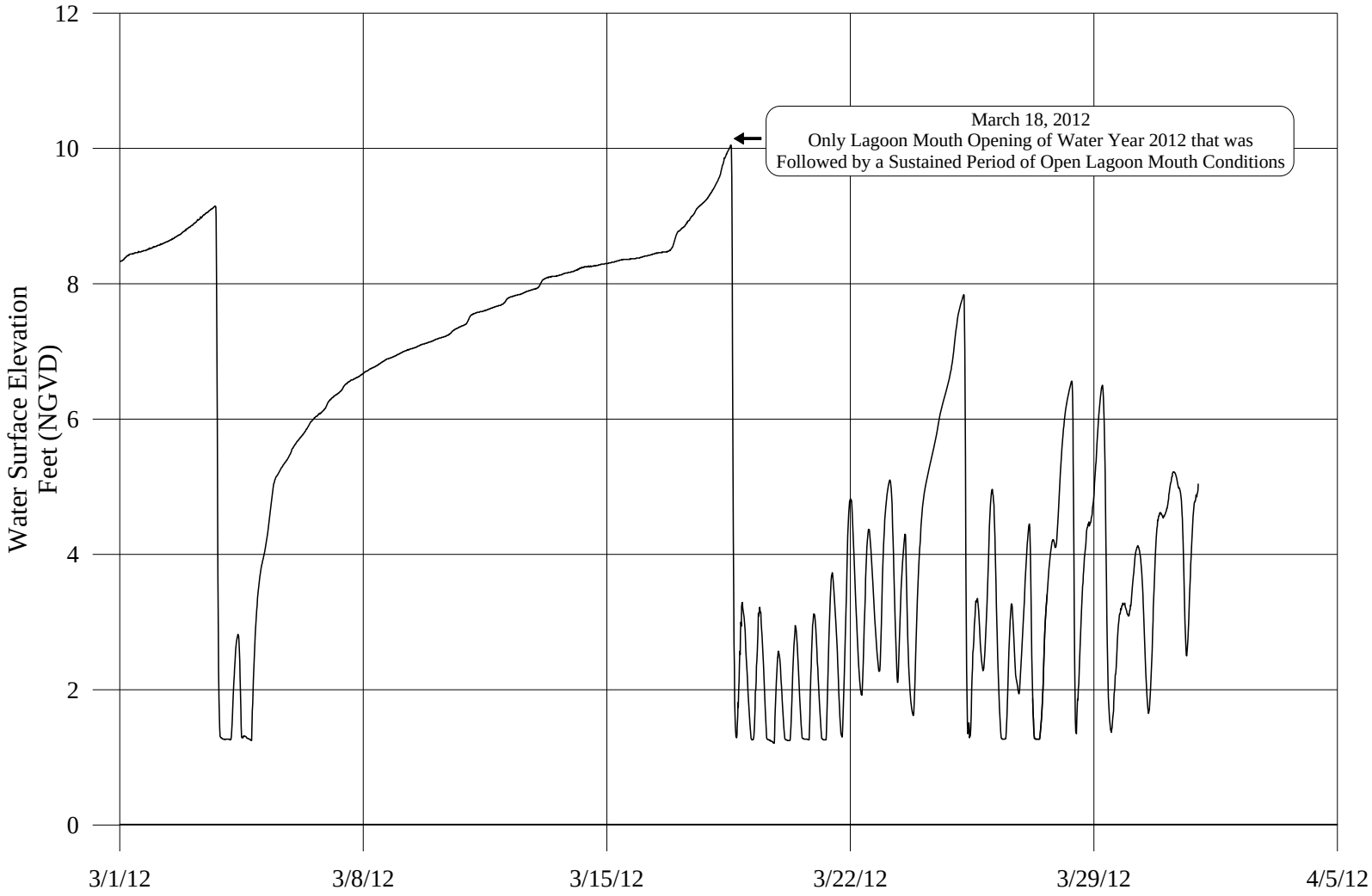


Figure II-4
Carmel River Lagoon Water Level



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 a way of measuring 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 2011-2012

District staff carried out a semi-monthly surface water quality sampling program for the Reporting Year (RY) 2012 (July 1, 2011 to June 30, 2012); 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 (uS/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 2012 (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 2012. Staff continues to apply adaptive strategies to correct these difficulties. During RY 2012, all data collected at this water-temperature station were unreliable, and therefore have not been reported. Water-quality data collected at the CRL station, which is located on the south side of the main body of the lagoon, were reliable and are listed in **Table III-1**. Maximum water temperature during water-quality sampling was 67.6°F, occurring on September 9, 2011. The minimum dissolved-oxygen measurement recorded was 6.2 mg/L, which is within the suitable criteria recommended by the Environmental Protection Agency (EPA) for steelhead (Chapman, 1986). The pH measurements ranged from 7.5 to 8.0, which is also within suitable range. Carbon dioxide measurements ranged from 10 to 20 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 135 to 35,000 uS/cm. The surface salinity ranged from 0.2 to 28.5 ppt. The conductivity and salinity are highly variable at the lagoon due to tidal influences and river inflows. The turbidity measurements ranged from 0.1 to 6.0 NTU. Overall, the biggest threat to steelhead rearing continues to be the high salinity readings that occur in in the lagoon, severely reducing the amount of rearing habitat that is adequate for juvenile steelhead in the late summer and fall months, coupled with the constant sub-optimal water temperatures during this period.

- **Garland Park--** Water temperature for the Garland Park (GAR) station is shown in **Figure III-2**. Data for this site during the period of August 11, 2011 to October 26, 2011 were air temperatures and are not included in the summary statistics provided below. The sampling period that is included is July 1, 2011 to August 10, 2011 and October 27, 2011 to June 30, 2012. The maximum annual water temperature was 69.7°F, occurring on July 30, 2011. The overall average water temperature during the reporting year at this station was 54.9°F. Maximum daily average water temperature was 65.1°F, occurring on July 3, 2011. 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-3**. The sampling period for this station was July 1, 2011 to June 30, 2012. The maximum annual water temperature was 68.9°F, occurring on July 7, 2011. The overall average water temperature during the reporting year at this station was 55.3°F. The maximum daily average water temperature was 67.3°F, occurring on July 7, 2011. Constant water temperatures over 68°F are considered stressful for steelhead (Brungs and Jones, 1977). Daily average water temperatures were within adequate range for steelhead rearing during the entire sampling period. The Water-quality data collected at this station are listed in **Table III-2**. The minimum dissolved-oxygen measurement recorded was 8.4 mg/L, which is within the suitable criteria recommended by the EPA for steelhead (Chapman, 1986). Carbon-dioxide measurements ranged from 5 to 15 mg/L. The pH measurements ranged from 7.5 to 8.5. The conductivity measurements ranged from 138 to 251 uS/cm. The turbidity measurements recorded were between 0.1 to 3.2 NTU. Water-quality parameters measured were within the adequate range for steelhead rearing during the sampling period, with the exception of the July water temperatures mentioned above.

- **Above San Clemente Reservoir--** Water temperature for the Above San Clemente (ASC) station is shown in **Figure III-4**. The sampling period for this station was July 11, 2011 to June 30, 2012. The maximum annual water temperature was 67.4°F, occurring on June 17, 2012. The overall average water temperature during the reporting period at this station was 54.7°F. Maximum daily average water temperature at this station was 64.8°F, occurring on September 11, 2011. 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-5**. The sampling period for this station was July 1, 2011 to June 30, 2012. The maximum annual water temperature observed was 68.4°F, occurring on July 6, 2011. The overall average water temperature observed at this station during the sampling period was 55.5°F. The maximum daily average water temperature at this station was 67.2°F on September 28, 2011. Daily average water temperatures were within adequate range for steelhead rearing during the entire sampling period. Water quality data collected at this station are listed in **Table III-3**. Water quality at this station is highly influenced by reservoir water quality and release location. The minimum dissolved oxygen measurement recorded was 6.7 mg/L, which is within the suitable criteria recommended by the EPA for steelhead (Chapman, 1986). Carbon dioxide measurements ranged from 5 to 20 mg/L. The pH and conductivity measurements ranged between 7.5 to 8.0 and 122 to 245 uS/cm, respectively. Turbidity measured at this station ranged from 0.2 to 4.8 NTU. Water-quality

parameters measured were within the adequate range for steelhead rearing during the reporting year.

- **Above Los Padres Reservoir--** Water temperature for the Above Los Padres (ALP) station is shown in **Figure III-6**. The maximum annual water temperature was 65°F, occurring on June 17, 2012. Average water temperature during the reporting period was 52°F. Maximum daily average water temperature at this station was 64°F, occurring on July 7, 2011. Daily average water temperatures were within the adequate range for steelhead rearing during the entire reporting year.

CONCLUSIONS AND/OR RECOMMENDATIONS:

Water-quality conditions at all stations in the mainstem Carmel River for RY 2012 were within adequate ranges for steelhead rearing. Even though Water Year 2012 was characterized as a "dry" hydrologic year, water temperatures were relatively cooler, and no sample sites observed average daily water temperatures above 68^{o}F. Water-quality conditions in the Carmel River Lagoon during the late summer and fall months (July through October) are 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 2012, salinity readings for this period are commonly stratified and increase with depth (**Appendix III-1**). The deepest parts of the lagoon ranged up to 20 parts per thousand and above, reducing rearing habitat that is available to juvenile steelhead. Lagoon water temperature frequently was observed within sub-optimal ranges during the course of this period.

Figure III-1
Temperature and Semi-Monthly Water Quality Monitoring Locations in the Carmel River Basin During RY 2012

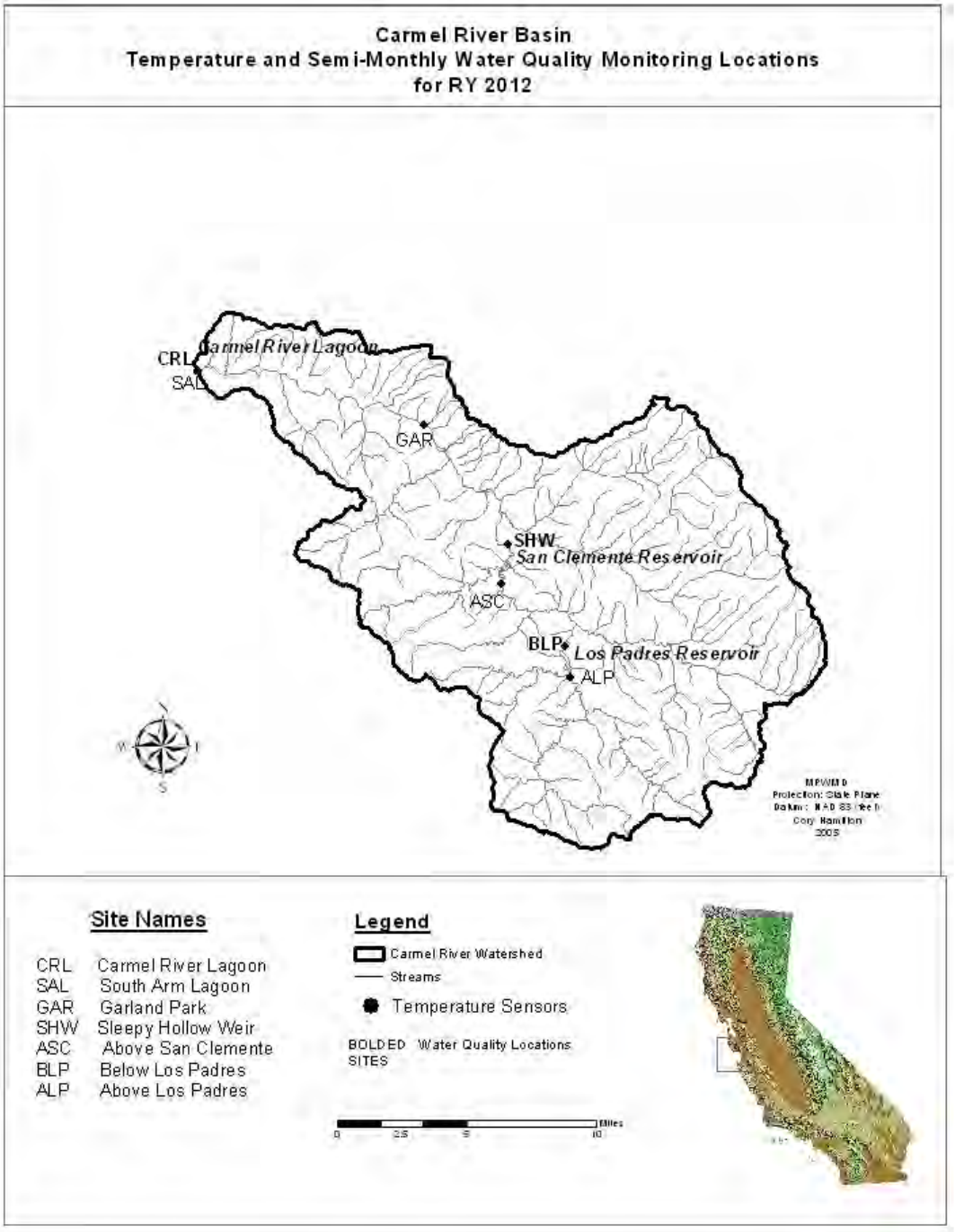


Figure III-2
Daily temperatures recorded from a continuous temperature data logger at the Garland Park (GAR) station during RY 2012

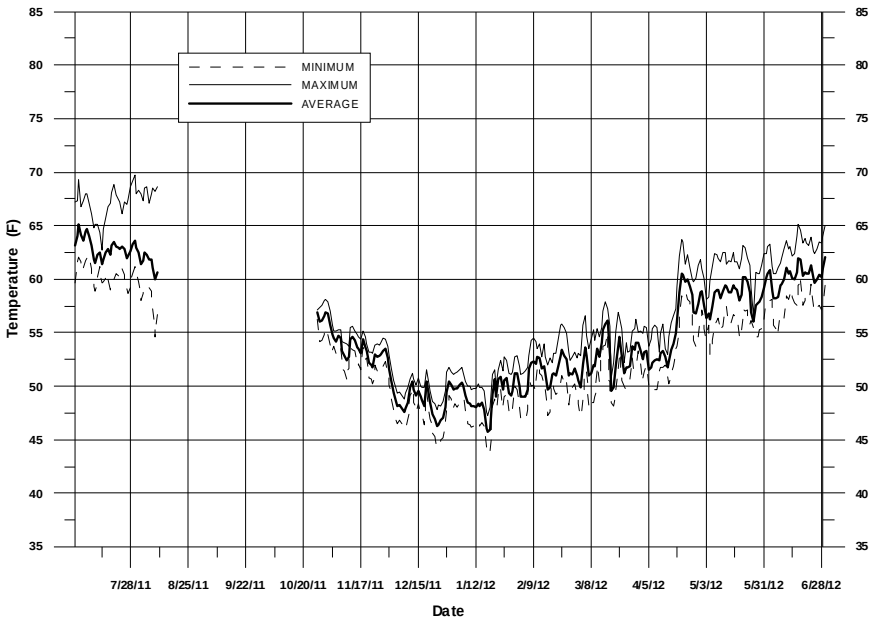


Figure III-3
Daily temperatures recorded from a continuous temperature data logger at the Sleepy Hollow Weir (SHW) station during RY 2012

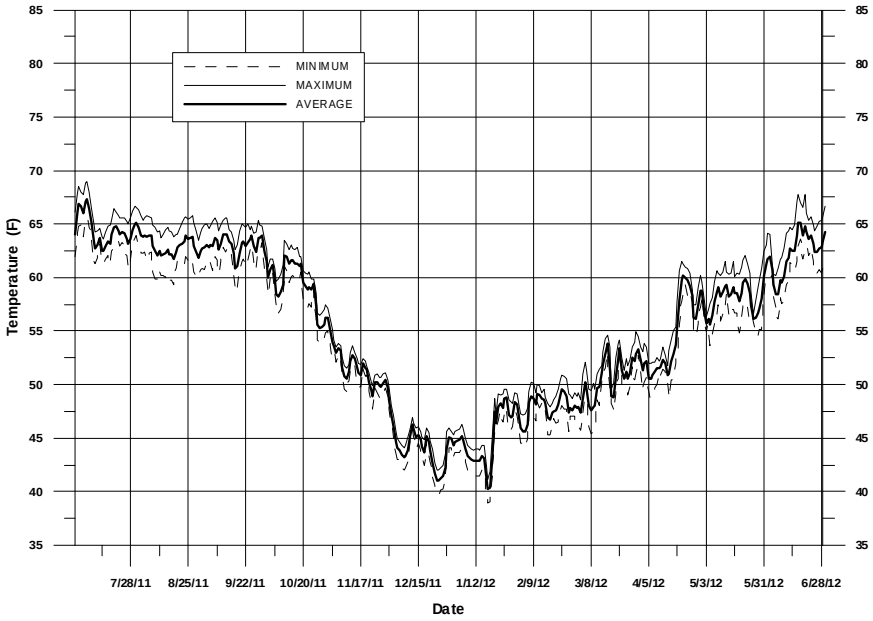


Figure III-4
Daily temperatures recorded from a continuous temperature data logger at the above San Clemente (ASC) station during RY 2012

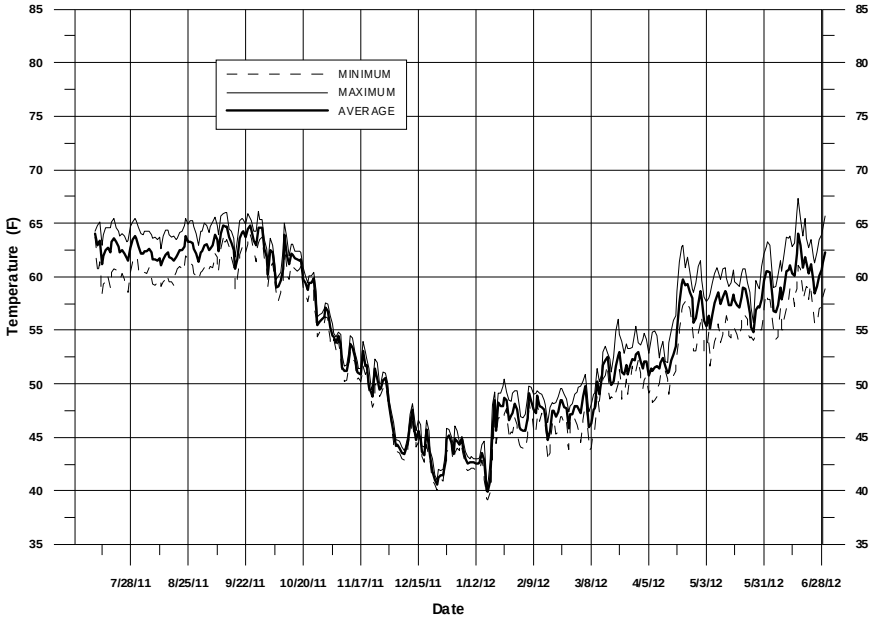


Figure III-5
Daily temperatures recorded from a continuous temperature data logger at the Below Los Padres (BLP) station during RY 2012

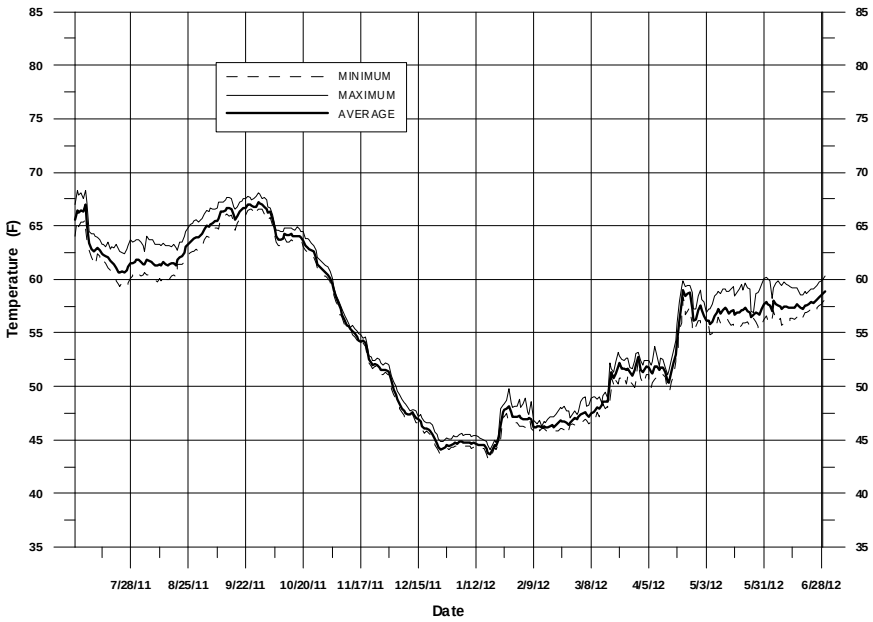


Figure III-6
Daily temperatures recorded from a continuous temperature data logger at the Above Los Padres (ALP) station during RY 2012

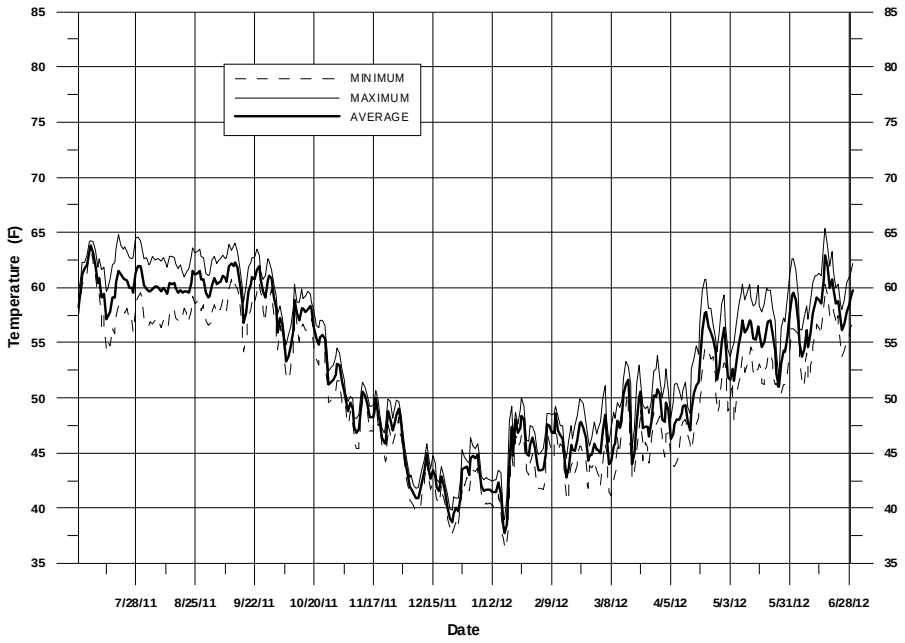


Table III-1
Water-quality data collected by MPWMD during RY 2012 at Carmel River Lagoon (CRL) site.

Date	Time 24 Hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Nacl (ppt)	Turbidity (NTU)	WSE (ft)
7/7/11	1400	58.5	7.8	15	8.0	35000	28.5	0.1	2
8/2/11	0920	63.3	8.6	10	8.0	549	0.3	0.7	6.76
8/24/11	1000	65.8	8.2	10	8.0	558	0.3	0.1	6.06
9/9/11	0945	67.6	8.2	10	8.0	135	0.8	0.6	5.94
9/22/11	0930	62.1	6.2	15	8.0	23860	20.8	6.0	6.98
10/6/11	0930	64.8	11.1	15	7.5	1050	0.6	3.0	7.66
10/20/11	1000	64.8	8.4	15	7.5	1280	0.8	0.3	8.76
11/10/11	0950	52.0	7.5	15	7.5	785	0.5	0.2	9.19
11/17/11	1000	55.0	11.0	10	8.0	738	0.5	0.1	9.8
12/7/11	1020	49.5	9.0	15	7.5	397	0.4	0.3	8.76
12/15/11	1000	47.5	8.4	15	8.0	540	0.4	0.4	9.6
1/4/12	1015	48.7	8.5	15	7.5	789	0.6	0.2	9.9
1/18/12	0930	43.8	8.1	15	7.5	749	0.6	2.6	8.2
2/7/12	1010	51.8	8.1	10	7.5	1268	0.9	0.1	6.68
2/22/12	0951	52.8	8.5	15	8.0	3188	2.3	0.5	5.93
3/6/12	0974	54.0	13.6	20	8.0	4570	3.3	0.8	6.01
3/19/12	0950	49.3	9.2	20	7.5	1964	1.5	4.2	3.4
4/3/12	0950	52.5	9.0	20	8.0	573	0.4	1.8	2.6
4/16/12	1015	54.0	8.9	20	8.0	470	0.3	2.8	2.5
5/9/12	0900	57.2	13.4	20	7.5	1571	0.4	1.0	5.02
5/23/12	0930	66.2	7.6	20	8.0	470	0.3	0.5	6.55
6/5/12	0930	64.4	7.1	20	7.5	433	0.2	0.6	8.16
6/22/12	1048	66.0	8.9	15	7.5	637	0.4	0.6	7.34
Minimum		43.8	6.2	10.0	7.5	135	0.2	0.1	
Maximum		67.6	13.6	20.0	8.0	35000	28.5	6.0	
Average		57.0	8.9	15.4	7.8	3547	2.8	1.2	

Table III-2
Water-quality data collected by MPWMD during RY 2012 at Sleepy Hollow Weir (SHW) station.

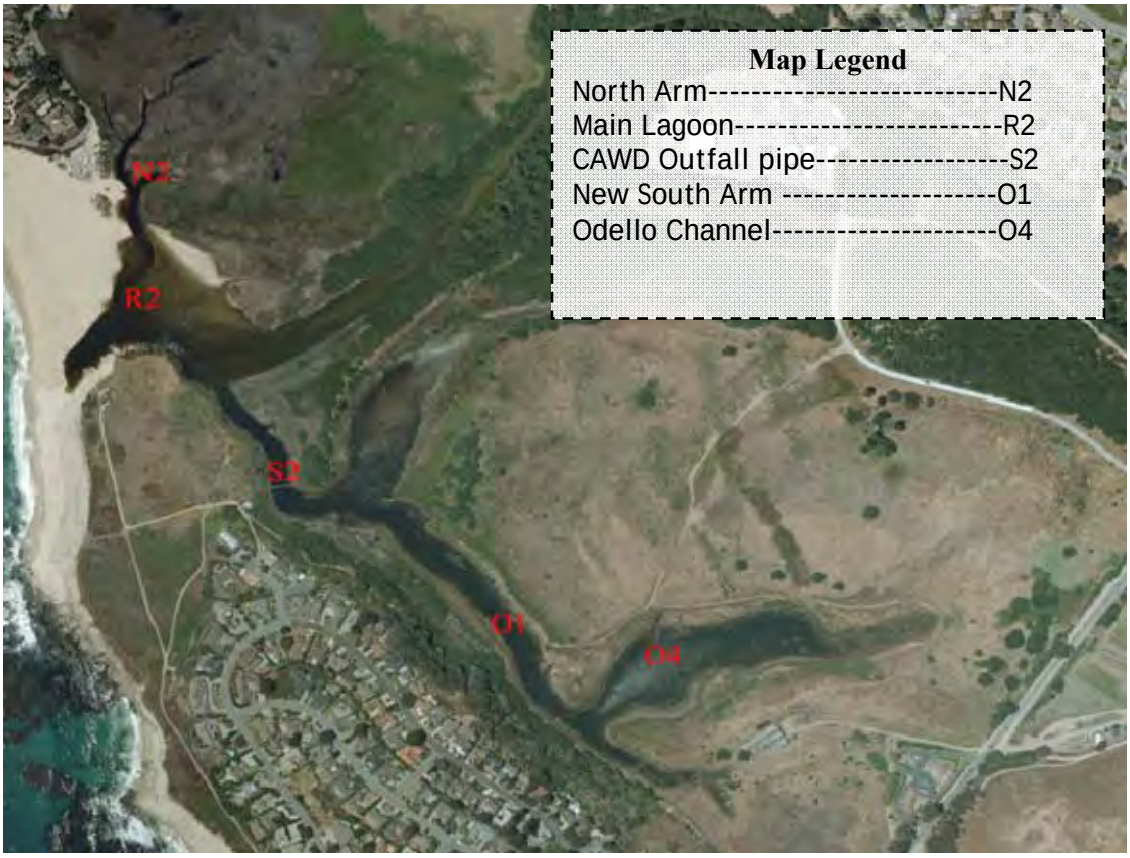
Date	Time 24 hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Turbidity (NTU)
7/7/2011	1100	66.9	8.6	10	8.0	230	0.05
8/2/2011	1050	63.5	8.6	10	8.5	231	0.75
8/24/2011	1110	63.3	8.7	5	8.5	233	3
9/9/2011	1050	65.1	8.7	5	8.0	236	2.6
9/22/2011	1030	68.0	8.4	10	8.0	240	2.7
10/6/2011	1020	59.5	9.0	10	8.0	251	1.7
10/20/2011	1100	62.1	9.3	15	8.0	239	1.4
11/10/2011	1115	50.5	10.2	5	8.0	214	1.75
11/17/2011	1130	52.5	10.4	10	8.0	222	2.06
12/7/2011	1200	45.9	11.6	10	8.0	204	1.92
12/15/2011	1130	45.3	10.4	10	8.0	211	1.98
1/4/2012	1130	44.4	11.4	10	8.5	209	2.77
1/18/2012	1100	39.7	12.8	10	7.5	195	3.2
2/7/2012	1200	48.7	10.0	15	8.0	180	0.36
2/22/2012	1110	49.1	14.6	5	8.0	178	0.12
3/6/2012	1050	50.0	15.4	5	8.0	N/A	0.25
3/19/2012	1120	48.4	9.4	15	8.0	163	0.88
4/3/2012	1130	51.0	10.6	10	8.0	138	0.15
4/16/2012	1130	52.0	9.5	15	8.0	143	0.71
5/9/2012	1010	58.1	9.0	15	8.0	172	0.45
5/23/2012	1145	60.8	9.6	10	8.0	218	0.43
6/5/2012	1050	64.2	8.8	15	8.0	180	0.35
6/22/2012	1256	64.8	9.6	10	8.0	205	0.6
Minimum		39.7	8.4	5.0	7.5	138	0.1
Maximum		68.0	15.4	15.0	8.5	251	3.2
Average		55.4	10.2	10.2	8.0	204	1.3

Table III-3
Water-quality data collected by MPWMD during RY 2012 at Below Los Padres (BLP) station.

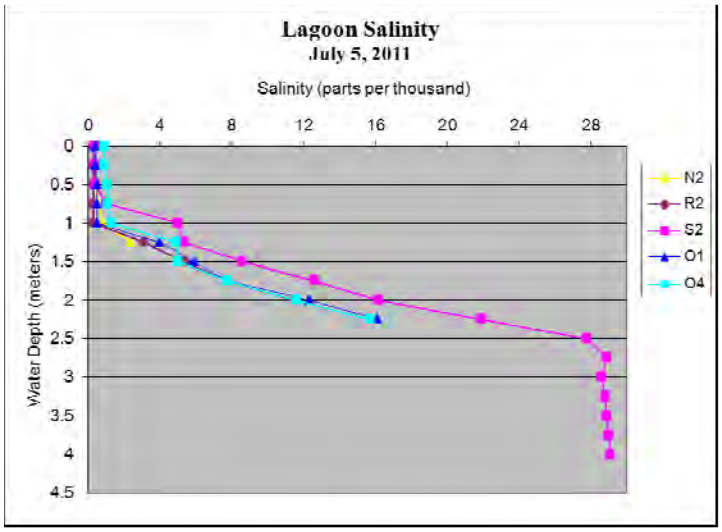
Date	Time 24 hr	Temperature (F)	Dissolved Oxygen (mg/L)	Carbon Dioxide (mg/L)	pH	Conductivity (uS/cm)	Turbidity (NTU)
7/7/2011	0930	68.2	8.4	5	7.5	211	0.15
8/2/2011	1400	65.8	7.7	10	8.0	201	1.2
8/24/2011	1300	66.0	7.6	10	7.5	206	0.96
9/9/2011	1300	61.9	7.3	10	7.5	232	2.9
9/22/2011	1250	62.2	6.8	10	8.0	242	1.1
10/6/2011	1210	59.9	7.9	15	7.5	239	1.7
10/20/2011	1330	59.0	6.7	20	7.5	245	1.6
11/10/2011	1300	56.8	8.4	15	7.5	225	3.18
11/17/2011	1315	50.5	9.0	15	7.5	220	3.1
12/7/2011	1310	43.9	9.3	20	8.0	N/A	2.2
12/15/2011	1330	47.7	9.5	15	7.5	192	1.85
1/4/2012	1350	45.7	9.7	15	7.5	186	1.17
1/18/2012	1230	44.6	10.4	15	7.5	173	1.65
2/7/2012	1330	47.8	9.7	15	7.5	155	1.2
2/22/2012	1330	48.3	9.7	10	7.5	N/A	1.25
3/6/2012	1300	48.4	10.3	20	7.5	N/A	1.25
3/19/2012	1300	51.8	9.5	10	7.5	147	N/A
4/3/2012	1300	52.0	11.4	10	7.5	122	0.22
4/16/2012	1300	52.0	9.2	15	7.5	125	0.4
5/9/2012	1230	59.2	9.2	15	7.5	147	0.35
5/23/2012	1045	58.1	9.3	15	8.0	149	0.95
6/5/2012	1300	59.5	9.1	20	7.5	159	1.65
6/22/2012	1430	59.2	8.9	10	7.5	170	4.8
Minimum		43.9	6.7	5.0	7.5	122	0.2
Maximum		68.2	11.4	20.0	8.0	245	4.8
Average		55.2	8.9	13.7	7.6	187	1.6

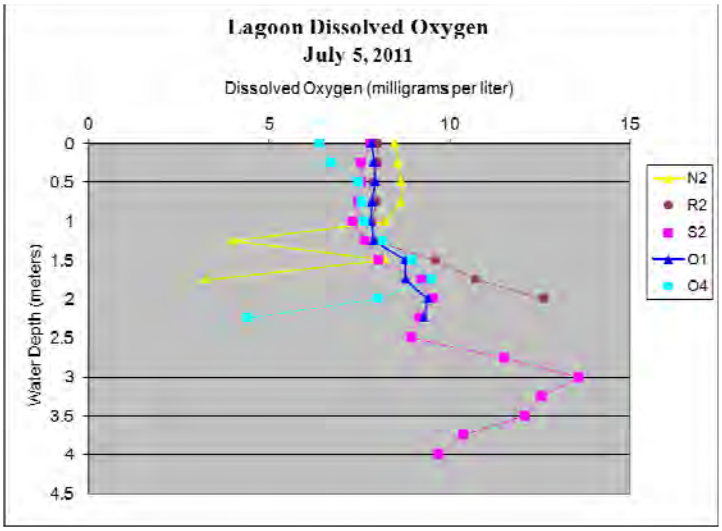
Appendix III-1

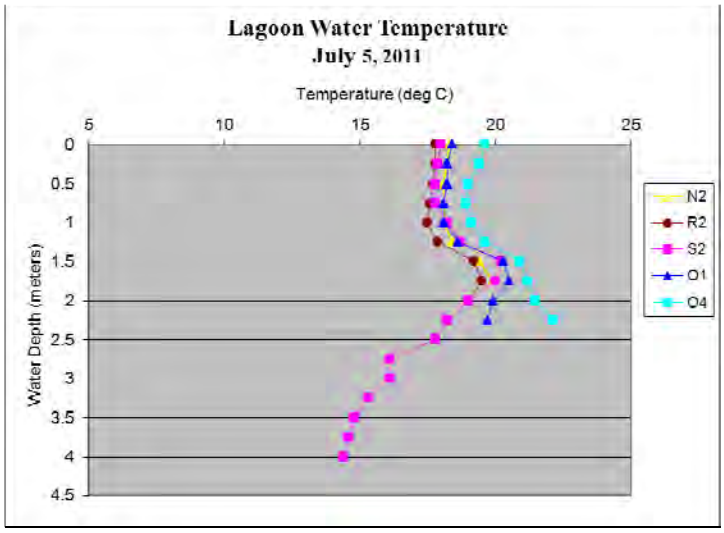
Carmel River Lagoon Profiles.
Salinity (ppt), Dissolved Oxygen (DO), Temperature (degrees C).
July 2011 – June 2012



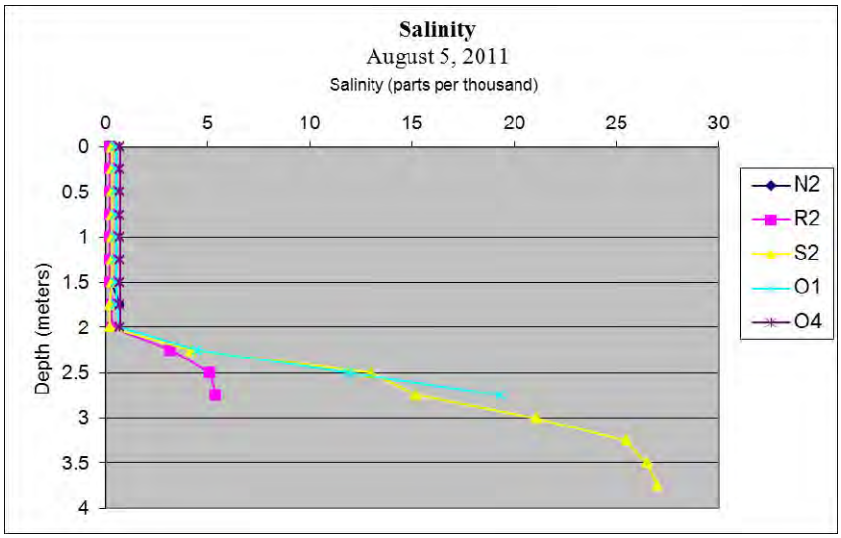
July 2011

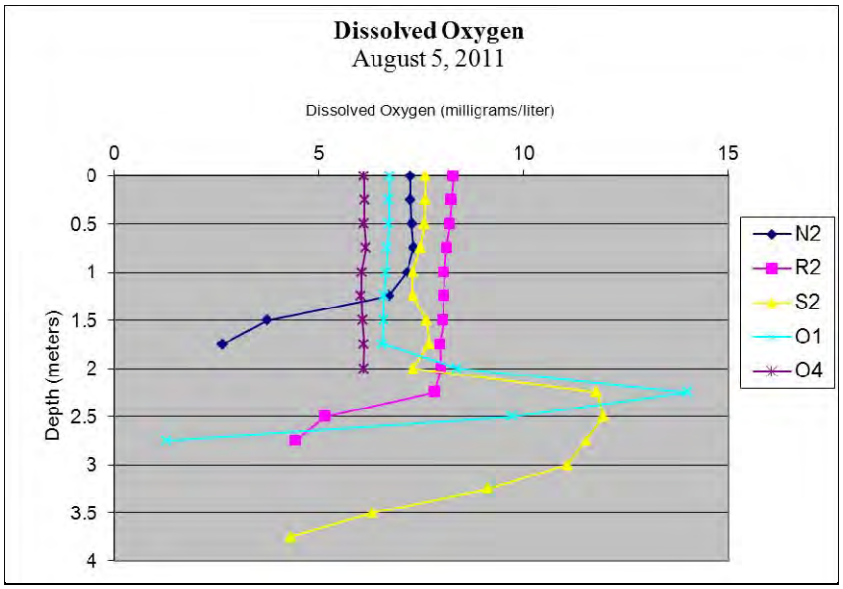

Lagoon Salinity
July 5, 2011
Salinity (parts per thousand)
0
4
8
12
16
20
24
28
Water Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
N2
R2
S2
O1
O4

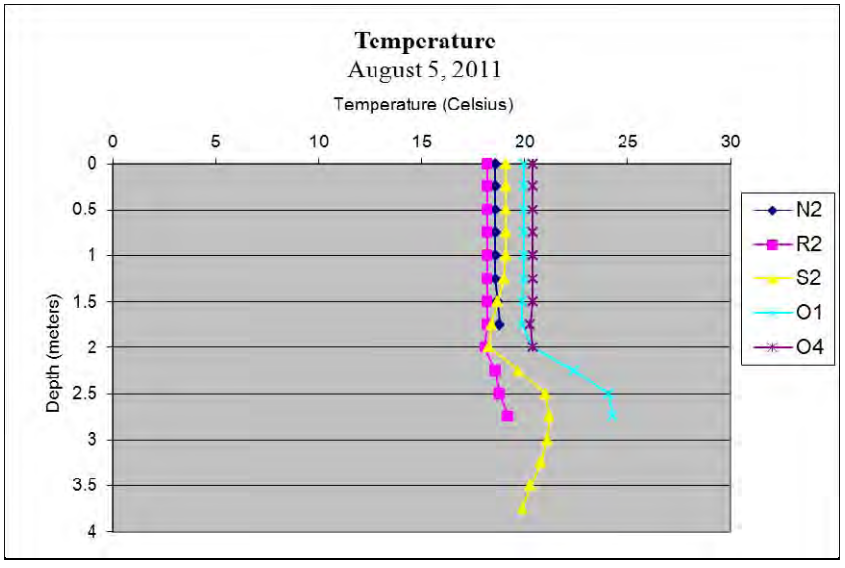

Lagoon Dissolved Oxygen
July 5, 2011
Dissolved Oxygen (milligrams per liter)
0
5
10
15
Water Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
N2
R2
S2
O1
O4


Lagoon Water Temperature
July 5, 2011
Temperature (deg C)
5
10
15
20
25
Water Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
N2
R2
S2
O1
O4

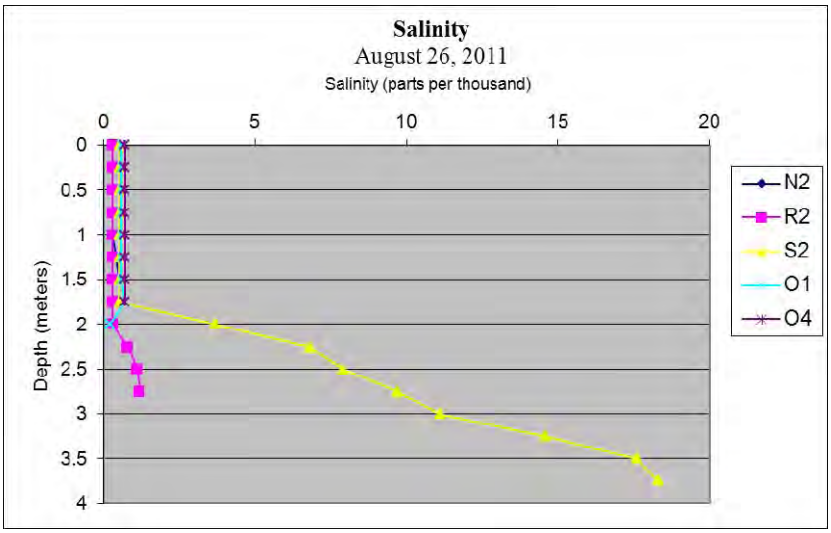
Early August 2011

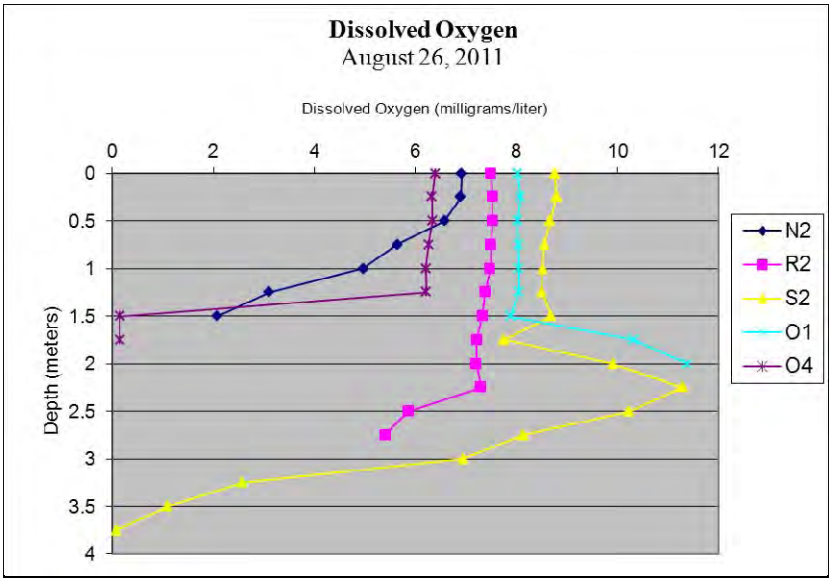


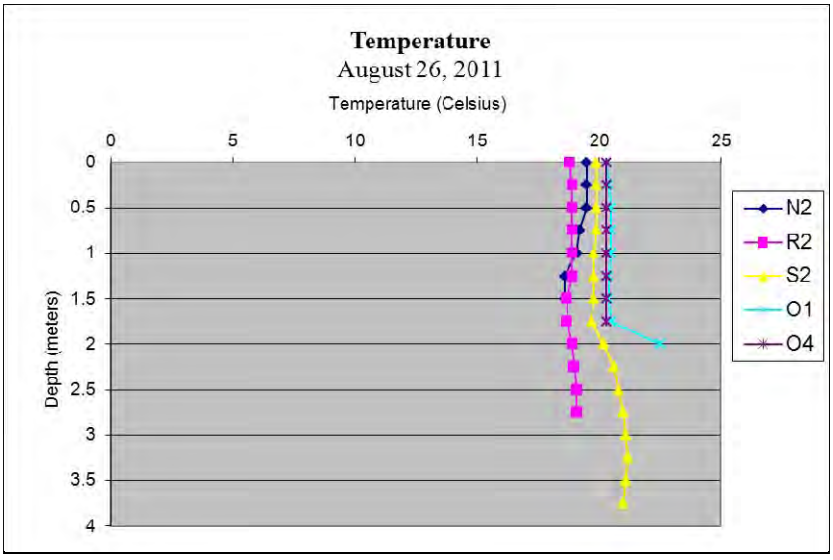




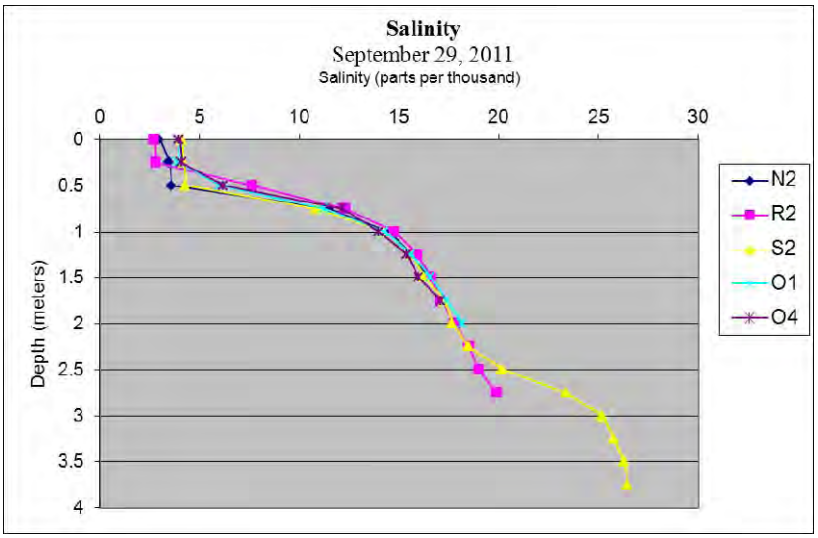
Late August 2011

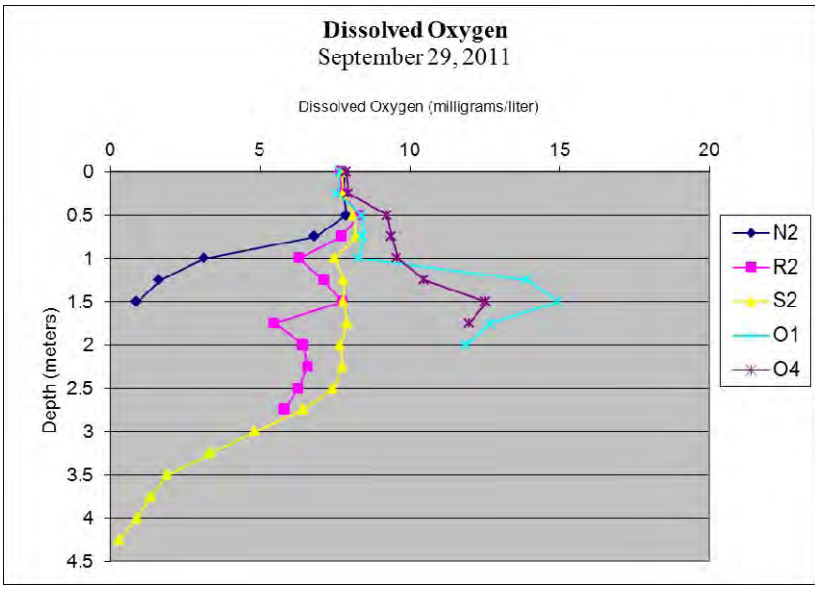


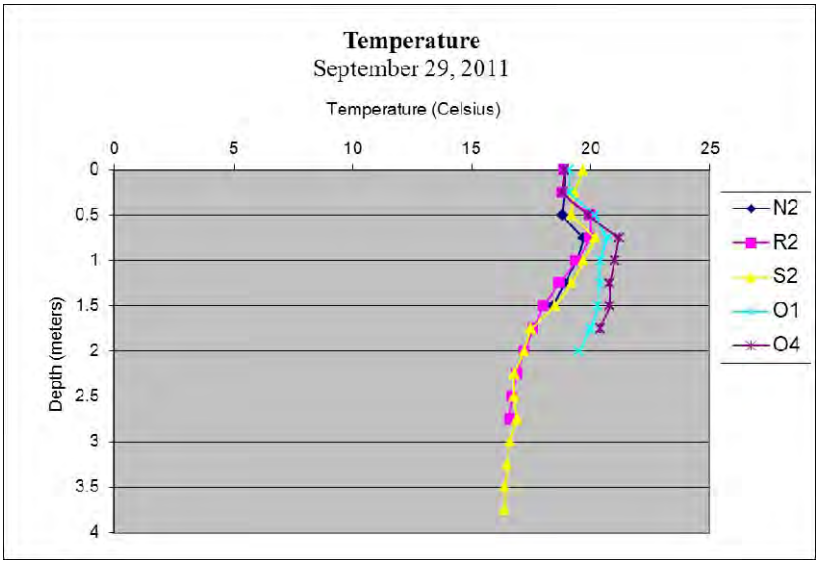




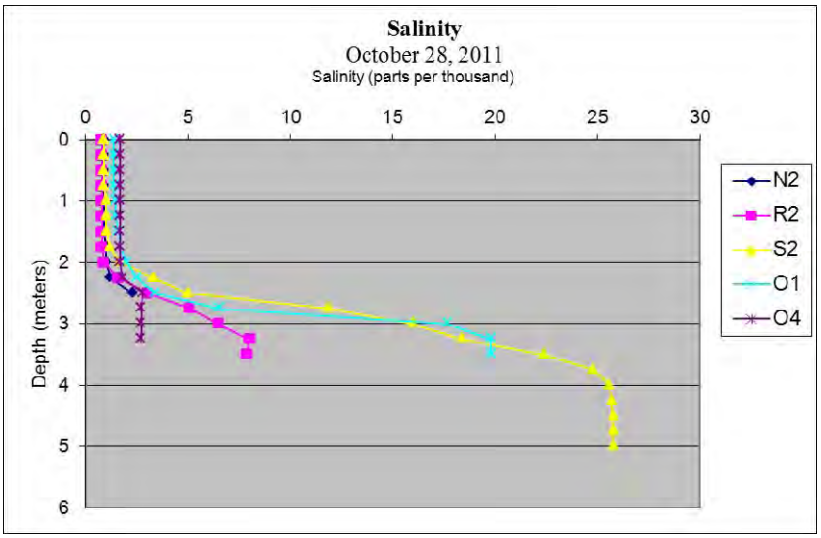
September 2011

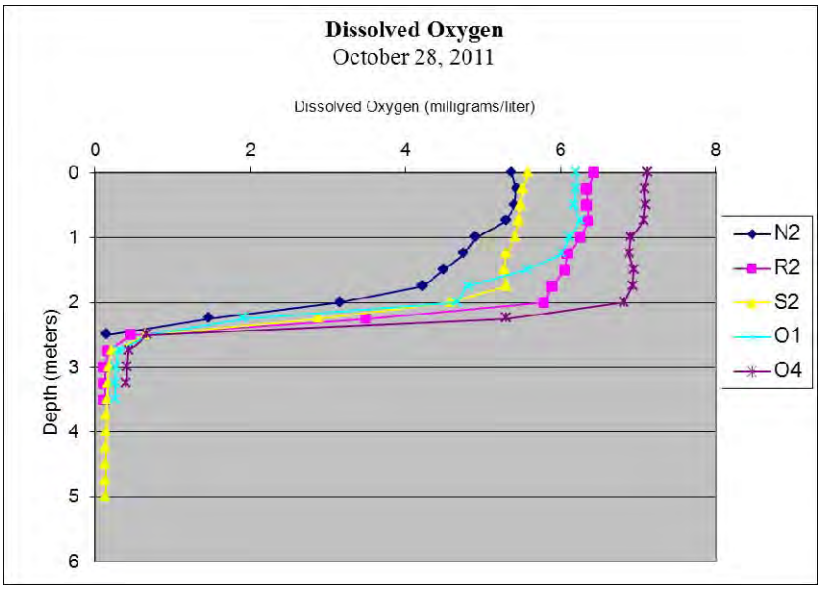


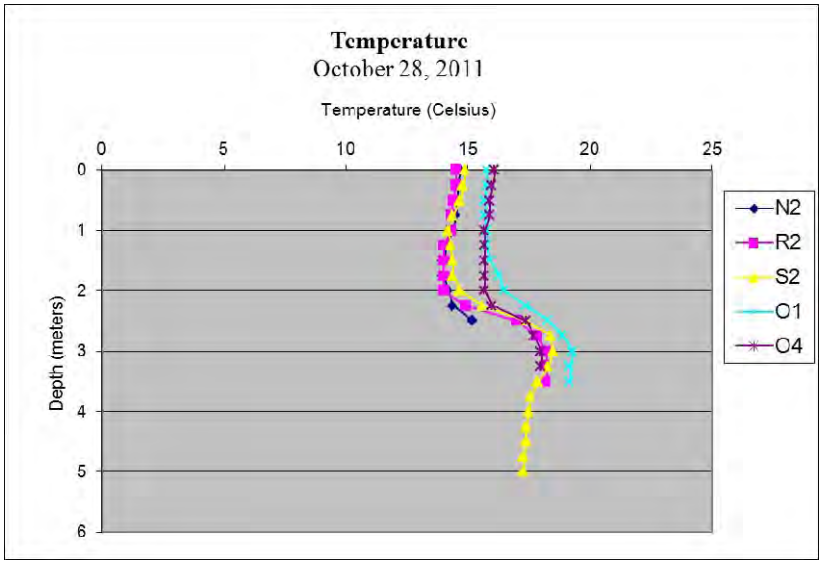




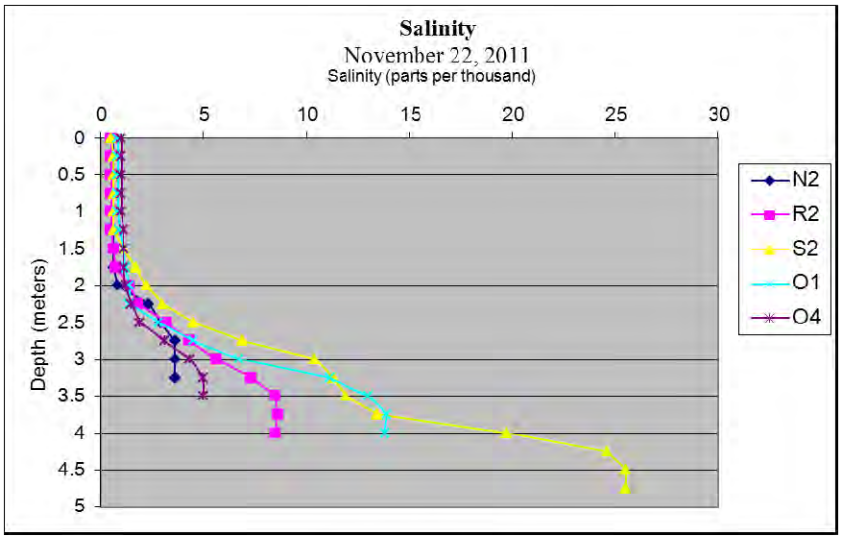
October 2011

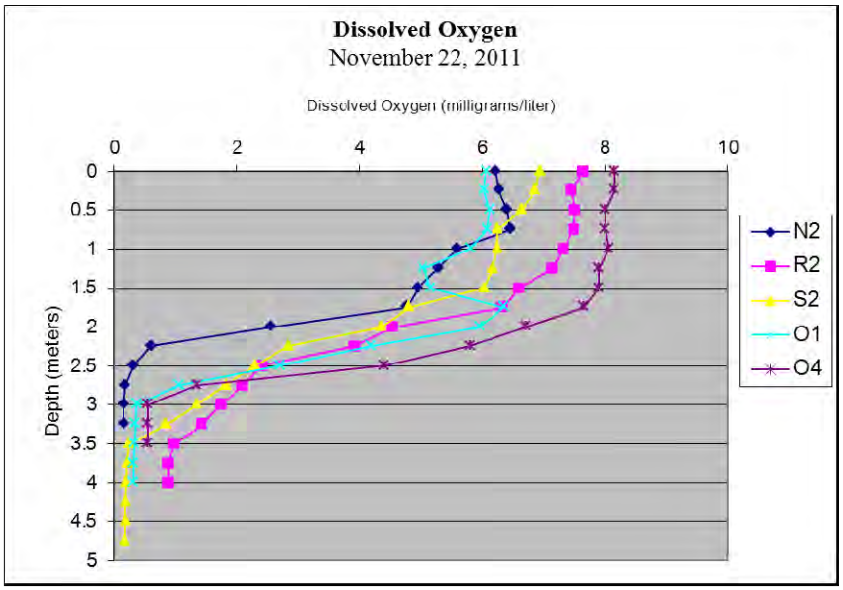


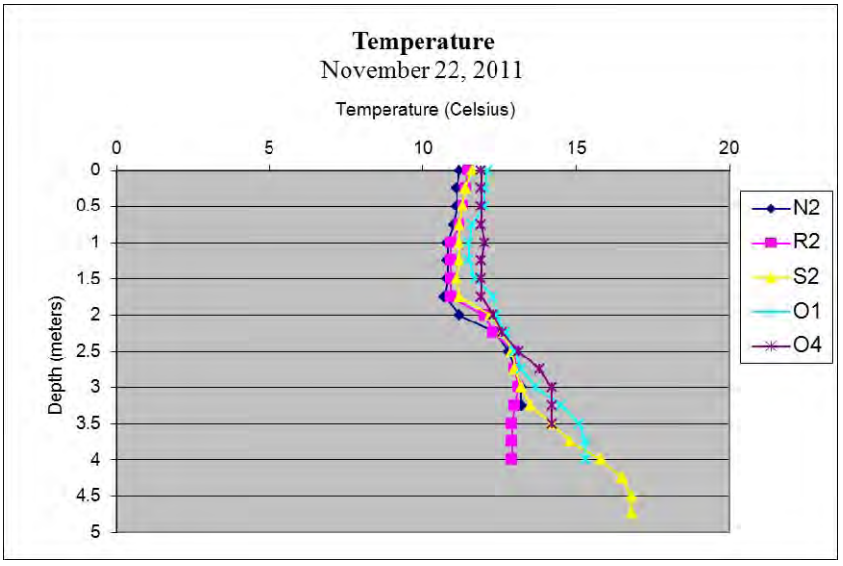




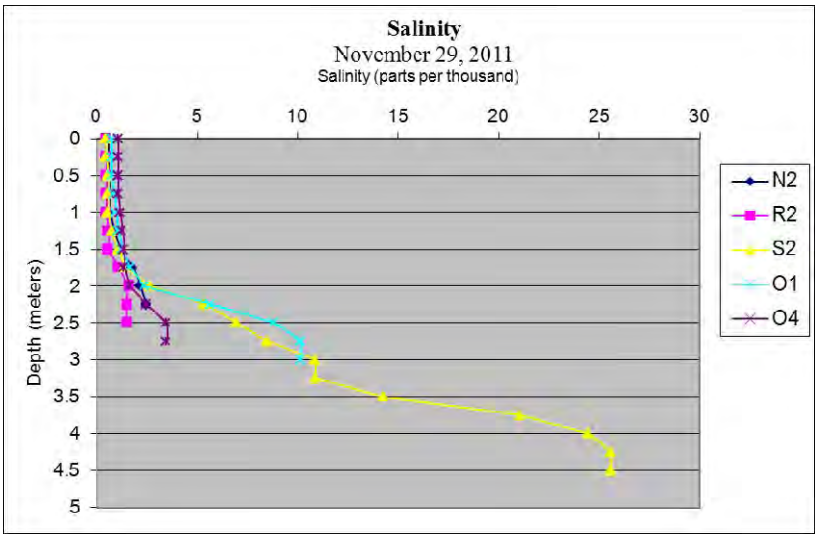
Pre-Breach November 2011

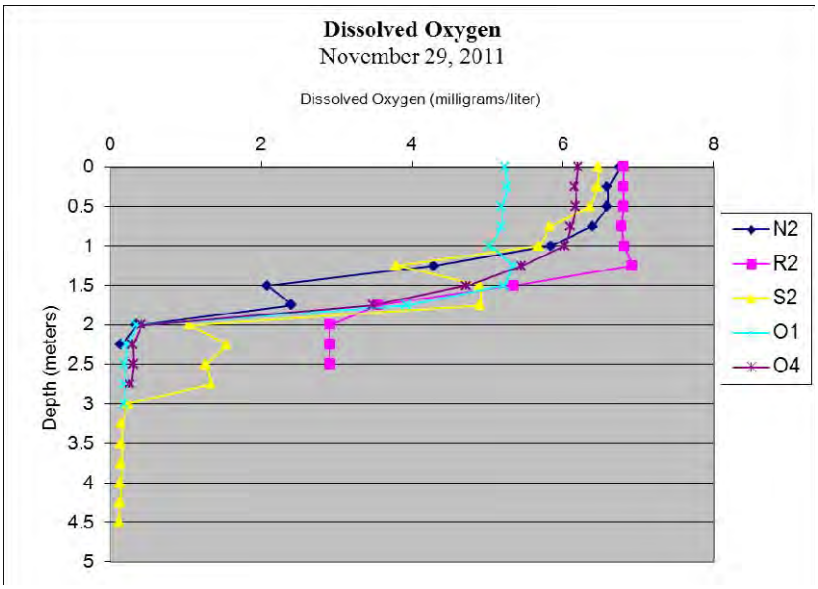


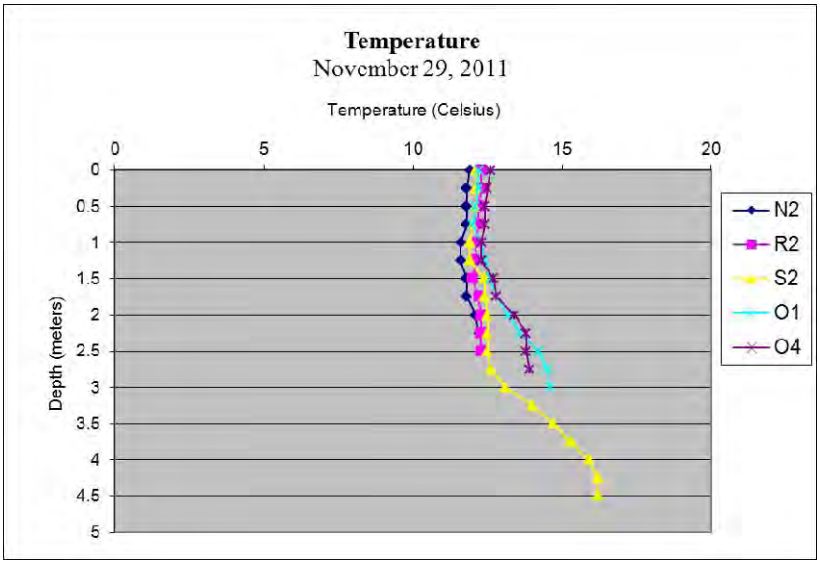




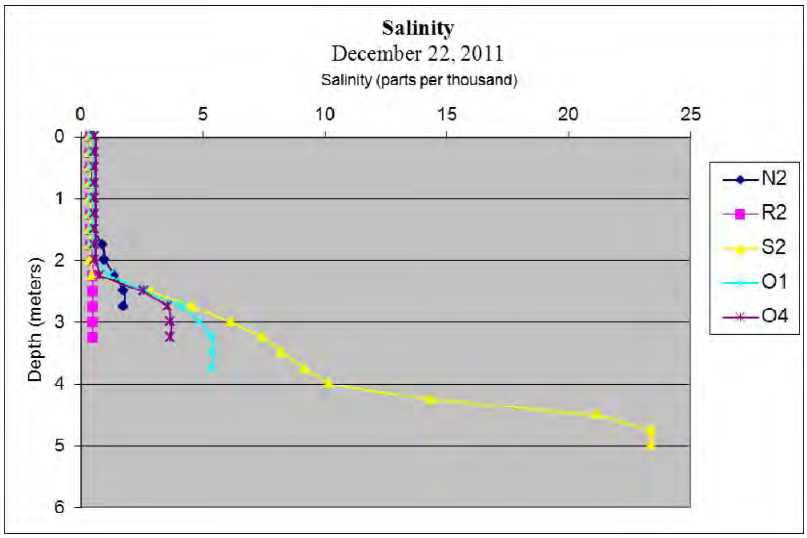
Post-Breach November 2011

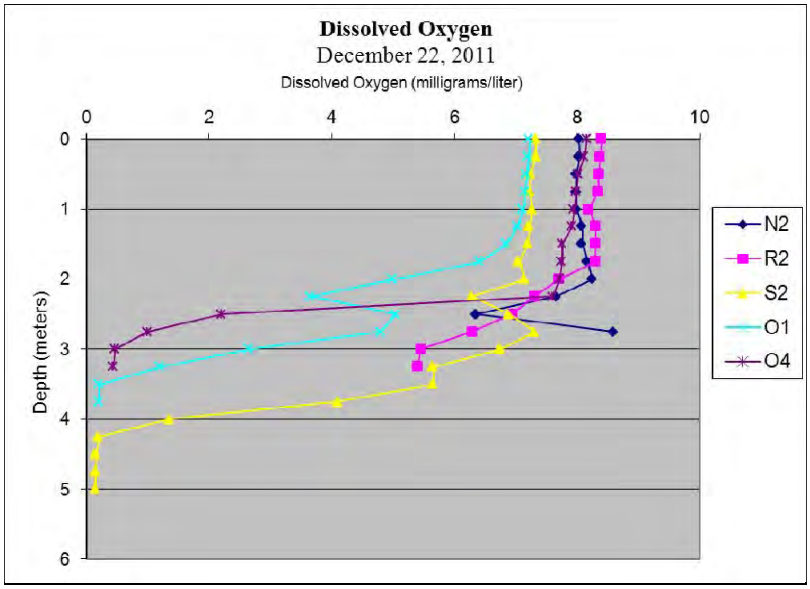


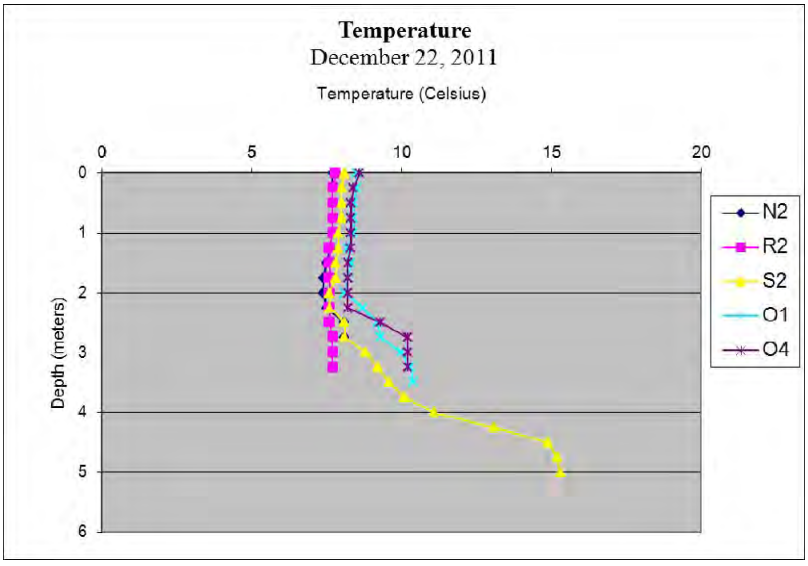




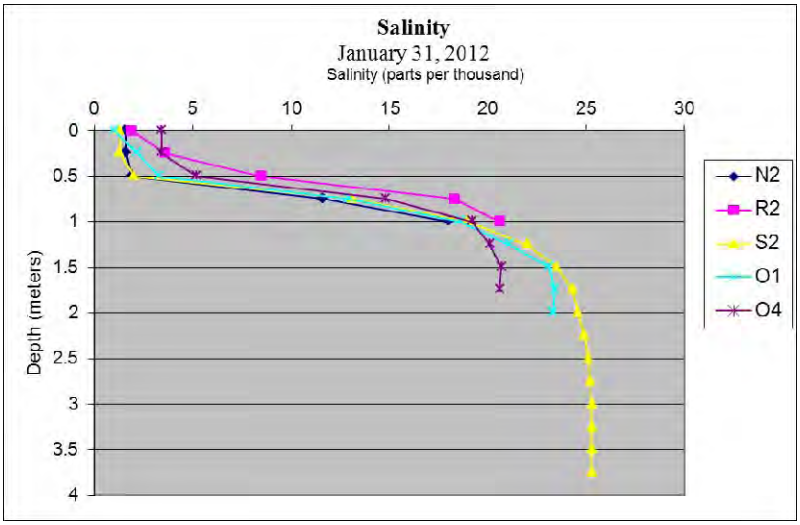
December 2011

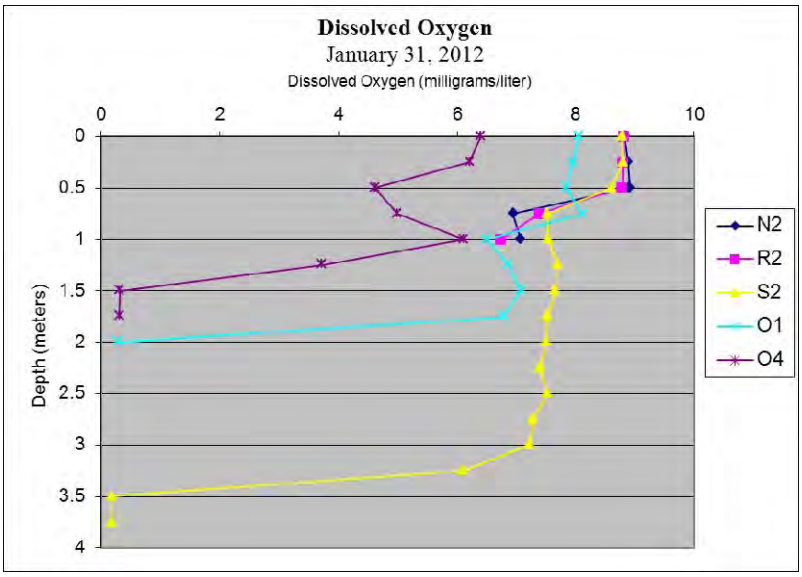


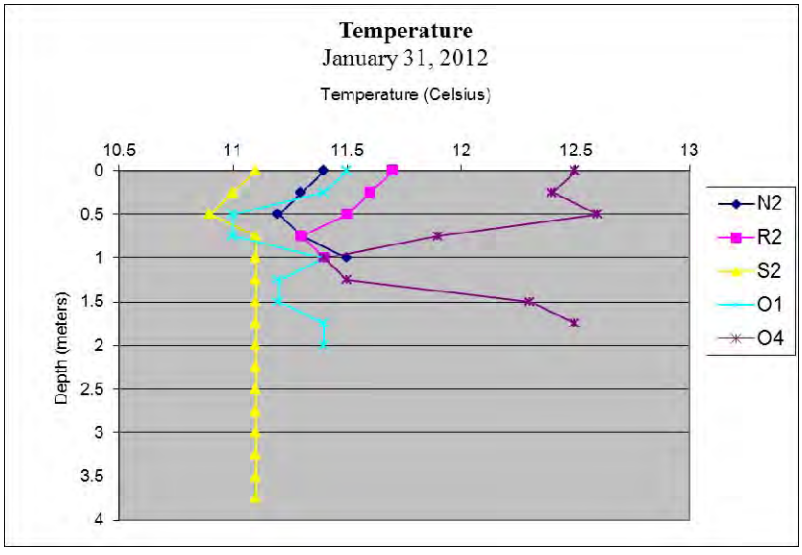




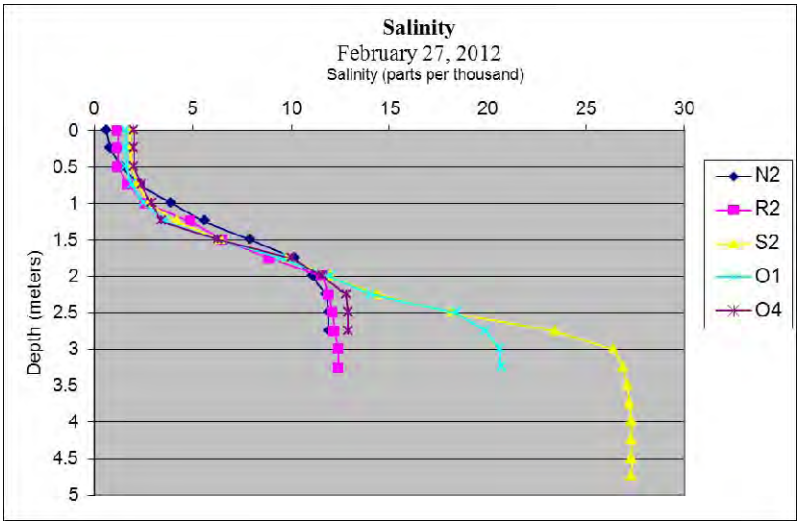
January 2012

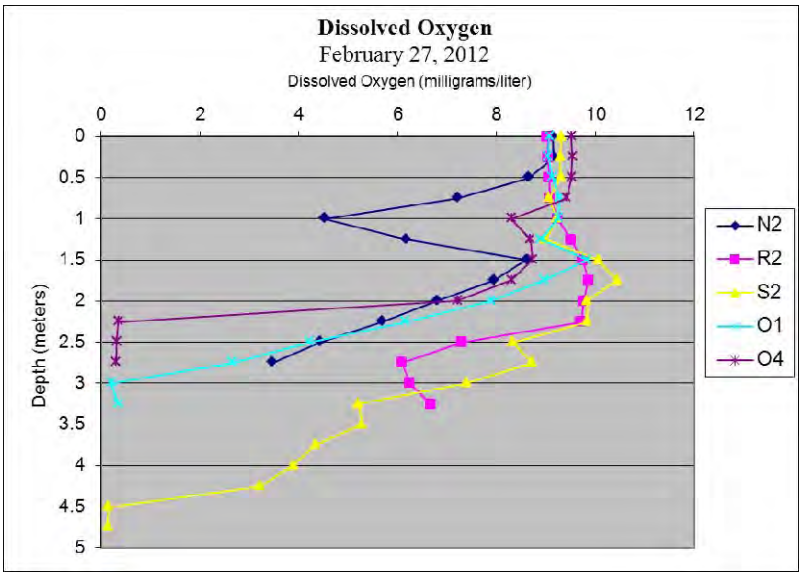


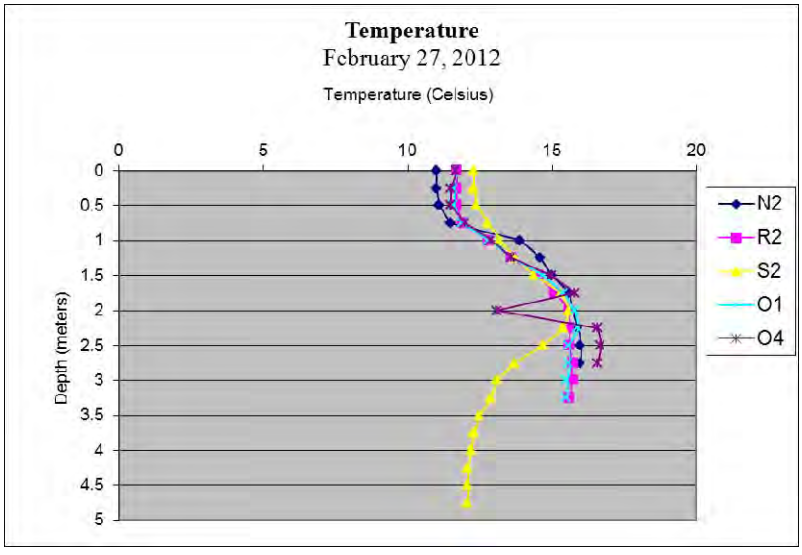




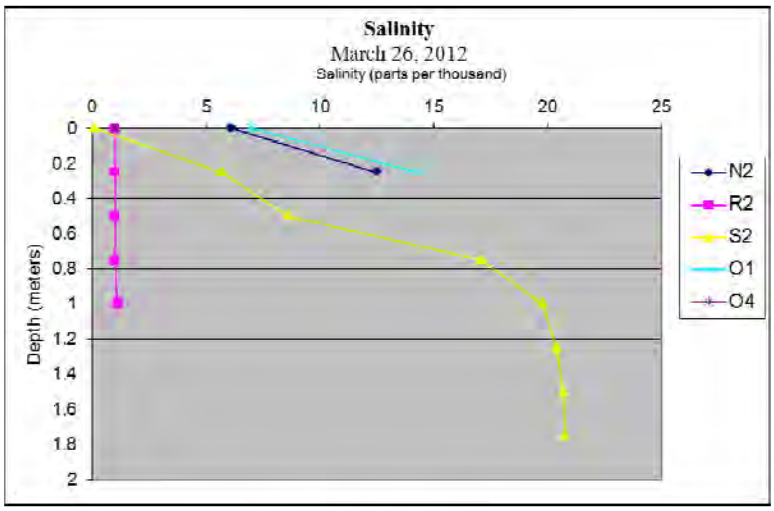
February 2012

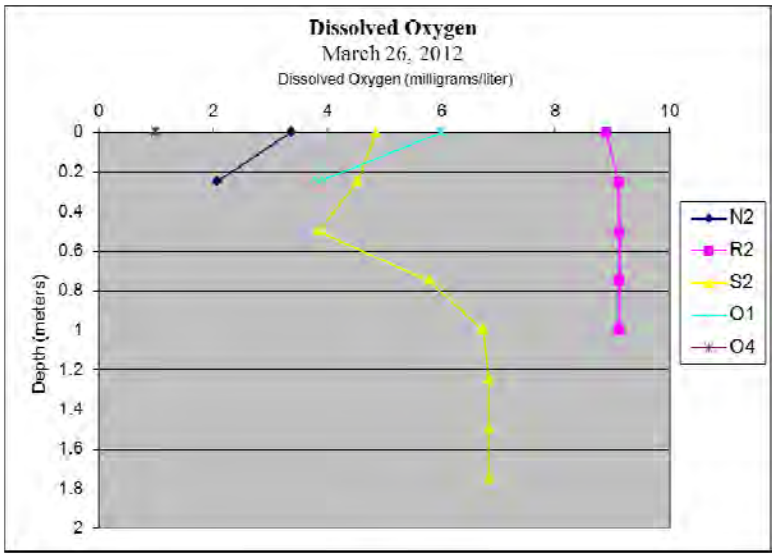


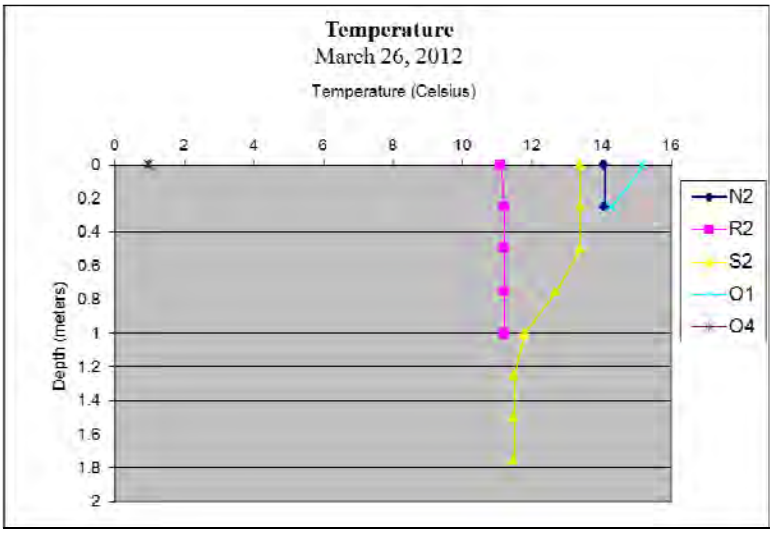




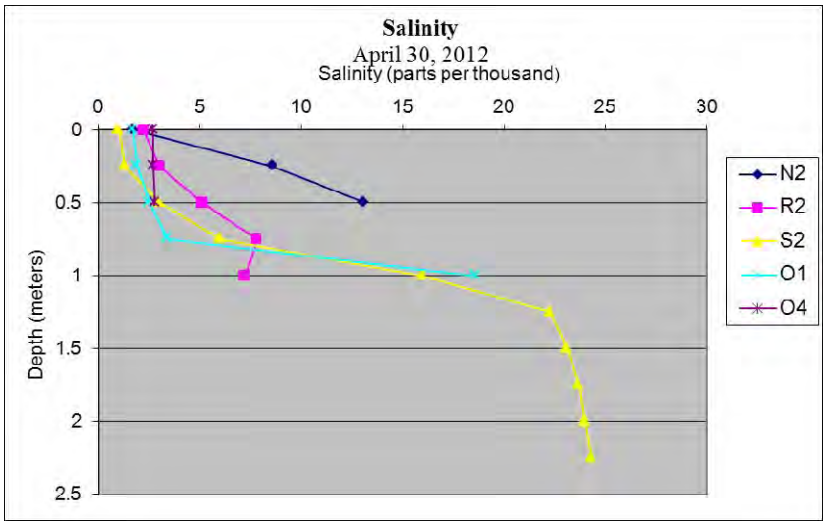
March 2012

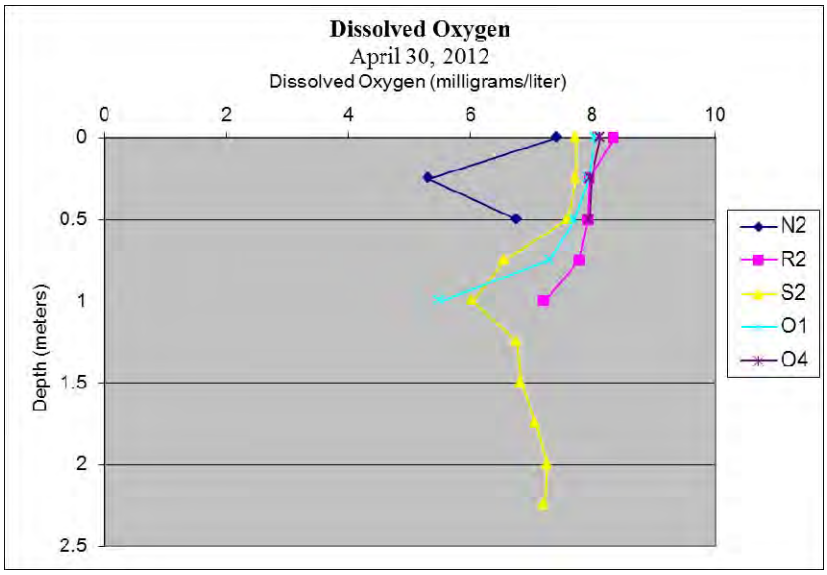

Salinity
March 26, 2012
Salinity (parts per thousand)
0
5
10
15
20
25
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Depth (meters)
N2
R2
S2
O1
O4

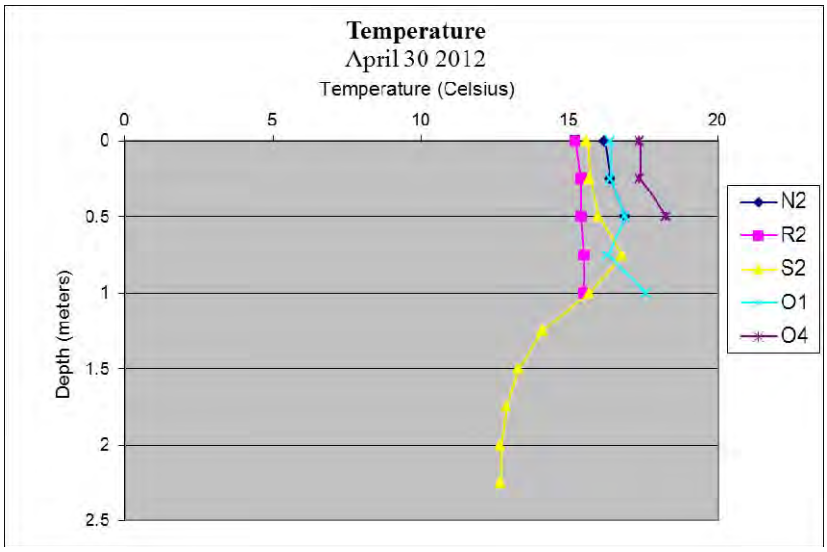

Dissolved Oxygen
March 26, 2012
Dissolved Oxygen (milligrams/liter)
0
2
4
6
8
10
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Depth (meters)
N2
R2
S2
O1
O4


Temperature
March 26, 2012
Temperature (Celsius)
0
2
4
6
8
10
12
14
16
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Depth (meters)
N2
R2
S2
O1
O4

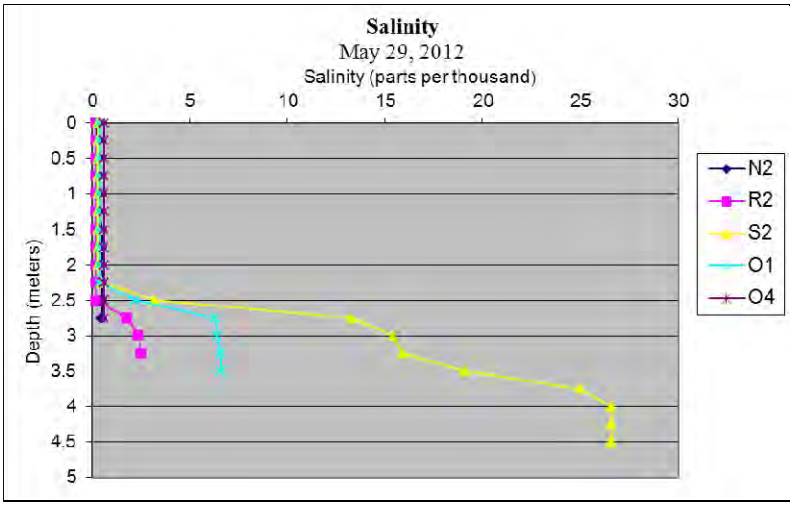
April 2012

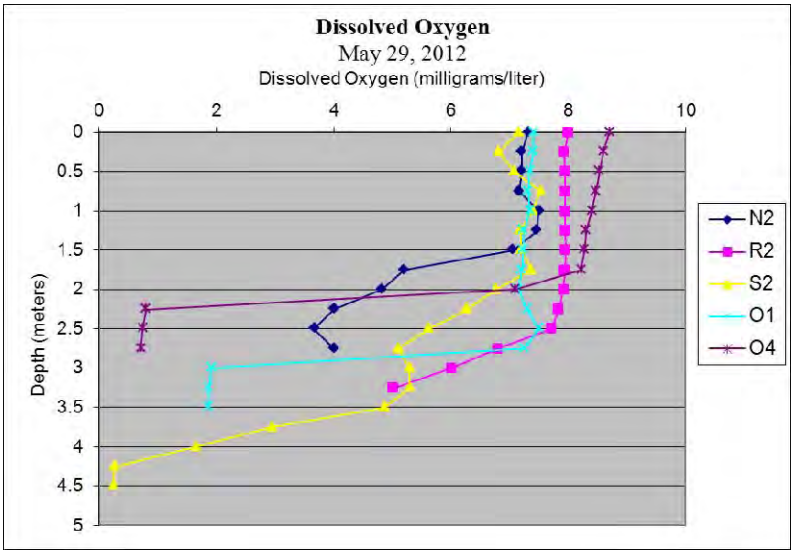

Salinity
April 30, 2012
Salinity (parts per thousand)
0
5
10
15
20
25
30
0
0.5
1
1.5
2
2.5
Depth (meters)
N2
R2
S2
O1
O4

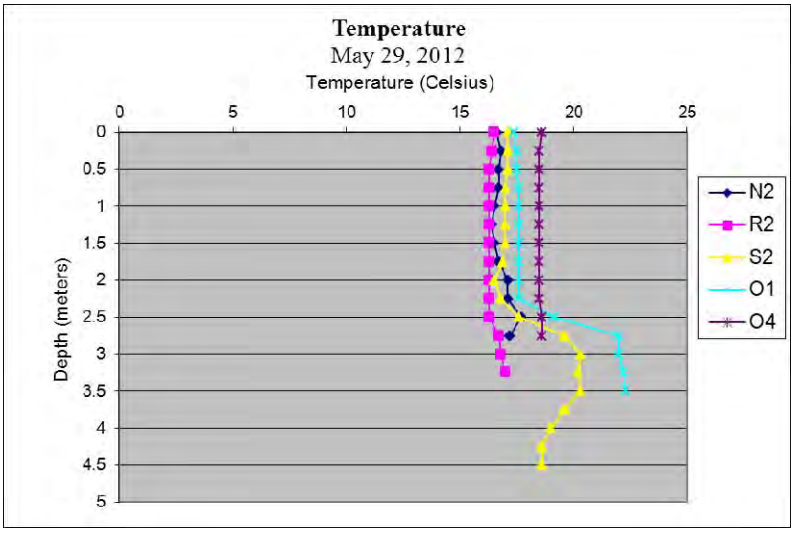

Dissolved Oxygen
April 30, 2012
Dissolved Oxygen (milligrams/liter)
0
2
4
6
8
10
0
0.5
1
1.5
2
2.5
Depth (meters)
N2
R2
S2
O1
O4


Temperature
April 30 2012
Temperature (Celsius)
0
5
10
15
20
0
0.5
1
1.5
2
2.5
Depth (meters)
N2
R2
S2
O1
O4

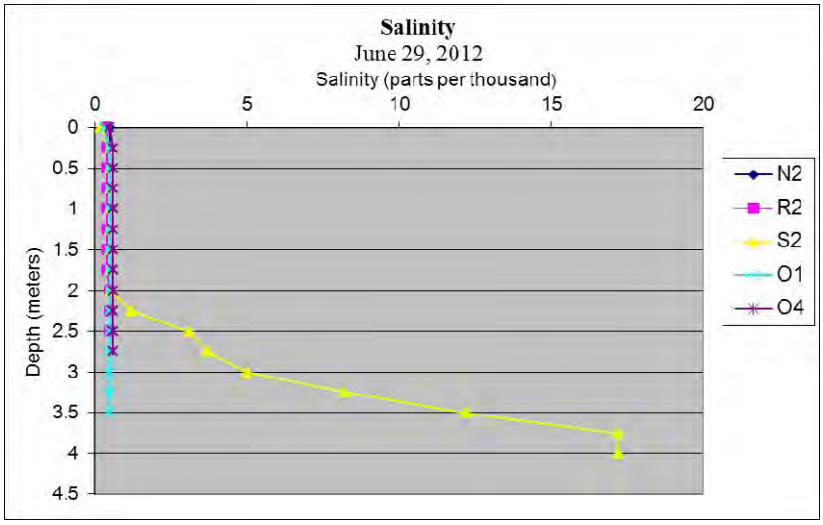
May 2012

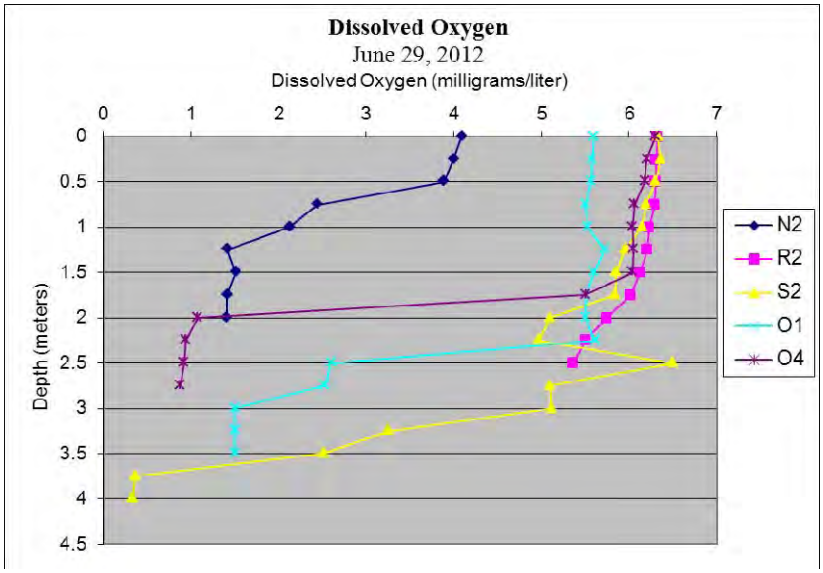

Salinity
May 29, 2012
Salinity (parts per thousand)
0
5
10
15
20
25
30
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
N2
R2
S2
O1
O4

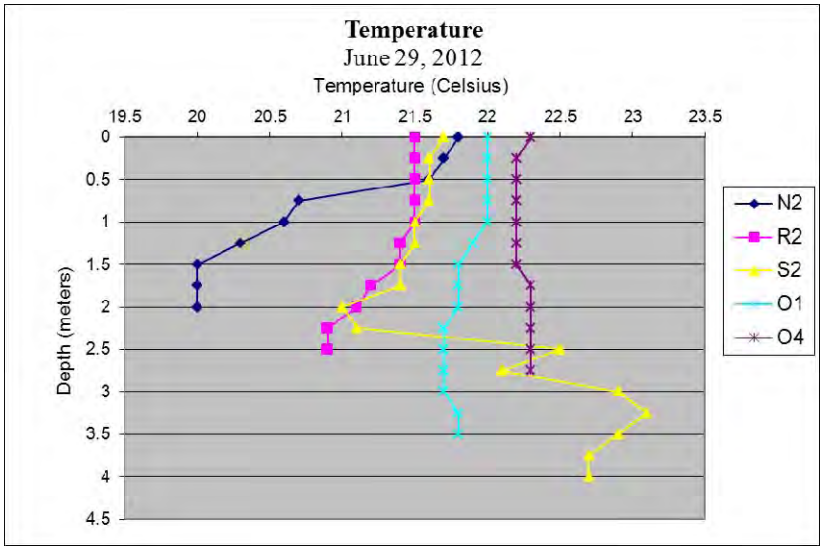

Dissolved Oxygen
May 29, 2012
Dissolved Oxygen (milligrams/liter)
0
2
4
6
8
10
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
N2
R2
S2
O1
O4


Temperature
May 29, 2012
Temperature (Celsius)
0
5
10
15
20
25
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
N2
R2
S2
O1
O4

June 2012


Salinity
June 29, 2012
Salinity (parts per thousand)
0
5
10
15
20
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
N2
R2
S2
O1
O4


Dissolved Oxygen
June 29, 2012
Dissolved Oxygen (milligrams/liter)
0
1
2
3
4
5
6
7
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
N2
R2
S2
O1
O4


Temperature
June 29, 2012
Temperature (Celsius)
19.5
20
20.5
21
21.5
22
22.5
23
23.5
Depth (meters)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
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 Cal-Am from each of their production wells, and these measurements are also utilized in the District's program.

Implementation and Activities During 2011-2012

- **Carmel Valley Aquifer --** The District's monitor well network in the Carmel Valley Aquifer consists of dedicated monitor wells and several private 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 East monitor well (River Mile 3.13) and the Rio North monitoring well (River Mile 1.65) compared with mean daily streamflow in the Carmel River at Highway 1 (River Mile 1.09). The Rancho Cañada East monitor well is located nearby the most downstream (i.e., westerly) Cal-Am production well in Carmel Valley, the Cañada well, approximately 375 feet from the river channel, and about 250 feet from the Cañada well. As shown on this figure, the groundwater elevation increased approximately two feet between the beginning of October 2011 and the end of March 2012, due to the reduced groundwater production at this time of the year, combined with the resumption of Carmel River flows. Groundwater levels declined gradually from April through September 2012 in response to receding surface flows and increased groundwater pumping. At the end of WY 2012 (i.e., September 30, 2012), the groundwater elevation in this well was about one foot lower than at the start of the WY.

The Rio North well is approximately 850 feet from the river channel. At this location, the magnitude of seasonal water-level fluctuation, approximately one foot, is less than at the Rancho Cañada East monitor well, due to its location farther from the river and major production wells in the lower Carmel Valley. Typically, the seasonal rise in water level

at the Cal-Am Rio North well lags relative to the Rancho Cañada East monitor well. The lag time is a response to the effect of distance from the river channel on the timing of groundwater recharge from river-flow events. This phenomenon is not as pronounced in **Figure IV-1**, due to the monthly water-level sampling frequency. The peak groundwater elevations recorded in both wells were observed a few days after the peak runoff in late April 2012.

During the October 2011-September 2012 period, the monitoring data indicated that groundwater storage in the Carmel Valley Aquifer remained relatively full during WY 2012. In the river reach between San Clemente Dam and the Narrows (i.e., aquifer subunits 1 and 2), the lowest storage capacity estimate was 92% of capacity at the end of October 2011. Similarly, in the river reach from the Narrows to the Carmel River Lagoon (i.e., aquifer subunits 3 and 4), the lowest storage capacity estimate was 86% of capacity at the end of September 2012. The aquifer remained relatively full during the year due to a number of factors, including:

- Availability of adequate 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 & Game 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 Seaside Basin monitor well network. These graphs show 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 graphs illustrate the more dominant effect that production from the Paralta well has had on water levels in the Santa Margarita Sandstone, which is the aquifer zone from which the Paralta well obtains most of its production. The graphs also illustrate 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. 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 2012. Additional information on the ASR program is available at the District office. Discussion of the District's Water Project 1 (Phase 1) ASR Project 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: the Carmel Valley alluvial aquifer, and the Seaside Basin Coastal subareas. 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 2011-2012

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. However, the Upper Valley wells were not sampled in Spring 2012, but were sampled in Fall 2012. 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 2011 and 2012, samples were collected quarterly from six wells closest to the coast in the Seaside Basin monitoring network by District staff under contract for 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 2012. One of

the eight wells in lower Carmel Valley was not sampled because it was submerged under high water in the Carmel River Lagoon during the sampling period. Another well that had 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 2011. 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 in the coastal area 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 potential seawater intrusion into the aquifer. All three wells in the cluster closest to the ocean were destroyed by river erosion in 2011, and all three of 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 one of the three coastal locations 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 is available for sampling. The increasing trend in Specific Electrical Conductance (SEC) and Chloride from 2008 to 2011 was reversed in 2012, although levels are still higher than in 2008 or 2009 (**Figure IV-5**). 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.

Well 16S/1E-23E4, located 6.53 miles upstream from the mouth of the Carmel River, shows a slight decline in overall water quality in 2012 relative to 2011. Degradation in water quality was noted at this site in 2007, and in 2008 staff made improvements to the wellhead at this site to reduce potential flooding along the roadside where this well is located. Attempts have been made to improve results through air-lifting and more extensive and rigorous pumping, but due to the relatively small amount of available saturation below the water table at this well, these efforts have had limited success. Staff will continue to monitor the site to ensure the wellhead is secure from surface-water sources.

Well 16S/1E-23La, located 6.72 miles upstream from the river mouth, exhibits a slight shift in water quality in 2012 relative to 2011, as shown on the graph of SEC and Chloride that is included to track long-term trends (**Figure IV-6**). Both SEC and Chloride were higher at this site in 2012 than any year since 2006. Why these

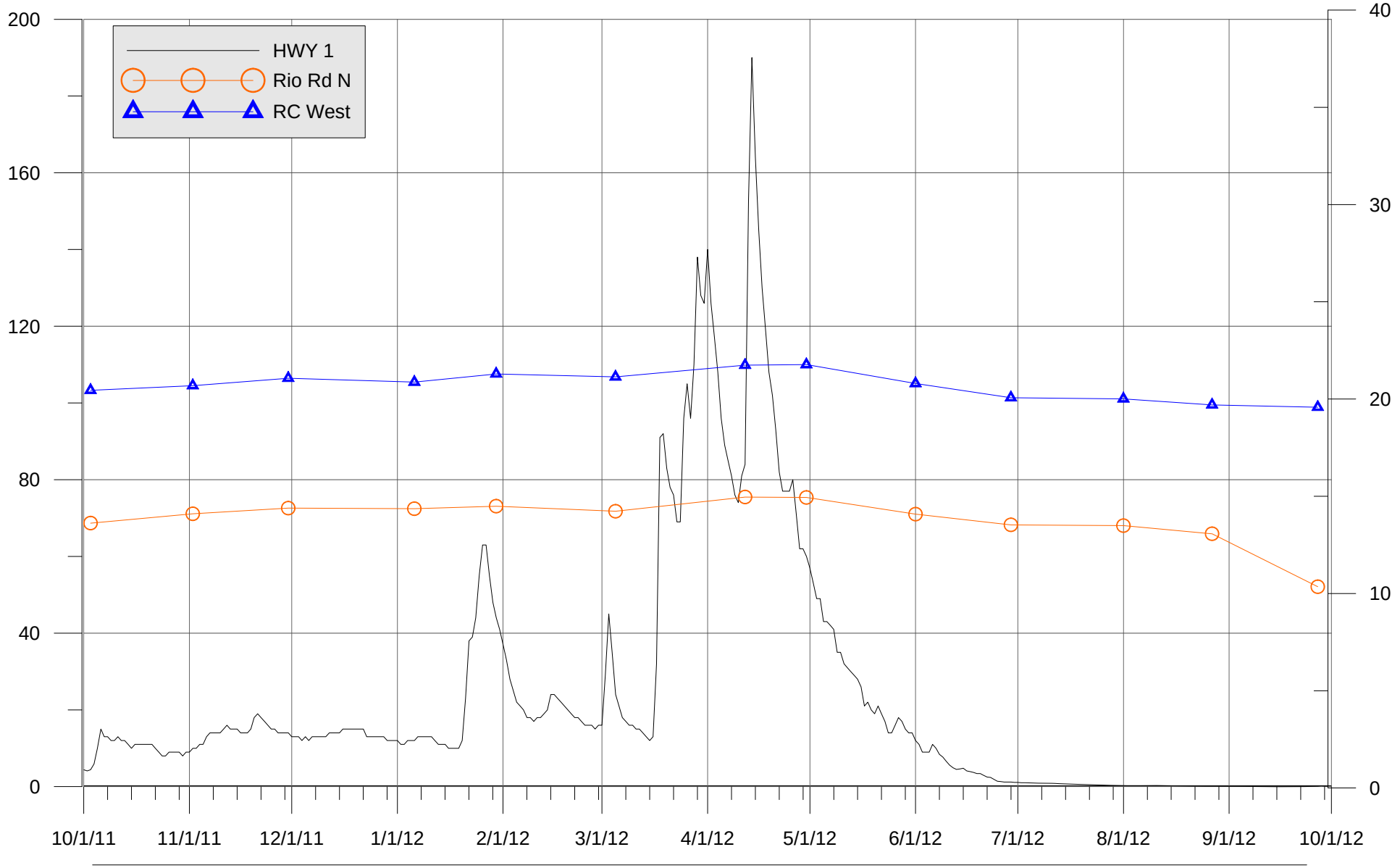
constituents appear to have changed at this site is not evident, as other constituents were not significantly changed from last year. Staff will continue to track changes to determine if they are indicative of a negative trend, or are anomalous short-term events.

- **Seaside Groundwater Basin --** Eleven monitor wells in the coastal subareas of the Seaside Basin were sampled in June and July 2012. 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.

U:\mpwmd\Allocation\RY12\RY 12 Report - Place your Files in This folder\IV Groundwater Monitoring

2012, a 2-3 inch rainstorm in the Carmel River (CR) Basin prompted the Monterey County Public Works Department to open the lagoon mouth to the ocean, as storm runoff of approximately 100 cfs along the CR advanced toward the lagoon. Following the March 18 event, the lagoon mouth generally remained open to the ocean until May 18, 2012 when beach berm sands sealed off the lagoon mouth for the remainder of WY 2012.

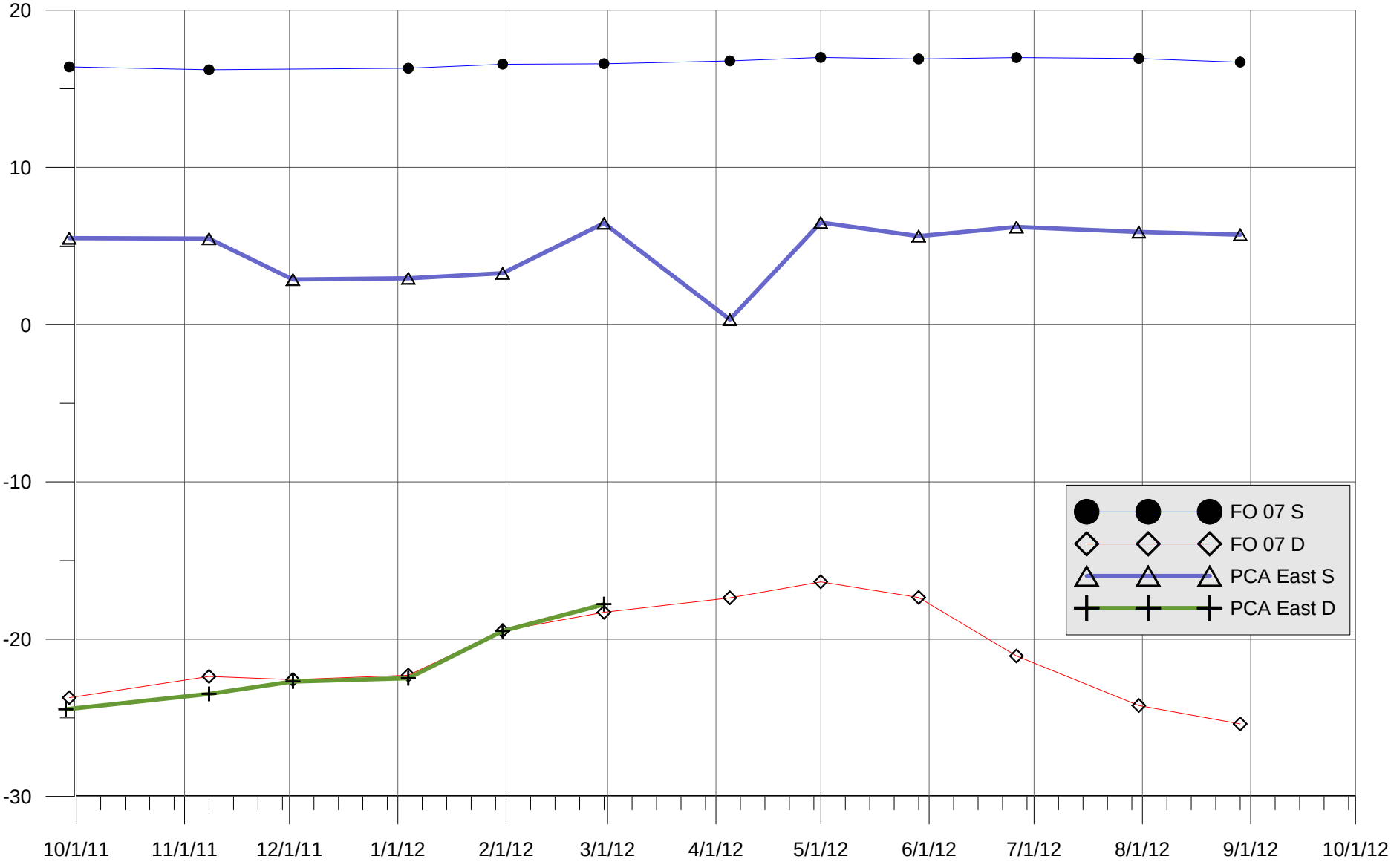
U:\mpwmd\Allocation\RY11\RY 11 Report - Place your Files in This folder\II Precipitation, Streamflow, Lagoon Water Level Monitoring



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.

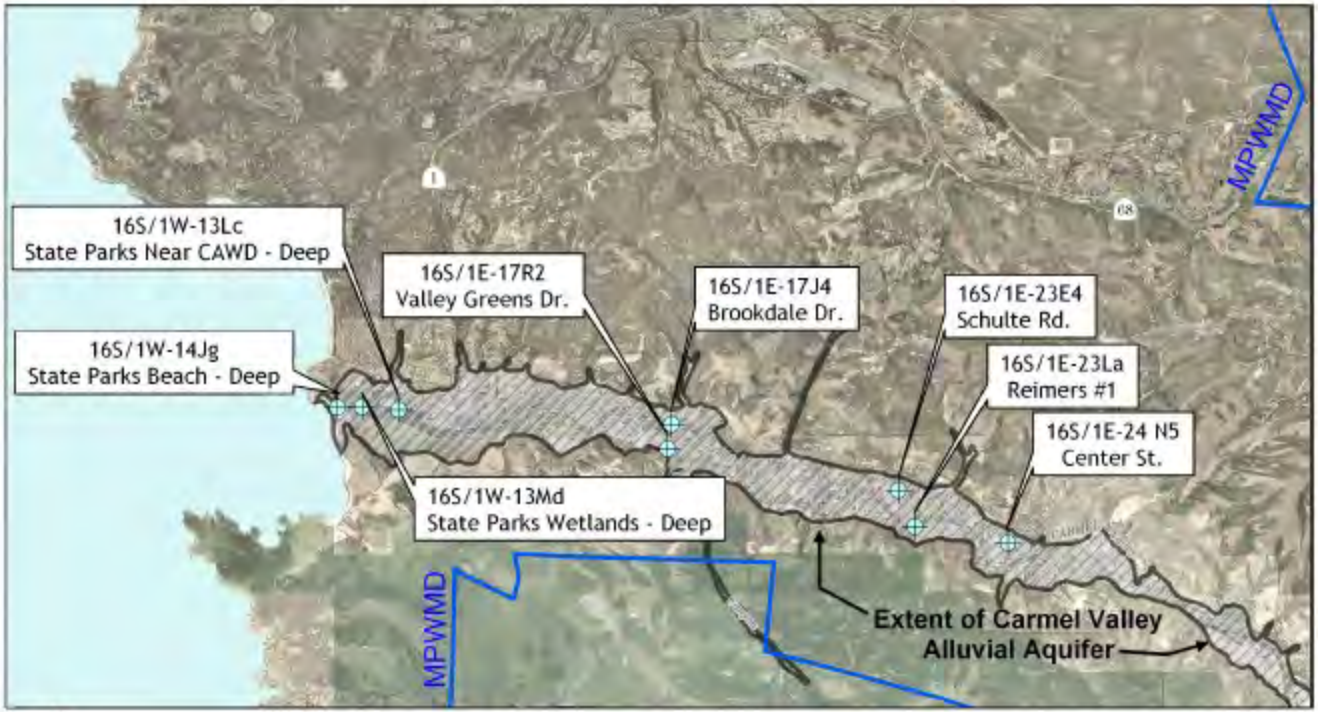


MONTEREY PENINSULA WATER MANAGEMENT DISTRICT

Figure IV-2 Hydrographs of PCA East and FO 07 for WY 2012

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

Figure IV-5

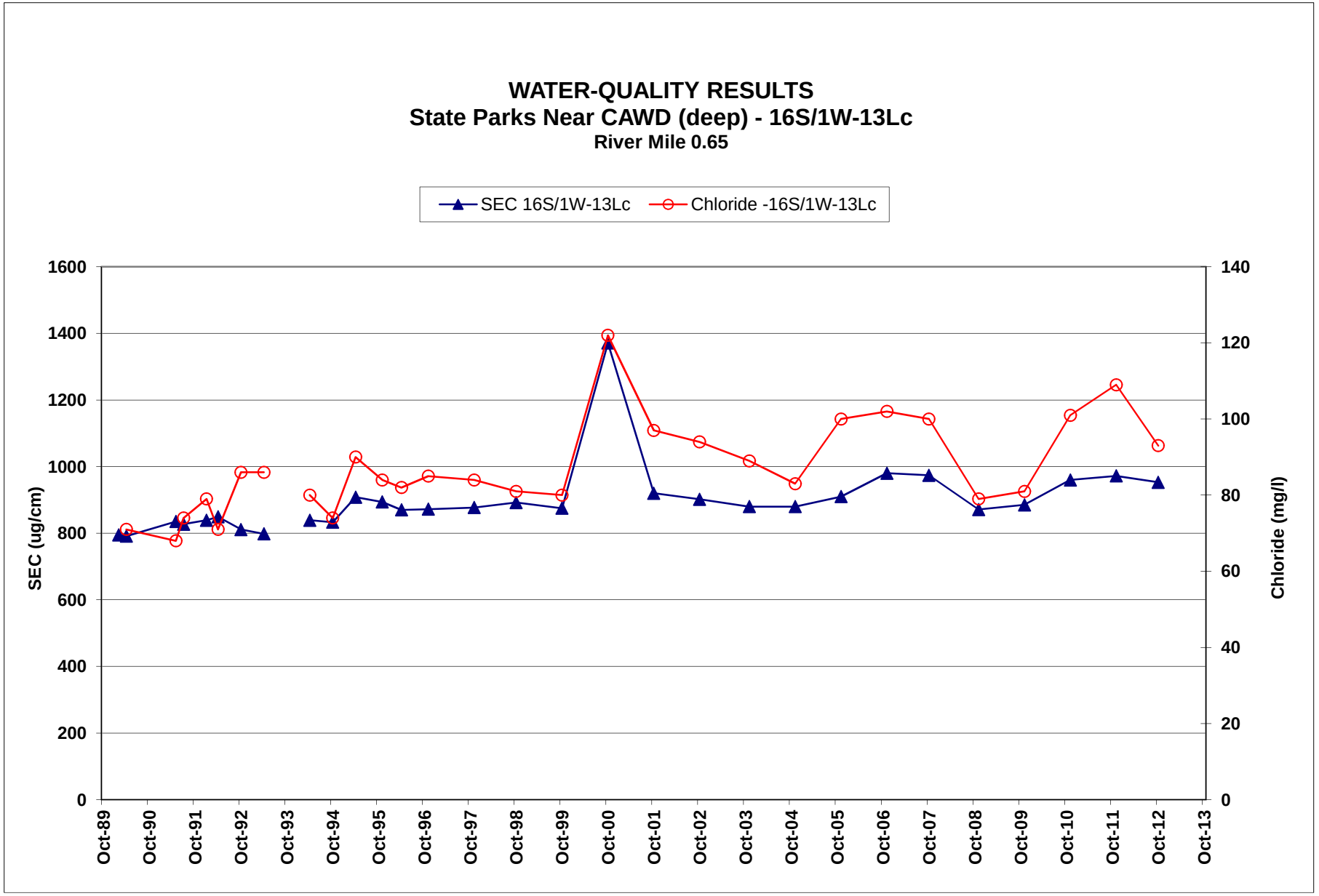


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Figure IV-6

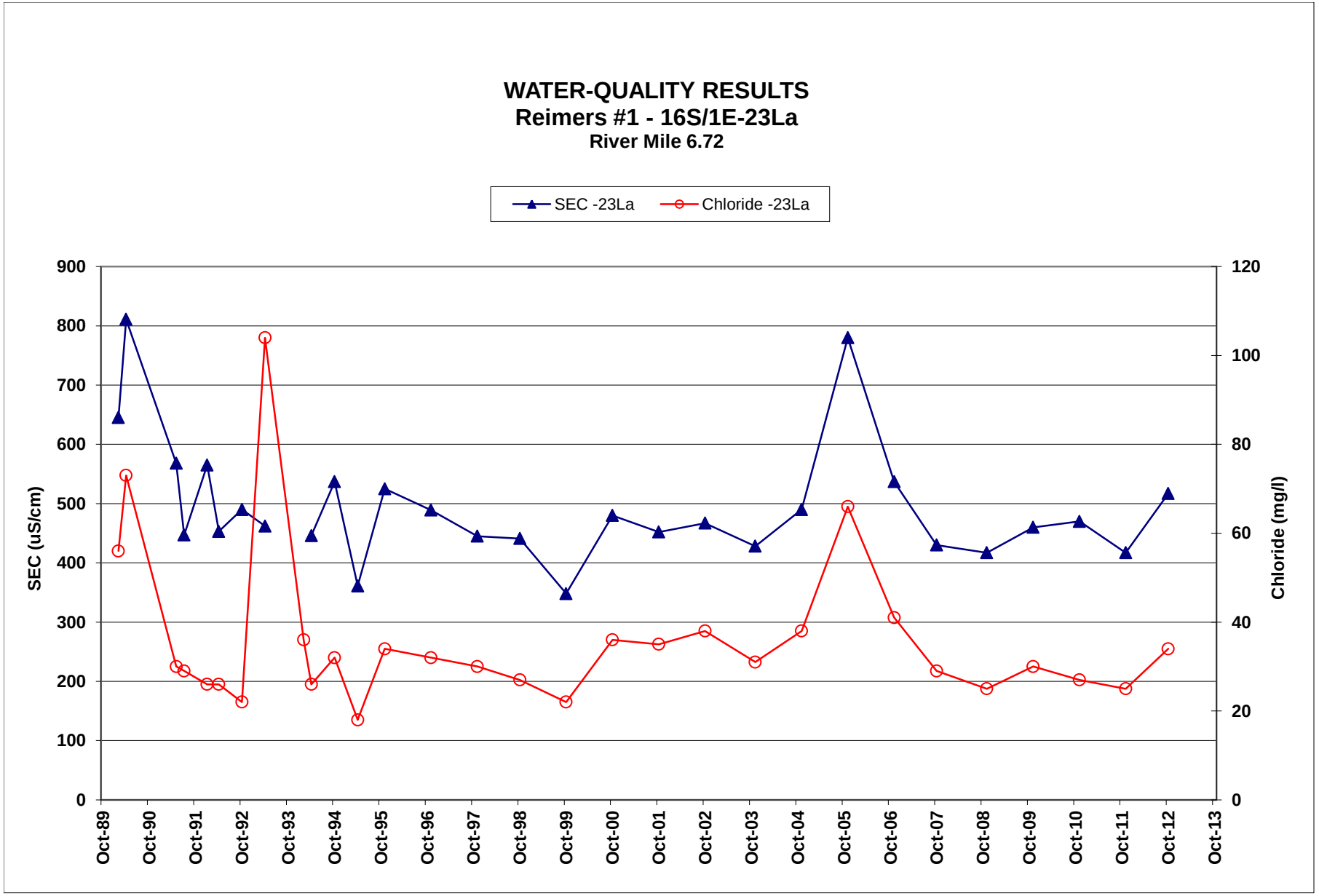
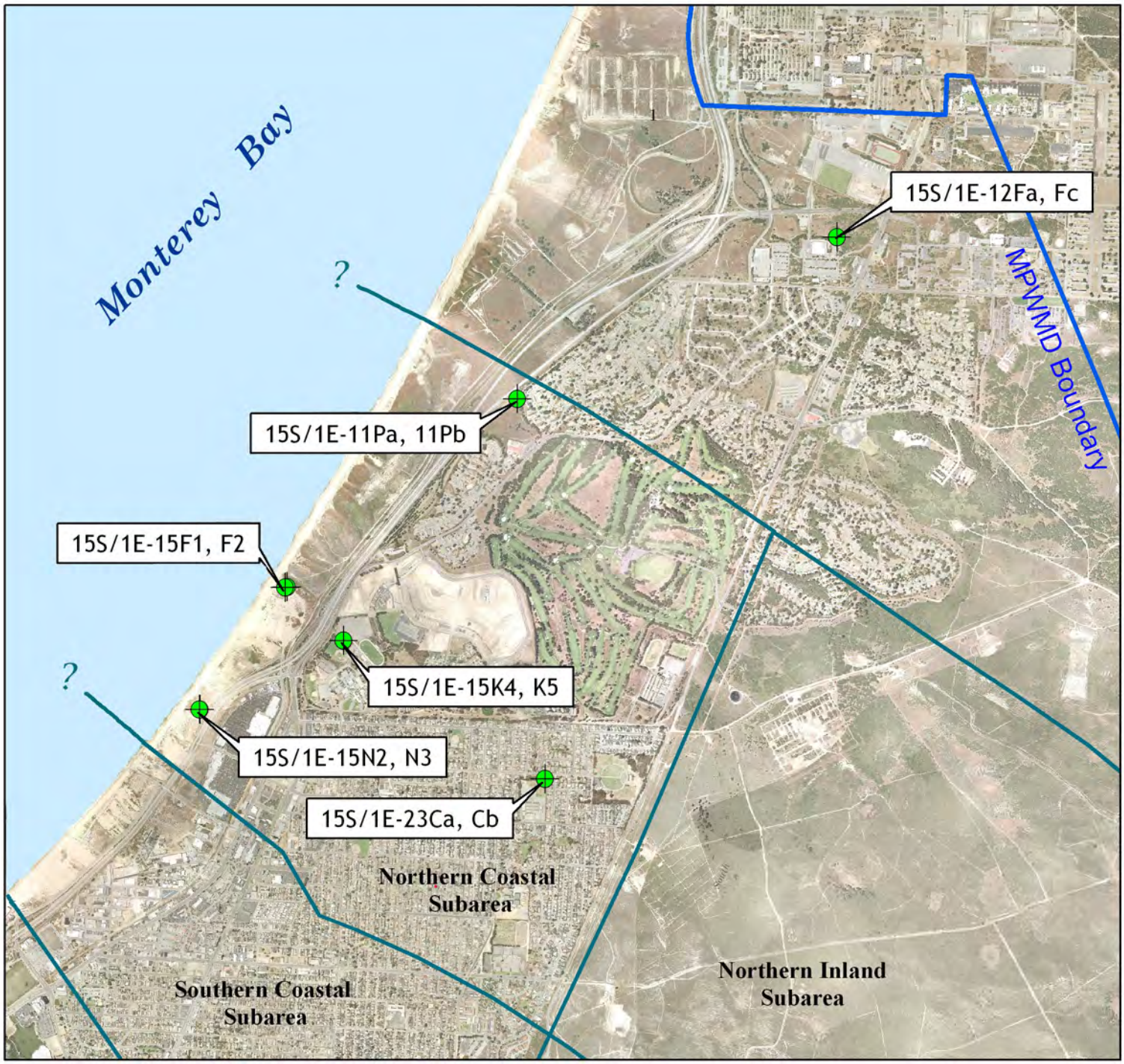

WATER-QUALITY RESULTS
Reimers #1 - 16S/1E-23La
River Mile 6.72
SEC -23La
Chloride -23La
SEC (uS/cm)
Chloride (mg/l)
900
800
700
600
500
400
300
200
100
0
120
100
80
60
40
20
0
Oct-89
Oct-90
Oct-91
Oct-92
Oct-93
Oct-94
Oct-95
Oct-96
Oct-97
Oct-98
Oct-99
Oct-00
Oct-01
Oct-02
Oct-03
Oct-04
Oct-05
Oct-06
Oct-07
Oct-08
Oct-09
Oct-10
Oct-11
Oct-12
Oct-13

Figure IV-7

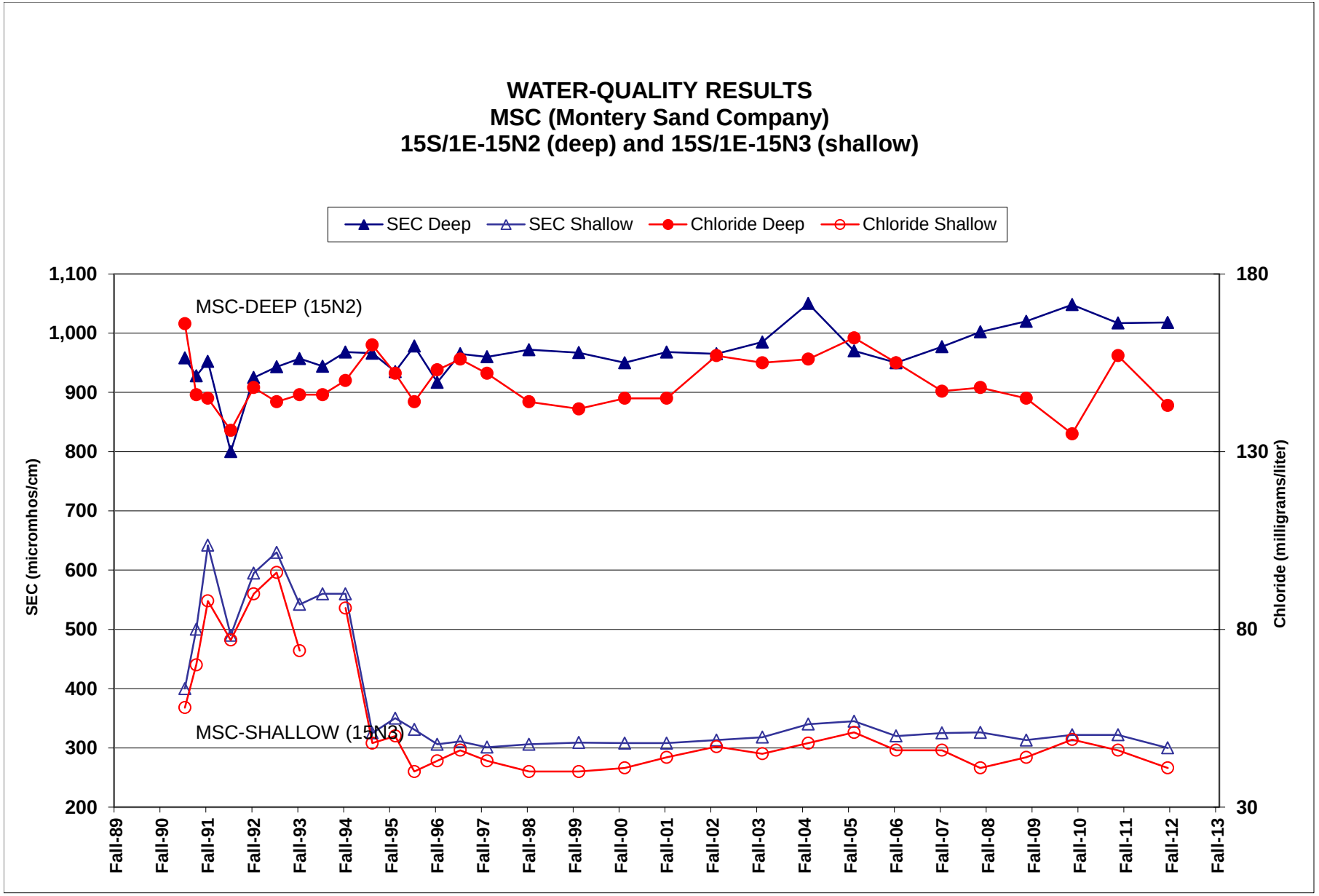
SEASIDE BASIN COASTAL GROUND WATER QUALITY MONITOR WELL LOCATIONS



Monterey Peninsula Water Management District

u/tom/pdf12/wqmaps/WQseaside

Figure IV-8



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V. ANNUAL LOW-FLOW MEMORANDUM OF AGREEMENT

Description and Purpose

The original Memorandum of Agreement (MOA) between the California Department of Fish and Game (CDFG), Cal-Am, and the District was developed in July 1983 to balance CDFG'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 MOA limits Cal-Am diversions from San Clemente Dam to the Carmel Valley Filter Plant (CVFP) and directs how Cal-Am pumps 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 2011-2012

- **2011 MOA** – The 2011 MOA was developed on September 8, 2011 and signed by the District on September 25, 2011. The final document was signed by the District and Cal-Am, 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 14 cfs from June through December 2011. The 2011 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.

- **2012 MOA** – The 2012 MOA was developed on September 11, 2012 and approved by the District Board September 17, 2012. The final document was signed by the District and Cal-Am, but was not signed by CDFG due to the same unresolved language that was proposed in 2009 by CDFG. 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 2012. The 2012 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.

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, CDFG and NMFS, in conformance with the annual low-flow 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, CDFG 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 that 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 to allow Cal-Am to combine its production allocation from the Coastal Subareas with its production allocation from the Laguna Seca Subarea. Accordingly, in WY 2011, Cal-Am was allowed to produce a maximum of 3,087 AF from the Coastal Subareas and 246 AF from the Laguna Seca Subarea, for a total of 3,333 AF from its sources in the Seaside Groundwater Basin.

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 2011, the CDO (Order 2009-0060) set Cal-Am Carmel River production to 10,429 AF. The Seaside adjudication decision limits Cal-Am production in the Coastal and Laguna Seca Subareas of the Seaside Basin to 3,202 AF and 246 AF, respectively (115 AF of the coastal amount was carryover of native Seaside Basin water that was not produced in WY 2010). This brought the WY 2011 total production limit from all sources to 13,877 AF (not including any adjustments for supplemental supplies).

In WY 2012, the CDO (Order 2009-0060) set Cal-Am Carmel River production to 10,308 AF. The Seaside adjudication decision limits Cal-Am production in the Coastal and Laguna Seca Subareas of the Seaside Basin to 2,701 AF and 146 AF, respectively. This brought the WY 2012 total production limit from all sources to 13,156 AF (not including any adjustments for supplemental supplies).

Implementation and Activities During 2011-2012

During 2011 and 2012, 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 2012 are described below.

- **Cal-Am Main System Production in Water Year 2012**[1] – During WY 2012, Cal-Am produced 12,052 acre-feet (AF) of water for customer service from all sources in its Carmel River, Seaside Coastal and Laguna Seca Subarea systems (not including 132 AF diverted from the Carmel River Basin and injected into the Seaside Basin at the District's ASR facilities). This production consisted of 7,515 AF from Carmel River source wells, 2,701 AF of native water from Seaside Coastal wells, 370 AF from Laguna Seca Subarea wells, 242 AF from the Sand City desalination plant, as well as 1,117 AF recovered from Seaside Coastal wells under separate ASR water rights. In addition, Cal-Am produced 107 AF of recovered "pre-permanent ASR water rights" water, which is a portion of the 325 AF that had not been recovered or claimed as replenishment assessment credit during the 10-year injection testing period prior to securing permanent water rights for the ASR project. Of the system total, no water was diverted at San Clemente Dam, which represents the ninth 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.

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[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 2011-2012

Figure VII-1 shows summaries of reported production from Cal-Am and non-Cal-Am wells in WY 2012, and **Figure VII-2** shows WY 2011 data for comparison. The information in **Figure VII-1** has been revised since it was presented in the April 15, 2013 Board Packet based on additional production data received for five wells that were not available at that time.

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 2012 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 2012 was 11,810 AF, or 5,832 AF (33.1%) 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 2012 was 2,659 AF, or 387 AF (12.7%) less than the non-Cal-Am production limit of 3,046 AFY established by Ordinance No. 87. Staff is continuing to obtain production data from delinquent well owners, so the non-Cal-Am portion of production may increase. Combined production from Cal-Am and non-Cal-Am sources within the MPWRS was 14,648 AF in WY 2012, which is 6,218 AF (30.1%) less than the 20,687 AFY production limit set for the MPWRS as part of the District's Water Allocation Program. It should be noted that this production limit set for the MPWRS did not include production from the Laguna Seca Subarea, whereas the WY 2012 production values above include the Laguna Seca Subarea.

During WY 2012, District staff inspected 14 new water meter installations to ensure compliance with

the District's water meter installation standards and guidelines, including two wells that were formerly registered as Land Use reporting method wells. In addition, staff reviewed copies of five 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.

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Figure VII-1

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
DRAFT WATER PRODUCTION SUMMARY FOR WATER YEAR 2012

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	7	62.2	1	0.1	8	62.3	0	0.0	8	62.3
AS2	45	136.6	36	40.1	81	176.7	3	420.7	84	597.4
AS3	126	989.5	49	52.2	175	1,041.7	6	[5] 5,464.6	181	6,506.4
AS4	30	593.0	7	2.7	37	595.8	1	1,629.1	38	2,224.9
SCS	5	263.3	1	1.1	6	264.4	5	3,925.3	11	4,189.7
LSS	7	481.5	2	2.7	9	484.2	5	369.8	14	854.0
CAC	11	76.6	7	11.6	18	88.2	0	0.0	18	88.2
CVU	287	284.5	44	44.5	331	329.0	0	0.0	331	329.0
MIS	102	338.4	10	6.8	112	345.2	0	0.0	112	345.2
ACTIVE	620	3,225.6	157	161.9	777	3,387.4	20	11,809.5	797	15,197.0
INACTIVE	316		32		348		0		348	
NOT REPORTING	24		9		33		0		33	
SAND CITY DESAL							0	242.0		adjusted
METHOD TOTALS:	960	3,225.6	198	161.9	1,158	3,387.4	20	23,861.0	1,178	27,248.5

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. 131.7 AF was subtracted from CAW production in AS3 to account for water provided to ASR Water Project (ASR Wells #1, 2 and 3) in WY 2012.
6. This total includes 1,117 AF of WY 2011 ASR injection recovery, 106.8 AF recovery of Pre-Permanent Water Rights and 3,071 AF of Native Groundwater.
7. No water was provided to Seaside (Municipal) from CAW SCS in WY 2012..

DISTRICT-WIDE PRODUCTION	
SURFACE WATER DIVERSIONS:	
CAW Diversions (San Clemente Dam):	0.0
Non Cal-Am Diversions:	24.9
CAW WELLS:	
[6] SEASIDE:	4,295.1
CARMEL VALLEY:	7,514.4
Within the Water Resources System:	11,809.5
Sand City Desal:	242.0
Outside the Water Resources System:	0.0
CAW TOTAL, Wells and Diversion:	12,051.5
NON CAW WELLS:	
Within the Water Resources System:	2,625.1
Outside the Water Resources System:	762.4
NON CAW TOTAL, Wells and Diversion:	3,412.3
GRAND TOTAL:	15,463.8

Figure VII-2

MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
DRAFT WATER PRODUCTION SUMMARY FOR WATER YEAR 2011
October 1, 2010 - September 30, 2011

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	6	93.2	1	0.1	7	93.3	0	0.0	7	93.3
AS2	45	125.4	35	37.9	80	163.3	4	328.8	84	492.2
AS3	120	1,046.0	50	51.1	170	1,097.1	6	5,229.1	176	6,326.2
AS4	28	601.1	7	2.9	35	604.0	1	3,001.1	36	3,605.1
SCS	4	265.0	2	1.6	6	266.6	5	4,144.8	11	4,411.4
LSS	5	447.2	2	2.7	7	449.9	4	385.1	11	835.0
CAC	9	49.9	7	11.6	16	61.5	0	0.0	16	61.5
CVU	260	852.3	43	42.2	303	894.5	0	0.0	303	894.5
MIS	89	299.5	10	7.1	99	306.6	0	0.0	99	306.6
ACTIVE	566	3,779.7	157	157.1	723	3,936.8	20	13,089.0	743	17,025.8
INACTIVE	303		32		335		22		357	
NOT REPORTING	79		10		89		0		89	
								adjusted		adjusted
METHOD TOTALS:	948	3,779.7	199	157.1	1,147	3,936.8	42	12,247.1	1,189	16,183.9

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. 1,117.5 AF was subtracted from CAW production to account for water provided to MPWMD Water Project #1 (ASR Wells #1 and #2) in WY 2011.
6. 275.7 AF was added to CAW production to account for water from Sand City Desal Plant in WY 2011.
7. 16.3 AF was provided to Seaside (Municipal) from CAW SCS; production volumes for both of these producers were adjusted accordingly in WY 2011.

DISTRICT-WIDE PRODUCTION	
SURFACE WATER DIVERSIONS:	
CAW Diversions (San Clemente Dam):	0.0
Non Cal-Am Diversions:	3.3
CAW WELLS:	
SEASIDE:	4,529.9
CARMEL VALLEY:	8,559.0
Within the Water Resources System:	13,089.0
Adjustments to CAW production (see Notes 5 - 7)	12,247.1
Outside the Water Resources System:	0.0
CAW TOTAL, Wells and Diversion:	12,247.1
NON CAW WELLS:	
Within the Water Resources System:	2,674.2
Outside the Water Resources System:	1,262.6
NON CAW TOTAL, Wells and Diversion:	3,940.1
GRAND TOTAL:	16,187.3

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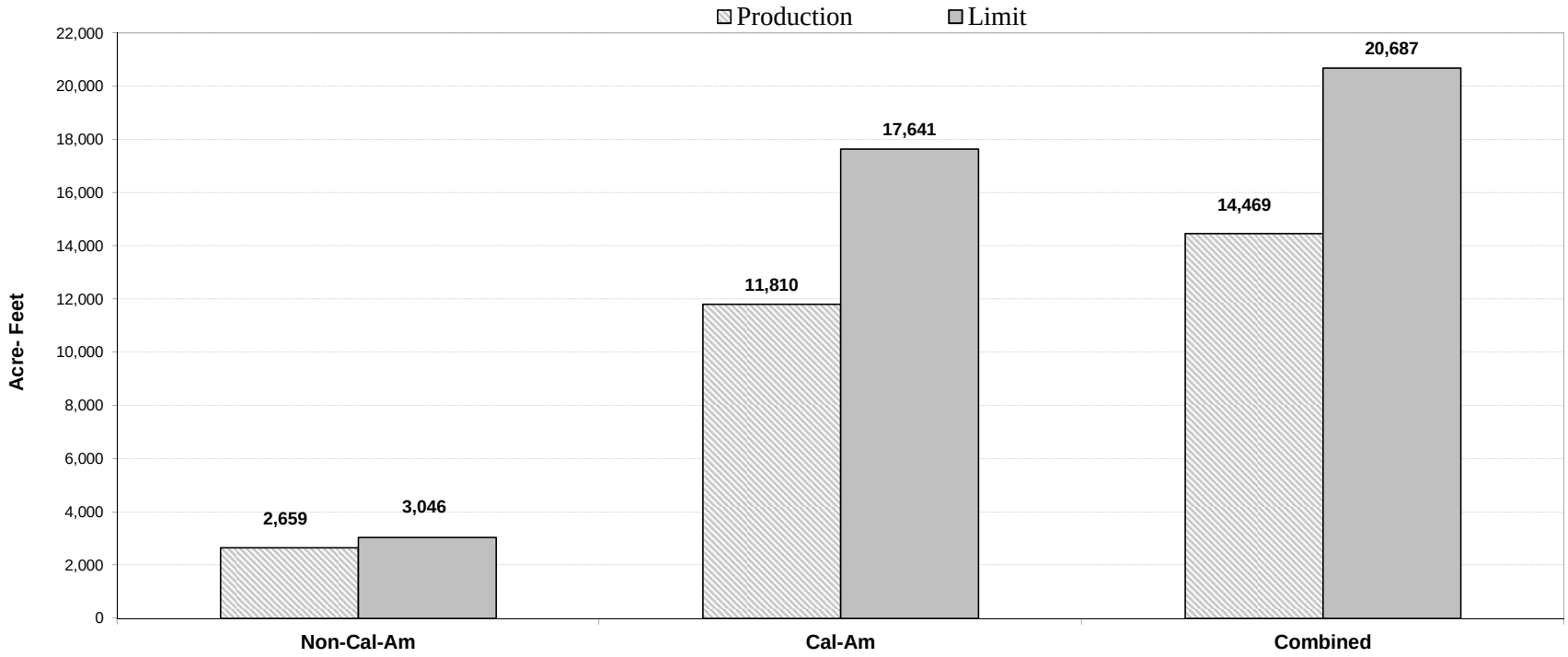
Figure VII-3

Comparison of Reported Production to Allocation Limits within the Monterey Peninsula Water Resources System Water Year 2012



VIII. WATER EFFICIENCY AND CONSERVATION

Description and Purpose

As a legislated function of the District, the District implemented a comprehensive water conservation program 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 mad 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 are 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 third key element of the Conservation Program was 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 2012, 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 2011-2012

● **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 **1,291** properties that changed ownership in FY 2011-2012 were inspected prior to the close of escrow. Eight-eight percent (**88%**) of the inspected properties were found to be in compliance during the first inspection. An additional five percent (5**%**) 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 **720** properties for compliance with Water Permit conditions during FY 2011-2012.

A total of about **1,320** inspections were conducted in FY 2011-2012. An estimated **9.287** 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 Rebate Program was suspended for lack of funding for fiscal year 2011-2012.

From July 1, 2011, through June 30, 2012, a total of **39** applications for rebates were received, one application was approved with the use of rebate refund. **Table VIII-1** summarizes the Rebate Program for FY 2011-2012.

● **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 websites.

- 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 2011-2012. 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 California American Water and 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 prestigious WaterSmart Innovations Conference and Exposition. The conference offered 16 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.

- A second CIMIS station was installed at Laguna Seca Golf Ranch. CIMIS Station #229 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 during FY 2011-2012 that effect 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)	0	14	0.584472	190,451
Ultra Low Flush to HET	0	0	0	0
Ultra HET	0	0	0	0
High Efficiency Dishwasher	125.00	10	0.03	9,776
High Efficiency Clothes Washer	0	12	0.1932	62,954
Instant-Access Hot Water System	0	1	0	0
On Demand Systems	0	0	0	0
Zero Use Urinals	0	0	0	0
Cisterns	0	0	0	0
Smart Controllers	0	0	0	0
Rain Sensors	0	0	0	0
Moisture Sensors	0	0	0	0
Lawn Removal & Replacement	0	0	0	0
Rebate Refund	-125.00	0	0	0
Total	**0.00**	**37**	**0.807672**	**263,182**

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 AF. This amount was based on the production capacity of the Paralta well (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 VIII 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 tracked separately. In addition, there are several other "Entitlements" of water available to specific areas of the CAW service area.

Implementation and Activities During 2011-2012

Between August 1993 and July 2012, a total of 324.096 AF of the 342.720 AF Paralta Well Allocation had been permitted for use by Jurisdictions, leaving 18.624 AF remaining, or 5.4 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, 2012.

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

Table IX-1

ALLOCATION REPORT
Reported in Acre-Feet
Water Year 2012

Jurisdiction	Paralta	Pre-Paralta Credits	Public	Total Water Available
Airport District	5.224	0.000	0.000	5.224
Carmel-by-the-Sea	1.397	1.081	0.492	2.970
Del Rey Oaks	0.000	0.000	0.000	0.000
Monterey	0.035	0.181	6.601	6.817
Monterey County	10.116	0.000	2.424	12.540
Pacific Grove	0.000	2.128	0.381	2.509
Sand City	0.000	0.000	23.373	23.373
Seaside	1.688	34.438	1.359	37.485
TOTALS	18.460	37.828	34.630	90.918

Allocation Holder	Total Demand from Water Permits Issued	Remaining Water Available
Quail Meadows	31.657	1.343
Water West	8.014	4.706

* 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 2012

Entitlement Holder	Entitlement	Total Demand from Water Permits Issued	Remaining Entitlement/and Water Use Permits Available
Pebble Beach Co. [1]	246.730	11.223	235.507
Del Monte Forest Benefited Properties [2] **(Pursuant to Ord No. 109)**	118.270	32.277	85.993
Macomber Estates	10.000	9.595	0.405
Griffin Trust	5.000	4.809	0.191
CAWD/PBCSD Project Totals	**380.000**	**57.904**	**322.096**

Entitlement Holder	Entitlement	Total Demand from Water Permits Issued	Remaining Entitlement/and Water Use Permits Available
City of Sand City	165.00	0.678	164.322

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 Cal-Am, District staff tracks water use (Cal-Am metered sales) 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 2011-2012

Water-use trends may be tracked by using production data at the well head, as described above, or by considering Cal-Am metered sales information, as described below. **Figure X-1** provides water-use trends from 1980 through 2012, as represented by consumption in AF per Cal-Am connection (AF/connection) for customers[1] in the Cal-Am's Monterey 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 system subunits, as well as several user classifications. For WY 2012, the use per connection is based on Cal-Am's total metered sales[2] (10,516 AF) divided by Cal-Am's total customers (38,560) and equaled 0.273 AF/connection.

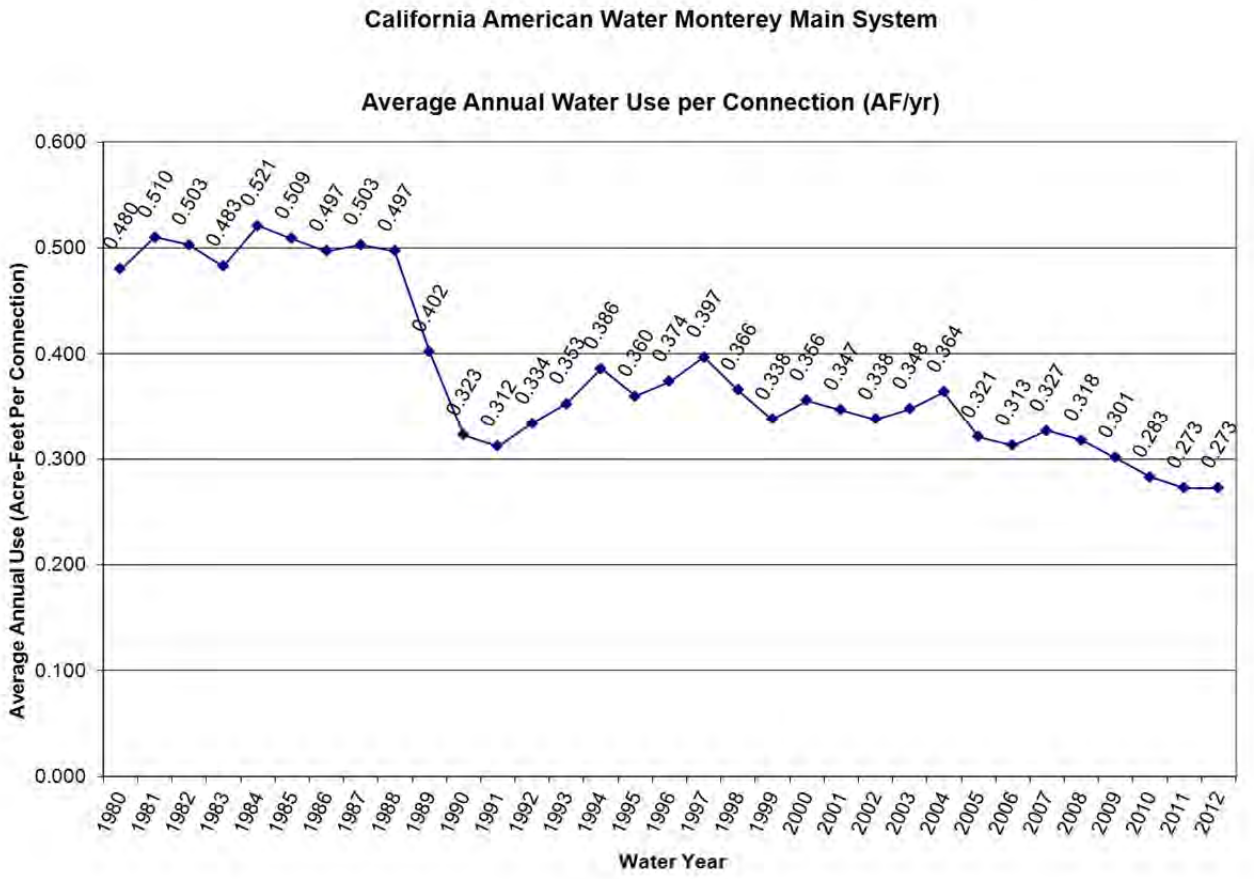
Water consumption per connection in WY 2012 was the lowest rate on record during the 1980-2012 period, likely due in part to increased awareness of the need for conservation and higher water charges, and possibly depressed economic conditions. Review of **Figure X-1** indicates that water use per connection for the last 23 years (1989-2012) 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 1989-2012, annual water consumption has remained relatively stable, with a range from approximately 0.27 to 0.40 AF/connection, and average of 0.328 AF/connection, compared to the average of 0.500 AF/connection for the 1980-1988 period. Notably, water consumption in WY 2012 (0.273 AF/connection) was 54% less than the pre-drought consumption in RY 1987 (0.503 AF/connection).

U:\mpwmd\Allocation\RY11\RY 11 Report - Place your Files in This folder\X Water Use Trends

[1] Includes residential, multi-residential, commercial, industrial, golf course, public authority, other and no-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 – 2012



XI. WATER DISTRIBUTION SYSTEM MANAGEMENT (WATER PERMITS)

Description and Purpose

The District balances water supply and demand by carefully tracking the amount of allotted water used by the Jurisdictions. 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 eight Jurisdictions within the District, there are several separate Water Entitlements: Water West, a water company purchased by 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 Meadow's subdivision, Pebble Beach Company (PBC) properties, Hester Hyde, Griffin Trust, and J. Lohr properties also have an independent Entitlement of water. Water from the Pebble Beach Company's Entitlement can be assigned to other properties located within the Del Monte Forest (Pebble Beach).

Implementation and Activities During 2011-2012

● **Permit Activity** -- From July 1, 2011, through June 30, 2012, a total of **691** Water Permits were issued. As shown in **Table XI-1**, **29** new houses and **478** residential Remodels/additions were permitted in the California American Water system. There were **34** Non-Residential Water Permits issued for Remodels/Additions and Changes of Use in the California American Water system. As of June 30, 2012, a total of **90.918 AF** of water remained available in the areas served California American Water. 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 Pebble Beach Company 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, 2012, the District had issued Water Use Permits allowing **118.270** 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, 2012, **32.277** 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 AFA. As of June 30, 2012, **five** Water Use Permits and Water Permits had been issued for a total of **0.678** 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 2011-June 2012)			
Type of Water Permit	**No. of Permits**	**Capacity (Acre-Feet)**	**Average Use Per Permit (Acre-Feet)**
New Residential	29	0.180	0.007
• *Pebble Beach Entitlements**	6	1.033	0.173
• *Sand City Entitlement**	0	0.000	0.000
Residential Remodels/Additions	478	0.194	0.001
• *Pebble Beach Entitlements**	5	0.482	0.097
• *Sand City Entitlement**	0	0.000	0.000
New Non-Residential	0	0.000	0.000
• *Pebble Beach Entitlements**	0	0.000	0.000
• *Sand City Entitlement**	1	0.060	0.060
Non-Residential Remodels/Additions	34	0.376	0.011
• *Pebble Beach Entitlements**	3	0.771	0.257
• *Sand City Entitlement**	3	0.594	0.198

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

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

Implementation and Activities During 2011-2012

Regarding compliance with SWRCB Order WR 2009-0060, Cal-Am target production from the Carmel River Basin in WY 2012 for the SWRCB tally was based on the initial regulatory limit of 10,978 AF. This number was then reduced by the CDO reduction of 670 AF, and by the WY 2012 Sand City Desalination Project production of 242 AF, resulting in and adjusted base amount of 10,066 AF. 1,117 AF of ASR recovery occurred in WY 2012, so reductions were made to Cal-Am's maximum allowable Carmel River diversions for this project bringing the total to 8,949 AF. Actual Cal-Am Carmel River Basin diversions (after ASR adjustment) for WY 2012 were 7,515 AF. Thus, Cal-Am reported diversions were 1,335 AF below the adjusted diversion limit from the Carmel River Basin imposed by the SWRCB. WY 2012 was the 15th straight year in which compliance with Order WR 95-10 was achieved and the third 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 2011-2012 reporting period.

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 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 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 District's 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, which further modified the Cal-Am production limits and imposed a production ramp-down schedule by water year. A water year begins on October 1 and ends on September 30 the following year. The District program to monitor water use includes tracking Cal-Am compliance with the SWRCB goals.

Implementation and Activities During 2011-2012

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. As noted in Section III-C of this report, 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 2012 (October 1, 2011 through September 30, 2012) data.

As shown in **Table XIII-1**, total water produced within the Monterey Peninsula Water Resources System during WY 2012 was 14,711 AF. Cal-Am's WY 2012 production of 12,052 AF is about a 1% decrease compared to WY 2011 production. Non-Cal-Am WY 2012 production of 2,659 AF (including surface diversions) is a 1% decrease compared to WY 2011 production. In WY 2012, Cal-Am accounted for about 82% of total production within the MPWRS.

Regarding compliance with limits imposed by MPWMD as part of the Water Allocation Program, Cal-Am water production from the MPWRS in WY 2012 was 12,052 AF, 68% of the annual limit (**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 2011 and 2012

WATER USER	ALLOCATION LIMIT	WY 2011 PRODUCTION	% LIMIT	WY 2012 PRODUCTION	% LIMIT
Cal-Am	17,641 AF	12,246 AF	69%	12,052 AF	68%
Non-Cal-Am	3,046 AF	2,674 AF	88%	2,659 AF	88%
TOTAL	**20,687 AF**	**14.920 AF**	**72%**	**14,711 AF**	**71%**

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.
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

[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 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 2011-2012

In 2012, District staff determined that approximately **24,665 acre-feet (AF)** of usable storage were required on May 1, 2012 to avoid requesting a District-wide voluntary 15 percent reduction in water demand. Similarly, approximately **19,369 AF** were required to avoid imposing mandatory 20 percent water rationing. Given that actual, usable storage on May 1 was estimated at **30,910 AF**, no demand reductions beyond existing Stage 1 restrictions were necessary for 2012 based on physical water availability. The 2012 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 (10,308 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 (2,848 AF), and the non CAW water production limit that was specified in the District's Water Allocation Program (3,046 AF). The 2012 trigger value for requesting voluntary 15 percent water conservation (24,665 AF) includes the water demand for the remainder of the current water year (8,616 AF) and one full year of carryover storage (16,049 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 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 2011 through June 2012 reporting period were guided by goals and objectives adopted by the Board on April 18, 2011, specifically a plan to pursue five Water Projects, which are described in more detail 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.

The following paragraphs provide a more detailed setting due to the complexity of the water supply situation. This background information is followed by a review of action in July 2011 through June 2012. For reference, quarterly written water supply project updates were provided in the January, April, July and October 2011 Board agenda materials. As of January 2012, the quarterly reports were replaced by verbal overviews and project-specific written materials at the monthly regular board meetings. All this information is available on the District website at: http://www.mpwmd.dst.ca.us/asd/board/meetings/meeting.htm (click on desired year and month).

A. Long-Term Water Supply Project

Description and Purpose

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) 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 2012. The SWRCB Order WR 95-10 identified an estimated 10,730 acre-feet per year (AFY) of historical unpermitted CAW 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 CAW 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 CAW. The draft CDO asserted that compliance with Order 95-10 – that is, to find a replacement water supply to offset unlawful diversions from the Carmel River Basin – had not yet been achieved after 12 years, and that CAW 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. The draft CDO proposed a series of cutbacks in CAW water diversions that would result in a 50% reduction in community water use by Water Year 2015. Extensive fines could be levied against CAW, 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.

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

After several additional draft versions, the final SWRCB Board determination on the CDO was issued on October 20, 2009. This would result in nearly a 50% reduction 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 in Santa Clara was held on April 22, 2010 (pursuant to SWRCB request for change in venue).

On April 22, 2010, the Santa Clara 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), with emphasis on District permits, CAW connections, rationing, etc. This FAQ also addresses a May 2010 submittal by CAW to the CPUC requesting a moratorium on new connections in its Monterey District Main System, with certain exceptions. The most recent version of the CDO FAQ dated

February 2011 is located at the link below:
http://www.mpwmd.dst.ca.us/CDO/FAQ/CDO_FAQ_20110202_HS.pdf

The District also participated in CPUC procedures regarding the CAW 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

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 CAW 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-CAW 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 CAW on August 14, 2003 requesting a Court adjudication of the Seaside Basin. The lawsuit involved issues such as: prioritization and quantification of water rights within the basin; rights to aquifer storage within the basin; rights to artificially introduce non-native water into the basin through direct injection or spreading grounds; a judicial determination that the basin is in overdraft; and 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 (the decision was subsequently amended on February 9, 2007). The complex and lengthy Decision determined that the Seaside Basin is in overdraft; quantified water rights for parties with overlying water rights; and set a reduced "natural safe yield" and a near-term "operating yield" allowed to be produced by certain parties 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 with two out of 13 votes. A MPWMD Board member serves as the MPWMD representative to the Watermaster Board. The Watermaster has generally held monthly meetings since its formal commencement on April 5, 2006.

District staff sits on the Watermaster Technical Advisory Committee (TAC) 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 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
A revised table dated September 27, 2011 on the "water supply gap" is provided at:
http://www.mpwmd.dst.ca.us/MPWMDSupplyGapPagesRevised.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 (TAC), asked the District in May 2012 to evaluate the necessary water supply required by a new project or projects. The MPWMD staff memorandum was provided to the Board at its May 21, 2012, at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120521/10/item10_exh10a.htm.

MPWMD Board Priorities for 2011-2012: On April 18, 2011, the Board amended its goals and objectives to pursue the following five Water Projects:

Water Project 1 (formerly called ASR Phase 1): Inject at least 1,111 AF of water in the 2011 season (assuming adequate stream flow), with infrastructure in place to enable operation at full capacity.

Water Project 2 (formerly known as ASR Phase 2): Complete project and expand production capability by at least 500 AF to meet SWRCB deadline for small water projects.

Water Project 3 (formerly known as the MPWMD "95-10 Desalination Project"): Assess the potential for development of local desalination facilities with the goal to establish a contingency project if the Regional Desalination Project is delayed; analyze options, including the Naval Postgraduate School site (priority site), and funding sources.

Water Project 4: Support the Monterey Regional Water Pollution Control Agency (MRWPCA) Groundwater Replenishment Project, as feasible, including cooperation on public outreach and a pilot project.

Water Project 5: Investigate Los Padres Reservoir Expansion, including a preparation of technical evaluation ("white paper"). Options include dredging or seasonal raising of the spillway level via a "rubber dam."

The August 25, 2011 MPWMD special meeting and workshop on water supply included an overview of pending reductions in Carmel Valley and Seaside, an overview of progress on the five MPWMD Water Projects, facts sheets on a variety of water supply options and breakout sessions to hear ideas from the public. The agenda materials are provided at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2011/20110825/20110825_agendaV2.htm.

A newsletter with an October 2011 status report is provided at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2011/20111017/docs/Water%20Supply%20Progress%20Flyerv3.pdf
A detailed matrix of Water Projects 1-5 implementation was provided in January 2012 at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120123/11/item11_exh11b.htm

Implementation and Activities During 2011-2012

The following paragraphs describe action on the Water Projects identified above in the July 1, 2011 through June 30, 2012 period. For clarity, background information is provided for certain projects.

> ***Water Project 1 (ASR Phase 1): Inject at least 1,111 AF during the diversion season (assuming adequate stream flow), with infrastructure in place to enable operation at full capacity.***

Water Project 1 is a cooperative effort with CAW which entails diverting excess water flows, if available, in the winter season (December 1 through May 31) from the Carmel Valley Alluvial Aquifer (CVAA) through existing CAW facilities and injecting the water into the Seaside Groundwater Basin via two MPWMD wells for later recovery in dry periods. The two wells drilled at the Santa Margarita site are now called "ASR-1" and "ASR-2." District and CAW staff and consultants regularly met to coordinate roles, responsibilities and tasks needed to enable operation of Water Project 1 at full capacity, as feasible.

The Final Environmental Impact Report (EIR) for Water Project 1 estimated 920 AFY as the long-term average project yield. In Water Year (WY) 2012, a total of 132 AF were diverted and injected in the months of March and April 2012. The cumulative injection total into the Seaside Basin from the program inception through May 2012 is 4,477 AF.

Efforts through June 2012 included completion of the Chemical/Electrical building at the Water Project 1 site as well as installation of permanent electrical power facilities. The District and CAW continued to work with the Fort Ord Reuse Authority (FORA) and the City of Seaside on easements for a strip of land that is needed to install permanent pipelines connecting the Phase 1 and 2 sites.

In 2011-2012, District staff and consultants completed the annual Water Project 1 report for year 2011, which summarized operations and included confirmation that diversions for Water Project 1 have not impeded fish passage, based on monitoring required by the CEQA process for operation of the Phase 1 ASR Project. 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. It should be noted that in future years the summary of operations at both the Water Project 1 site and Water Project 2 site at Seaside Middle School will be combined in a single report as the RWQCB oversight allows. The report is available at:
http://www.mpwmd.dst.ca.us/wrd/asr/Summary_WY11_jul12.pdf. For reference, other documents related to ASR may be found at: http://www.mpwmd.dst.ca.us/WaterProject1.html. A powerpoint presentation from October 2011 is provided at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2011/20111017/ppt/9.pdf.

Funding: On June 21, 2012, District and CAW staff met to discuss the potential for a long-term capital and operating lease for the District's Santa Margarita ASR facility. Such a lease would be modeled on the Sand City Desalination facility lease. The reason for such a lease would be to ensure recovery of some prior capital investment and creation of additional capital in order to complete the project, as well as to better define the operating relationship. This is a back-up measure to the District's new annual water supply charge to fund project completion and maintain stronger District control over the asset.

Costs for Water Project 1 have been primarily funded through a user fee that was included with the CAW water bills, until this funding mechanism was curtailed by the CPUC in 2009. The District continued to work on replacement revenue sources for Water Project 1 expenditures, including reimbursement agreements with CAW and other alternatives. An extensive effort occurred in January through June 2012 regarding a new ordinance that created a property assessment source of funding for water supply projects. Completion of Water Project 1 and 2 depends on these funds. For more information, please refer to the District website at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120627/0627agenda.htm.

Water Project 2 (ASR Phase 2): Complete project and expand production capacity by at least 500 AF to meet SWRCB deadline.

Well Construction and Easements: Water Project 2, with two proposed wells at the Seaside Middle School site, is expected to produce another 1,050 AFY. MPWMD began Water Project 2 planning work in 2008, and completed the first phase of development with the installation of dedicated monitor wells at the Middle School site 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). The first of the two planned ASR wells (ASR-3) was constructed in 2010 and appurtenant facilities were installed in 2011. Injection testing was initiated at ASR-3 in 2012. Also in 2012, the District completed the necessary California Environmental Quality Act (CEQA) documentation (Addendum to the Phase 1 ASR Project EIR) for the permanent Water Project 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 CAW 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. The second well (ASR-4) was not yet constructed as of June 2012.

The Water Project 2 site is planned to be a permanent ASR facility similar to Water Project 1. Remaining work will entail completion of the necessary engineering designs, permitting and construction of permanent facilities, including: a second full-scale ASR well (ASR-4), and permanent utility pipelines, electrical facilities, and a backflush percolation system. There will be no water treatment facilities at the Seaside Middle School ASR site; all water treatment prior to distribution into the CAW system will occur at the Santa Margarita facility. As of June 2012, a temporary pipeline from the Water Project 2 site to the Water Project 1 site for back-flushing was completed.

At its May 21 and June 12, 2012 meetings, the Board authorized a contract with Zim Industries to construct the ASR-4 well, including drilling a pilot borehole, installation of well casing, screen and gravel pack, development and testing of the well, provision of a pump, motor, flow control valve and

temporary discharge piping. By easement restriction, the well construction must occur during the summer school break period to avoid disruption of school activities at the Seaside Middle School site. The Board's authorization was with the understanding that the District and CAW will secure a cost reimbursement agreement prior to project initiation. Additional information is on the District website at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120521/02/item2.htm
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120612/15/item15.htm

The intent was to construct and equip the ASR-4 well during summer/fall 2012 so that the well will be ready for injection testing with Carmel River basin source water as soon as all site appurtenant facilities are completed. Please refer to next year's report for additional information.

Water Rights: Water Project 2 is facilitated by Amended Permit #20808C, authorized by the State Water Resources Control Board (SWRCB) on November 30, 2011, which allows MPWMD and CAW to divert an additional maximum of approximately 2,900 acre-feet per year (AFY), depending upon rainfall and operational limitations from the Carmel Valley Alluvial Aquifer for injection to the Seaside Basin via proposed Water Project 2 facilities if minimum instream flow requirements in the permit are met. Full implementation of Water Project 2 is estimated to yield an average of 1,000 AFY, which is additive to the estimated average yield of 920 AFY currently with Water Project 1. Thus, successful implementation of Water Project 2 could result in an average reduction of 1,920 AFY in diversions from the Carmel Valley Alluvial Aquifer during the summer season (June 1 – November 30), as required by Amended Permit #20808C.

CEQA: District staff and consultants prepared project description and hydrogeologic information for a technical addendum to the original Environmental Impact Report (EIR) on Water Project 1. Work had been conducted under a CEQA exemption for the WP2 test project; additional environmental review was needed for a long-term, permanent facility. At its April 2012 meeting, the Board formally approved Water Project 2 and accepted an Addendum to the original EIR/EA for Water Project 1. The Addendum provides a description of full implementation of Water Project 2 at the Seaside Middle School site. The Addendum is intended to support any and all future discretionary approvals for installation and operation of permanent facilities at the site. For more information, consult the District website at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120416/16/item16.htm.

Funding: In February 2011, the District and CAW executed a reimbursement agreement for MPWMD's expenses (not to exceed $2,750,000) associated with Water Project 2. These payments cover the cost of the actual expenses for planning, design, and installation of the first ASR well at the site (ASR-3) and associated appurtenant facilities.

As of June 30, 2012, the District and CAW were in the process of completing a second reimbursement agreement for the second well ("ASR-4). The agreement is an outgrowth of CPUC Decision 12-06-020 (issued on June 21, 2012) that allows CAW to create a Phase 2 project memorandum account in which to record costs associated with the ASR-4 well. Under the proposed agreement, Cal-Am would reimburse the District for the costs that the District incurs in designing, permitting, constructing, equipping, and testing the ASR-4 well, as well as its associated permanent appurtenant facilities at the Seaside Middle School site. The reimbursement agreement does not include any funding provisions for existing or planned improvements at Water Project 1 (Santa

Margarita site).

CAW Infrastructure: The capacity of the CAW distribution system to deliver injection water simultaneously to both Water Project 1 and 2 continued to be the subject of coordination meetings between MPWMD and CAW staff. CAW has indicated that the needed infrastructure upgrades to deliver injection water at full build-out capacity at both sites may not be available until CAW's "Monterey Pipeline" improvements are in place. In the meantime, pipeline construction by CAW in early 2011 in the City of Monterey helped improve the ability of CAW to deliver injected and stored water from the Seaside Basin wells to a larger area and number of customers in the CAW system.

> ***Water Project 3 (MPWMD Desalination Project): Assess the potential for local desalination facilities so as to establish a contingency project if the Regional Desalination Project is delayed; analyze options, including the Naval Postgraduate School site (priority site), and funding sources.***

In fall 2009, District consultants completed hydrogeologic field work and laboratory analyses along the Fort Ord coastline. A technical report on desalination project feasibility was presented to the Board at its December 14, 2009 meeting. The report concluded that the coastal Fort Ord hydrogeology does not support its use as the source of subsurface feedwater for a larger desalination project, and the District should not pursue the project. This is primarily due to the fact that there is not a continuous clay barrier to protect the lower Paso Robles and Santa Margarita aquifers from contamination by seawater extracted for the desalination project. The Board directed staff to provide a description of desalination projects investigated by MPWMD in the past in order to assess whether there are any remaining viable local desalination options within the District. This staff report was provided to the Water Supply Planning (WSP) Committee at its March 8, 2010 meeting. The staff report is provided on the District website at:
http://www.mpwmd.dst.ca.us/asd/board/committees/watersupply/2010/20100308/02/item2.htm.

The WSP committee recommended that staff proceed with investigation of the potential for projects within the District boundary, with emphasis on desalination. A minimum desalination project production goal of 2,000 AFY was set by the WSP committee. The District Engineer continues to lead this effort. In 2011, District staff met with representatives of the Monterey Bay National Marine Sanctuary, Naval Postgraduate School, City of Sand City, Pebble Beach Company, CPUC Division of Ratepayer Advocates, City of Santa Cruz, City of Monterey, and various coastal property owners regarding the potential for desalination projects within the District boundary.

At its November 15, 2010 meeting, the Board received the District Engineer's assessment of various sites evaluated in August 2008 consultant report titled "Monterey Peninsula Water Management District 95-10 Project Constraints Analysis." More information is available on the District website at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2010/20101115/15/item15.htm.
The WSP Committee meeting agendas and materials are on the website at:
http://www.mpwmd.dst.ca.us/asd/board/committees/watersupply/2011/2011.htm and
http://www.mpwmd.dst.ca.us/asd/board/committees/watersupply/2010/2010.htm.

Beginning in April 2011, the met with the Naval Postgraduate School (NPS) about the possibility of developing a desalination project at the abandoned City of Monterey wastewater treatment plant site that is now owned by the Navy. The local Navy administration wished to support local water

initiatives but expressed concerns about impact to the Navy's mission. The Water Supply Planning Committee met in November 2011 and recommended a Letter of Introduction to the Naval Support Activity, Monterey (decision-making body for the desalination site).

Regarding development of a desalination project in Sand City, Director Pendergrass stated at the May 4, 2011 WSP Committee meeting that development of additional desalination facilities within the City boundary is infeasible due to potential impacts to the existing desalination facility.

Through June 2012, representatives from Deep Water Desalination (near Moss Landing) and "The Peoples Desalination Project" (also at Moss Landing) 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

A list of archived desalination documents and links are provided at:
http://www.mpwmd.dst.ca.us/desalination-projects/desalination-projects.htm

Water Project 4: ***Support the MRWPCA Groundwater Replenishment Project, as feasible, including cooperation on public outreach and a pilot project.***

The MPWMD Board previously directed staff to assess the status of the Groundwater Replenishment Project (GWR) proposed by the Monterey Regional Water Pollution Control Agency. Possibilities include purified wastewater for irrigation only, and/or as potable supply through groundwater injection. In a September 2010 presentation, the MRWPCA General Manager noted that the GRP had been placed "on hold" until its role in the multi-agency Regional Water Project could be resolved. The MRWPCA presentation is available on the District website at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2010/20100920/ppt/7_files/frame.htm

In December 2010, based on the CPUC's approval of the Regional Water Supply Project, MRWPCA staff indicated a desire to restart work on the GRP as part of Phase 2 of the Regional Project, and requested MPWMD support. At its December 13, 2010 meeting, the MPWMD Board approved issuing a letter to MRWPCA expressing support for further investigation of the proposed GRP and related agency cooperation. The staff report and letter is provided on the District website at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2010/20101213/09/item9.htm and
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2010/20101213/handouts/item9.pdf.

At its March 31, 2011 Goal Setting Workshop, the District Board reiterated its intent to support reuse of recycled water, as feasible given MPWMD budget constraints. The Board directed staff to continue to work with MRWPCA to encourage wastewater recycling, including outreach and public education.

At its February 15, 2012 meeting, the District's Board directed the General Manager to develop a draft Memorandum of Understanding (MOU) between the District, MRWPCA, and CAW regarding a Groundwater Replenishment Project (GWP). This was presented to the MPWMD Board at its April 20, 2012 special meeting, which approved it. 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

Water Project 5: ***Investigate Los Padres Reservoir Expansion, including a preparation of technical evaluation ("white paper").***

Pursuant to previous direction of the Board, District staff pursued options for increasing storage at Los Padres Dam and Reservoir, which is owned by CAW. This effort stalled when CAW responded to District inquiries in an October 5, 2009 letter, which stated that CAW has "no interest" in making modifications to the dam. CAW confirmed its position in September 2010. A written report is provided in the January 28, 2010 agenda packet at:
http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2010/20100128/03/item3.htm

In a related matter, the District received a December 2011 letter from the National Marine Fisheries Service (NMFS) in response to the District's inquiry in October 2011 regarding either a new dam on the Carmel River or increased capacity to the exiting Los Padres Dam and Reservoir. NMFS is not supportive of either proposal.

Participation in Regional Water Supply Project Planning and Selection.

In 2011-2012, the District adopted a leadership position in the community with respect to water supply planning. In addition to the five water supply projects described above, the District was actively involved in 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. Please see annual, quarterly and monthly reports on the District website regarding District action regarding CAW's proposed Coastal Water Project, later refined as the Regional Water Project (RWP), and once again refined as the Regional Desalination Project. District participation in the California Public Utilities Commission (CPUC) approval processes accounts for significant staff and legal counsel effort.
It is notable that the regional project approved to date has focused solely on legalizing the existing supply; a second, expanded phase is needed to address future needs of the jurisdictions such as legal lots of record and new subdivisions to be served by CAW. Thus, the MPWMD Water Projects could be viewed as either a replacement for the RWP, if it does not move forward, or as an adjunct to facilitate needed future supply.

The November 22, 2011 Water Supply Planning Committee featured implementation timelines and work requirements for Water Projects 2-5. This portfolio of District projects continued to be developed as an alternative should the Regional Project not move forward, as well as to be available if and when needed for future supply needs beyond the Regional Project.

Regional Desalination Project
In late 2011, many meetings were held by a variety of parties and stakeholders about governance of the Regional Desalination Project should it move forward. District staff met with representatives of the County, Marina Coast Water District (MCWD), and CAW in December 2011 and January 2012

to discuss governance of the Regional Desalination Project should it move forward, with emphasis on accountability to the community.

Importantly, on January 17, 2012, CAW announced that it was withdrawing support for the Regional Desalination Project, 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) – a decision that would delay the project another 12 to 18 months.

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 recharge and ASR. In May 2012, the District Board voted to become involved in the CPUC process as a formal Party. In that role, the District will take a formal position on the project and reflect the District's interests. The initial position statement included support, in concept, for the Groundwater Recharge (GWR) and ASR components of the proposed project, and a desire to lend its status and capabilities as a public agency to help the desalination component achieve the lowest cost impact on ratepayers and implementation in a timely fashion. On June 4, 2012, the District filed its pre-hearing conference statement regarding CAW's application. This process continues to evolve as new facts emerge and the projects become refined over time.

Monterey Peninsula Regional Water Authority (MPRWA)

In early 2012, the mayors of local jurisdictions created a Joint Powers Authority (JPA) and named it the Monterey Peninsula Regional Water Authority (MPRWA). The Authority first met on February 9, 2012. On February 14, 2012 the District received a letter requesting input from the District on several key issues. The MPRWA invited General Manager Stoldt to serve on its Technical Advisory Committee (TAC), and the District attended the first TAC meeting on March 15, 2012. District staff continues to play an important role on the TAC.

On June 28, 2012, the JPA issued a request for proposals (RFP) for consultant services. The Contractor will be retained to provide an independent, unbiased, third-party cost assessment of three proposed regional desalination projects, as well as an evaluation of schedule and financing. District staff prepared the draft RFP on behalf of the TAC. The District General Manager was elected as chair of the Technical Advisory Committee at its July 2, 2012 meeting. More information on the JPA and TAC will be provided in next year's report. Additional information is available at: http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2012/20120716/13/item13.htm.

B. Near-Term Water Supply Projects

Description and Purpose

Section XV-A above describes long-term water supply alternatives, including the MPWMD ASR Water Project 1 and 2 Projects. This section focuses on annual ASR testing. Since 1996, the District has evaluated the feasibility of ASR at greater levels of detail. As of June 2012, the District had constructed four 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 March 2001 (now ASR-1); (3) another full-

scale ASR well at the Santa Margarita site (ASR-2); and a full-scale ASR well at the Seaside Middle School site (ASR-3). Injection in WY 2012 occurred at both ASR sites. 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 2011-2012

Between Water Years (WY) 1998 and 2012, the cumulative injection total into the Seaside Basin of excess winter flow from the Carmel River Basin was approximately 4,477 AF . As described in Water Project 1 above, diversion for WY 2012 occurred from March through April 2012 with a total of 132 AF injected. In WY 2012, Cal-Am recovered 1,117 AF of ASR water and delivered it to its system for customer use.

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
The materials for stakeholder meetings in 2012 are provided at:
http://www.mpwmd.dst.ca.us/Mbay_IRWM/2010PG/Stakeholder-info-meetings/stakeholder.htm

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 often 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 District monitors streamflow, captures emigrating smolts, and transports them to the lagoon or ocean.

Implementation and Activities During 2011-2012

The Carmel River had nearly continuous flow to the lagoon from July 2011 through June 2012 although flows for the entire period remained quite low **(Figure XVI-1)**. April 2012 had the greatest total discharge at 5,970 acre-feet, while the peak flow of the year occurred April 14, 2012 (190 cubic-feet-second, measured at the MPWMD's Highway 1 Gage) and provided fair conditions for smolt migration to the Carmel River Lagoon between the mid-March to early-May period. No smolts were captured during regular rescue operations in 2011 and no smolt trapping was needed during spring 2012, although staff was prepared to trap and transport if needed **(Figure XVI-2).**

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 from October through February. 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 2011-2012

District staff monitored river conditions during the fall and winter months of 2011-2012. Although the minimum daily flow dropped to 2.5 cfs in September and the maximum daily flow never exceeded 63 cfs at Highway 1 Gage, the river remained wet and no rescues were needed during this time **(Figure XVI-1)**. As a result of these low flows there was a moderate risk of fish stranding, and conditions were carefully monitored throughout the fall and winter in case rescues were needed.

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 San Clemente 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 Sleepy Hollow Steelhead Rearing Facility (SHSRF), located just downstream of San Clemente Dam, if existing habitat is not available or is fully saturated with juvenile steelhead.

Implementation and Activities during 2011-2012

- **MPWMD Annual Rescue Totals –** The surface flow of the Carmel River dropped to 10 cfs at the Highway 1 Bridge by August 15, 2011. In response to this decline, District staff began full-scale rescues on that day. Rescues continued for two weeks through August 29, 2011 between Highway 1 Bridge (RM 1.0) and Via Mallorca Br. (RM 3.24). During this period staff conducted 9 rescue operations, yielding a total of 1,751 steelhead including: 1,670 young-of-the-year (YOY), 81 yearlings (1+), and 0 mortalities **(Table XVI-1a)**. This total translates to 781 fish-per-mile (fpm) or 0.15 fish-per-lineal-foot (fpf). Since 1989, District staff has rescued 366,873 steelhead from drying reaches in the mainstem Carmel River. Compared to previous rescue seasons, rescue totals in the 2011 dry season were well below the 1989-2011 average of 15,951 **(Figure XVI-3)**.

- **2011 Dry Season, MPWMD Transplant Location –** During the 2011 dry season, a total of 1,751 juvenile steelhead rescued by MPWMD were transported and released at two different locations within the Carmel River watershed **(Table XVI-1b)**. All fish were released into the District's SHSRF (1,734) or in Garland Park (17). Due to the presence of striped bass, which have the potential to prey on juvenile steelhead, no rescued fish were released in the lagoon in 2011.

- **CRSA Annual Rescue Totals –** During the 2011 dry season, June through September, a total of 7,713 steelhead were rescued from five Carmel River tributaries by the Carmel River Steelhead Association (CRSA), including 7,480 YOY, 233 yearlings, with 218 (2.8%) mortalities. The majority of the rescued fish were from Cachagua/Finch Creeks (5,995), with lesser numbers from Garzas Cr (616), Robinson Canyon Cr. (363), Hitchcock Canyon Cr. (694), and Potrero Cr. (45). The CRSA did not do any mainstem rescues in 2011.

- **2011 Dry Season, CRSA Transplant Location –** During the 2011 dry season, juvenile steelhead rescued in the tributaries by the CRSA were released in the mainstem at the confluence of that tributary. The mortality of rescued and transported fish was 2.8% (218).

- **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 2011 – No major modifications were done at the Facility during the 2011 rearing season.

Summary of 2011 SHSRF Fish Stocking and Releases - Steelhead rescues began in August 2011. Between August 15 and August 30, staff received approximately 1,734 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. 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. These differences represent fish that are consumed by other fish during transport and quarantining, or numerical counting errors in the field during rescue operations. A total of 1,685 fish were stocked in the Facility after quarantine, including 1,610 young-of-the-year and 75 yearlings **(Table XVI-2)**.

During the 2011 three-month rearing period, 11% (186) of the Facility's fish died as a result of disease, stress, or general poor health, and 6% (106) were unaccounted-for mortalities, potentially through intraspecific predation (cannibalism). This is a 10% and 31% decrease from the 16-year averages of 21% diseased mortality and 37% unaccounted-for mortality. These results are likely due to new adaptive rearing management practices that target decreases in cannibalism and post rescue mortality.

Due to the "natural" rearing channel habitat (riffles and pools, cobbled bottom, boulders, logs, etc.) the fish cannot be graded into different sizes once they have been 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 was to match the size of the fish reared in the Facility to the size of the fish reared naturally in the river. Fish size distribution histograms comparing the November 2011 Facility fish to the October 2011 population survey results from the Sleepy Hollow and Garland Park stations **(Figure XVI-4**) clearly show that the sample of Facility fish are larger on average than their naturally reared counterparts (174 mm FL versus 110 mm FL and 87 mm FL, respectively). Recent studies in the Scott Creek watershed (Santa Cruz County) support past investigations that show that ocean survival is size-dependent and the larger the fish is at ocean entry increases the chances it will return. This study indicated that optimum size at ocean entry in Scott Creek was 150-250 mm. Of the fish measured in November (210) at SHSRF during release, 63% (132) were 150-250 mm in size.

In mid-October 2011, a storm hit the central coast increasing the river flow and reconnecting the river to the lagoon. In consultation with the National Marine Fisheries Service (NMFS) and the California Department of Fish and Game (CDFG) staff decided to release all the fish from the Facility in November. Fish from each rearing channel bay (pool) were subsampled for length and weight, and then the condition factor was calculated from this data. Average lengths, weights and condition factors for each rearing channel bay are shown in **Table XVI-3**. Most fish were in excellent physical condition, and ranged in size from approximately 3.5 to 13.5 inches (89 to 343 mm), and averaged 6.8 inches (174 mm). A total of 1,393 fish from the rearing channel were released in the lower river between River Mile (RM) 3.1 and 4.2 **(Table XVI-4)**.

The overall survival rate of fish reared at the Facility during the 2011 rearing season was 83%, a 41% increase from the Facility's 16-year average of 42%. This was likely due to lower stocking densities, improved disease prevention methods, and newly adaptive rearing management practices.

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 2011-2012

● **Winter Steelhead Adult Run** - The fish counter and video monitoring equipment at San Clemente Dam was operated continually between December 2011 and May 2012. A total of 470 fish passed by the counter, including 0 in December, 0 in January, 72 in February, 366 in March, 32 in April, and 0 in May **(Figure XVI-5)**. Analysis of the video suggests that the first sea-run adult steelhead passed the counter on February 15, 2012.

Due to low instream flows, the District directed Cal-Am to release an additional pulse of water from Los Padres Reservoir from March 1-2 to allow adult steelhead trapped in the lower river to continue their upstream migration. This proved successful as 42 adults were counted at the SCD ladder over the next three days.

The 2012 adult run of 470 fish was above the average run size of 431 fish for the 1994-2012 period where fish have been reliably counted using the District's continuous mechanical counter **(Figure XVI-6)**. The 2012 run was the largest run size, and only the third run of 400 or more fish, since 2003.

The Los Padres Dam Fish Trap is operated and monitored by Cal-Am. The number of trapped adult steelhead reported during the 2012 migration season was 174, including 6 in February, 156 in March, and 12 in April **(Figure XVI-7)**. The 2012 run size was the eighth highest on record since 1949 and the second highest since 2002 **(Figure XVI-8)**. The 2012 run of 174 fish was 61% above the average run size of 106 fish, for the 1949-2012 period.

● **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 redd surveys above SCD in 2007, and instead focused on the lower Carmel River. In the spring of 2007, 2008 and 2009 one thorough survey pass was completed between the Highway 1 Bridge and San Clemente Dam. The survey's 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.

During March 2012, fisheries staff completed a redd survey from just below Boronda Bridge

(RM 12.6) to the downstream end of the Rancho Canada Golf Course (RCGC) (RM 2.0). The river flow at the time of the survey was very low at 17 - 20 cfs at the Highway 1 gage. A slight increase in river flow in late January allowed adult steelhead to enter the river through the lagoon, but a very dry February reduced flows to the point where those fish were potentially unable to continue their upstream migration due to several critical riffles. There was concern about stranded adults being forced to spawn in sub-standard habitat and adult fish rescues were being discussed. Conditions were similar to those in 2007 when many adults became trapped and spawned in the lower river where many of those redds dewatered before the fry emerged from the gravel.

On March 1-2, 2012, Cal-Am released additional water from Los Padres Reservoir to bring the river flow up to 48 cfs for one day at the Near Carmel Gage and allow trapped adult steelhead to continue their upstream migration past the critical riffles. During the next three days, 42 adults were counted at the SCD ladder. By March 6th the river had returned to base flow (~18 cfs). The majority of this redd survey was conducted after the return to the base flow conditions.

Overall, spawning habitat in the lower river below Boronda Br. (RM 12.7) was good with abundant clean gravel available, even to the lower end of the RCGC reach. A total of 58 redds were counted, including eight redds downstream of Via Mallorca Bridge **(Table XVI-5)**. The furthest downstream redd was observed below the RCGC Br. #4 (RM 2.3). (Note: 4 lamprey redds were observed in the Scarlett reach, RM 9.3).

A few smolts and fingerling size steelhead were observed throughout the reach, but no fry were seen since it was too early in the year. Eighteen adults were observed, including two spawning pairs.

- **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.

Typically 11 sites are surveyed, but in 2011 only five sites were sampled throughout the 20-mile reach between Valley Greens Road in lower Carmel Valley and Los Padres Dam due to budget constraints. Because of the on-going excellent flow conditions in the lower valley, Staff again took the opportunity to sample the new Valley Greens Bridge site (RM 4.8) as well as two other lower valley sites while Sleepy Hollow and Cachagua rounded out the five sites. The juvenile steelhead population density at the five stations averaged 0.40 fish-per-foot (fpf) of stream and ranged from 0.11 fpf at the Valley Greens Station (RM 4.8) to 1.07 fpf at the Sleepy Hollow Station (RM 17.5) **(Table XVI-6).**

While the 2011 juvenile steelhead population density was slightly higher than in the previous two years, it was considerably less than the long-term average (1990 - 2011) average density of 0.81 fpf. In addition, the downward population trend over the past ten years continued **(Figure XVI-9).** Despite excellent river flow conditions in 2011 and a much higher number of returning adults at the SCR ladder (452), compared to 2010 (157), the number of juvenile steelhead remained very

low. It was projected the juvenile population would follow the 3-year-cycle pattern and rebound in 2011. It is unclear why that rebound did not occur but its possible densities were greater at sites that were not sampled.

- **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 2012 dry season, it was estimated that this mode of operation and flow releases from Los Padres Reservoir resulted in approximately 5.46 miles of additional viable aquatic habitat. The additional steelhead population density produced by this mode of operation was not calculated due to insufficient data availability.

E. Other Activities Related to the Steelhead Resource

The District carried out several activities in RY 2012 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 the benthic macro-invertebrate (BMI) communities, (d) Carmel River Lagoon water quality monitoring, and (e) assessment of steelhead migration barriers.

"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 March 2012, staff applied again to the California Department of Fish and Wildlife's (CDFW) Fisheries Restoration Grants Program to acquire $170,000 of funds for a $213,000 spawning habitat restoration and adult steelhead monitoring project below Los Padres Dam. The proposal made it past the administrative review to the Technical Review Team and the Peer Review Committee (grant was awarded in February 2013).

In November 2000, the District began a bioassessment program using benthic macro-invertebrates (BMI) as an indicator of water and habitat quality at four locations between Los Padres Dam and the Red Rock steelhead population survey site. In 2004, a new site above Los Padres Reservoir was added. The above Los Padres location can be used as a reference site to compare "pristine" habitat to habitat below the dams, and that of the lower, more developed valley. Results from the BMI analysis can be used as an indicator of water quality and food quantity and quality for juvenile steelhead, both between the sites and over time. Low BMI abundance may be attributable to: (a) poor substrate quality [little available gravel or filled-in interstitial spaces

(embeddedness)], (b) high levels of suspended particulates/turbidity, (c) poor oxygen concentration, or (d) high water temperature. BMI samples are collected from each site in the fall and sent to a laboratory for analysis.

In 2011, samples were taken at two sites, but were not sent to the lab for analysis due to budget constraints. In 2012, Staff began training for CDFW's new comprehensive Surface Water Ambient Monitoring Program (SWAMP) protocol and will switch the District's program over to it once they are fully trained.

In addition to the bioassessment program, the District also began detailed monitoring of substrate conditions at its juvenile steelhead population survey sites in 2000. Substrate size distribution and embeddedness are analyzed and compared over time and space at each location. Substrate size and embeddedness affect both steelhead spawning and rearing success, as well as the presence and abundance of the BMI that steelhead feed on. No embeddedness monitoring was done in 2011 due to budget constraints.

Implementation and Activities in 2011-2012

- **Rescue and Transportation of Kelts** – Normally, steelhead kelts migrate downstream in late spring through June. Although lower river spring flows were barely adequate for adult migration, monitoring was done and no kelts were observed or rescued in Spring/Summer 2012.

- **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 spawning habitat by at least 50%, the District applied again to the CDFW Fisheries Restoration Grants Program for funding to inject up to 1,500 tons of spawning gravel below the dam.

- **California Stream Bioassessment Procedure** – In November 2010, the District completed its summary report "Ten-Year Summary of the Monterey Peninsula Water Management District's Bioassessment Program on the Carmel River" (King, J. Thomas, 2010). This 102 page report can be downloaded from the District's web page.

Due to budget constraints, regular BMI sampling was not conducted in 2011. But, because of the unusually wet conditions in the lower river District staff did collect BMI samples at two locations and stored the samples for future analysis. The Valley Greens Rd Station (RM 4.83) was sampled for the second year in a row and a brand new site located at the Crossroads Shopping Center (RM 1.35) was added allowing the BMI dataset to cover an additional 3.5-miles of stream.

- **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 report and recommendations will be completed in late 2013. 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.

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, District staff has noticed 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, slightly above the 1994-2012 average of 431 adults.

Previous redd surveys below SCD confirm that the spawning habitat in the lower river has improved considerably over the last 20 years and adults are spawning in the lower river 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. The District deployed a DIDSON counting station, acquired from CDFW grant funding, during the 2011-2012 migration season in the lower river to help determine whether more adults are in fact spawning in the lower river.

At present, the exact reasons for this period of apparent decline in adult returns at SCD are not clear, but 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;

- 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;

- 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, 2009, 2010 and 2011 affecting subsequent adult populations;

- Variable ocean conditions; and the

- Ongoing but limited impacts of legal fishing (i.e., approximately 0.5 - 1.5% incidental mortality associated with catch-and-release fishing for adults in the winter season, and fishing for juvenile steelhead from in the upper watershed during the spring/summer trout season may slightly reduce the adult spawning stock or the number of juvenile fish that reach the ocean), as well as illegal poaching activities.

- **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 2011-2012 reporting period, the average population density was well below the long-term average of 0.81 fpf for the Carmel River due primarily to low adult returns in 2009-2010.

  District staff believes the recovery and fluctuation of the juvenile steelhead population in the Carmel River Basin is directly related to the following 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 23 years, now totaling 366,873 fish through 2011;

- Rearing and releases of rescued fish from the SHSRF of nearly 82,000 juveniles and smolts back into the river and lagoon over the past 16 years, at sizes larger than the river-reared fish, which in theory should enhance their ocean survival;

- 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;

- Chronic, and occasionally acute, fall temperature and hydrogen sulfide levels below LPD,

and the increase in suspended sediment from the SCD summer draw-down; and the

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

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 possible removal of the dam. The most significant issue is the effect of released sediment from the reservoir on downstream river habitat, proper functioning of MPWMD's SHSRF, and downstream property owners (flood elevations). Major changes include:

- Lowering of the reservoir water level to address seismic safety concerns;

- Significant changes in the sediment regime in the Carmel River downstream of San Clemente as the dam fills with sediment; 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, CDFG, NMFS, U.S. Fish and Wildlife Service, and others involved in addressing the resource management issues associated with seismic retrofit of San Clemente Dam. 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, and Carmel Area Wastewater District, 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 the MPWMD Highway 1 gaging station.
July 2011 through June 2012.

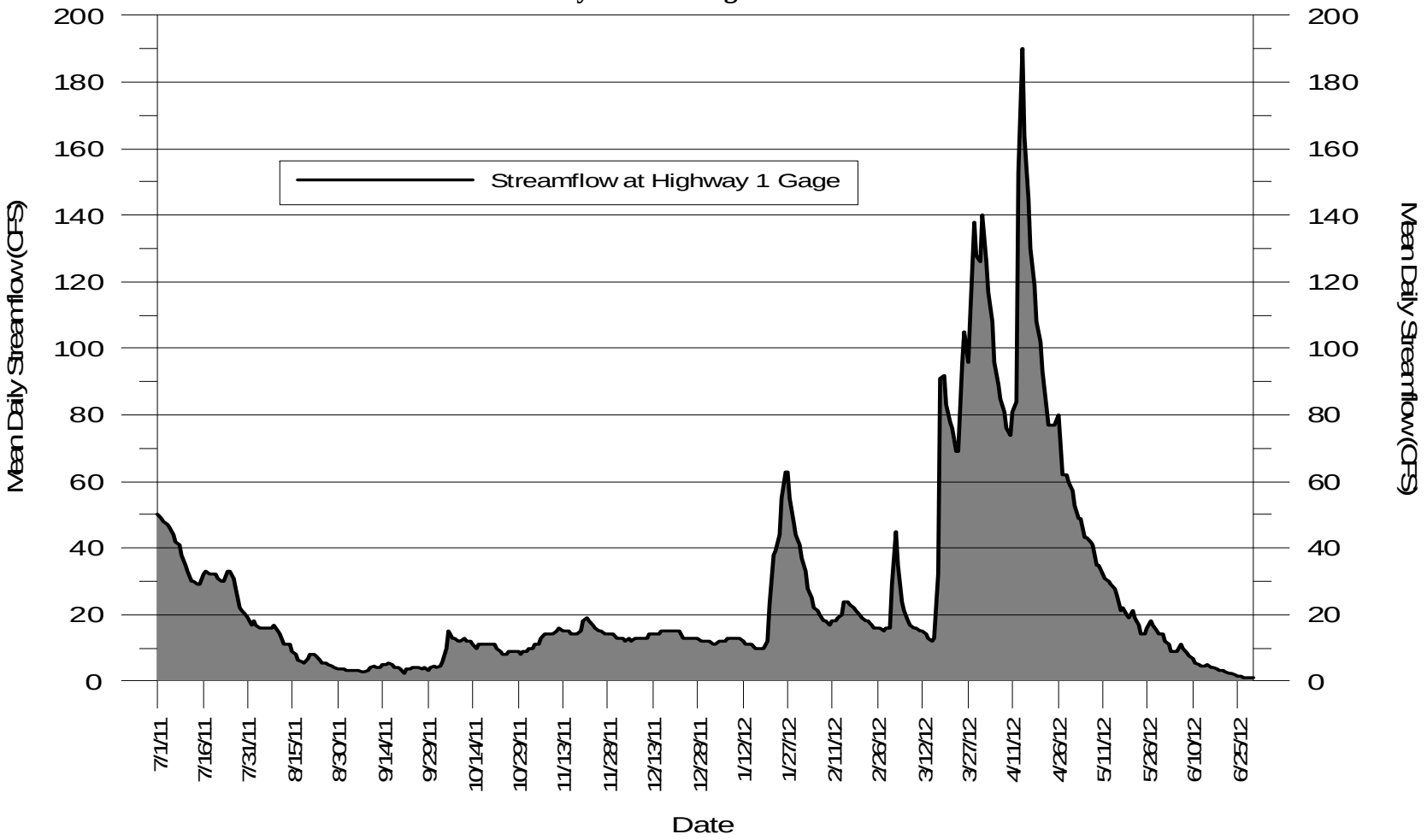


Figure XVI-2

Number of Steelhead Smolts Rescued in Carmel River Basin

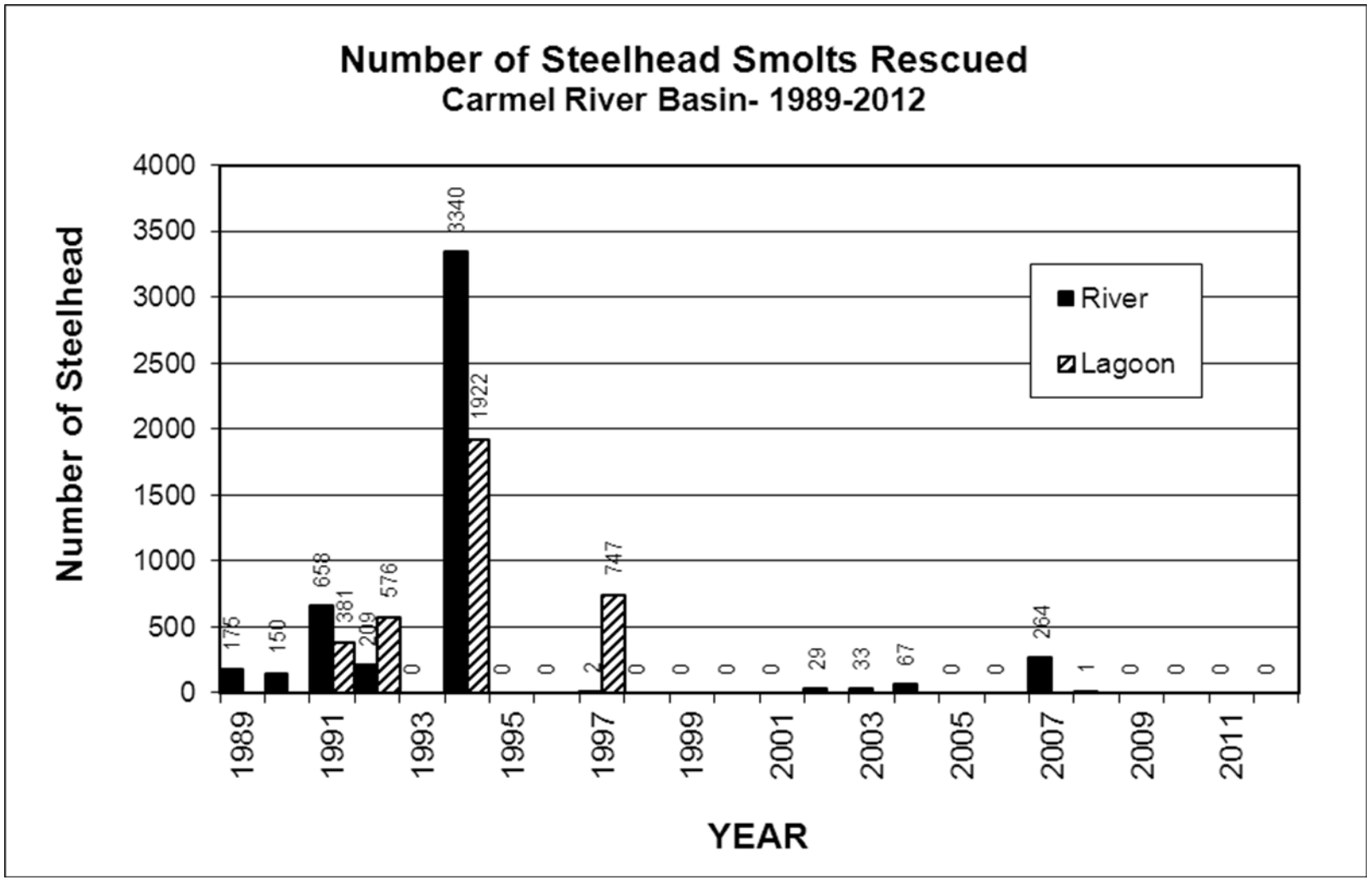


Figure XVI-3

Annual Number of Steelhead Rescued by MPWMD in the Mainstem Carmel River

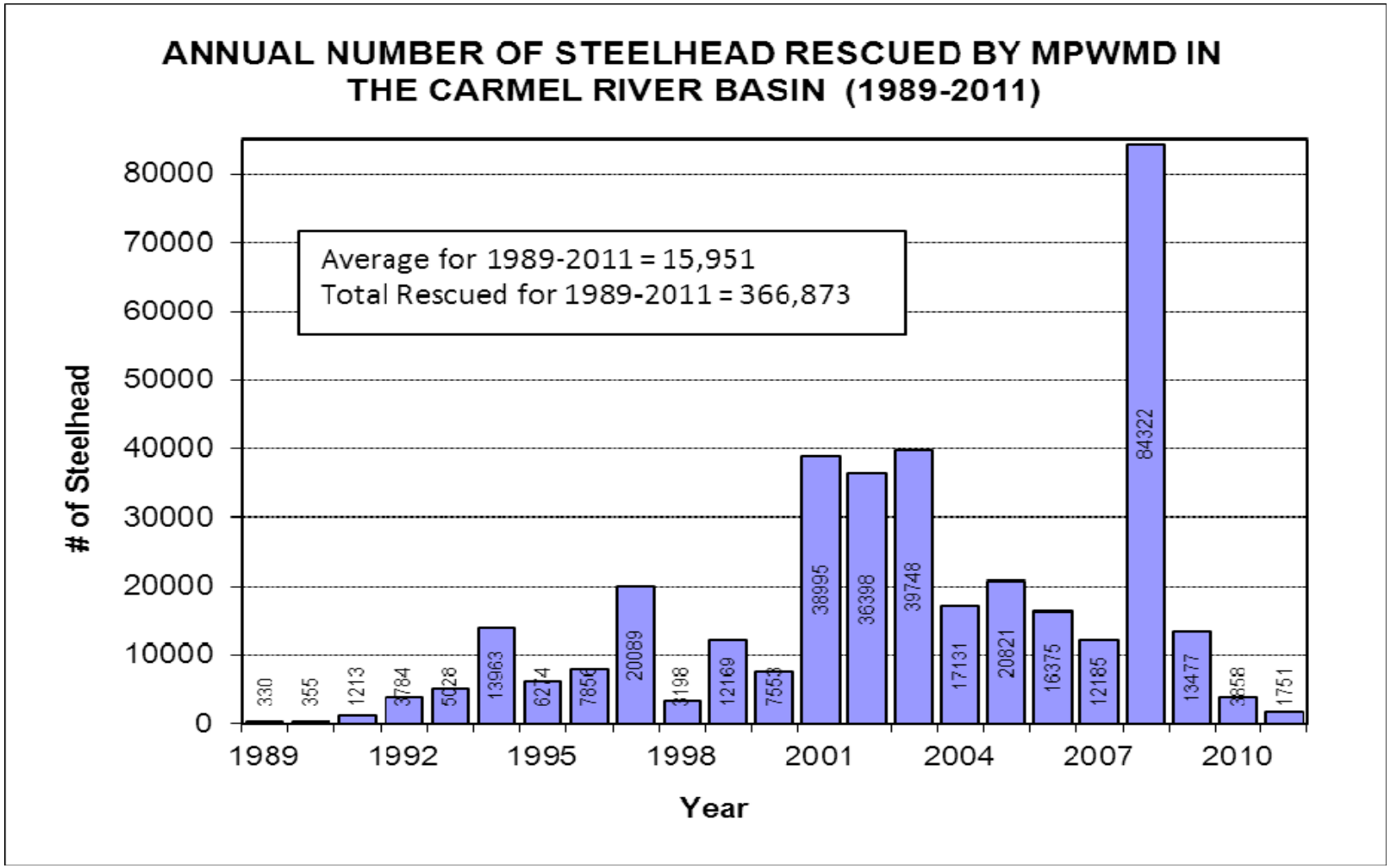


Figure XVI-4

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

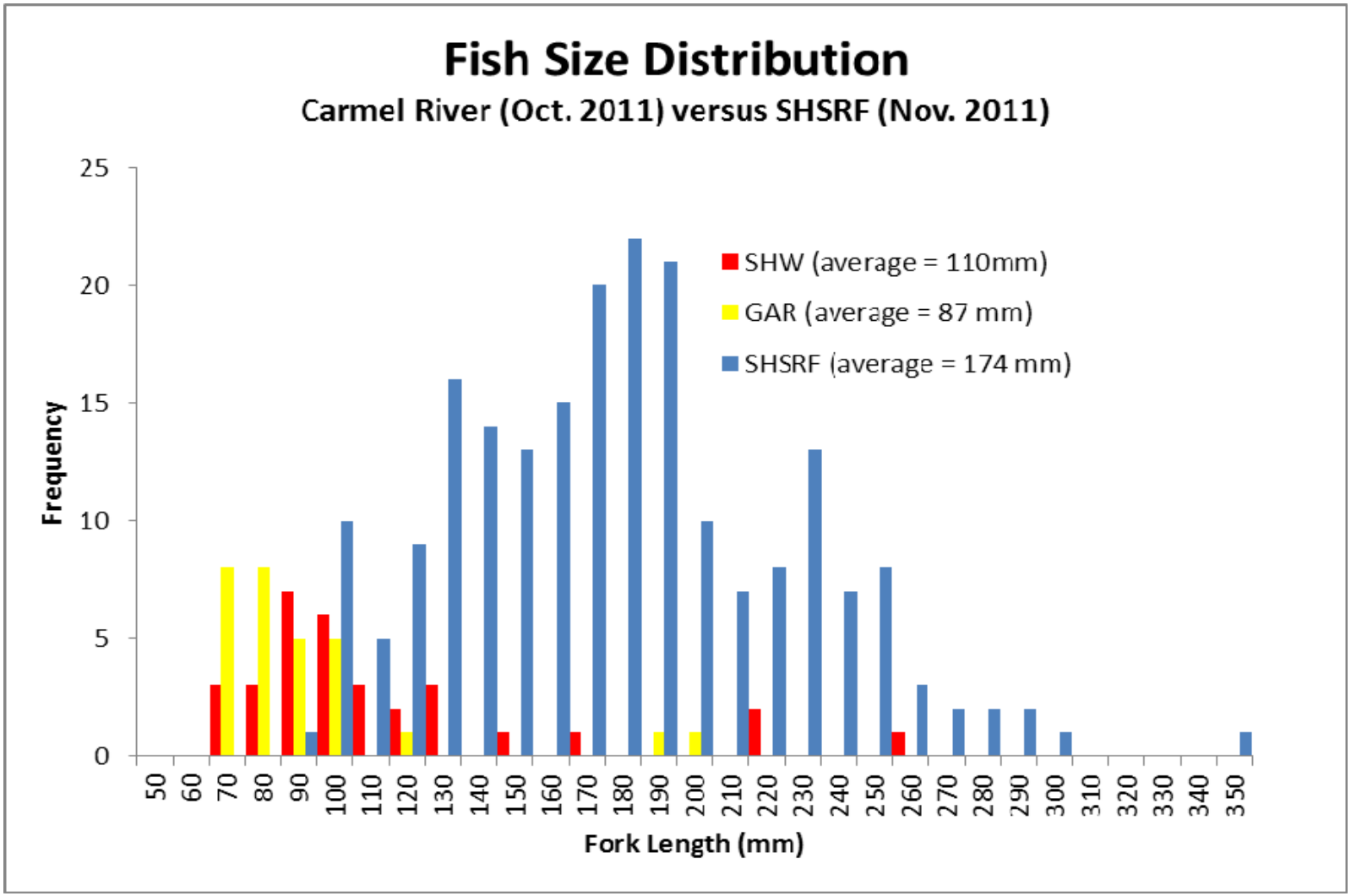
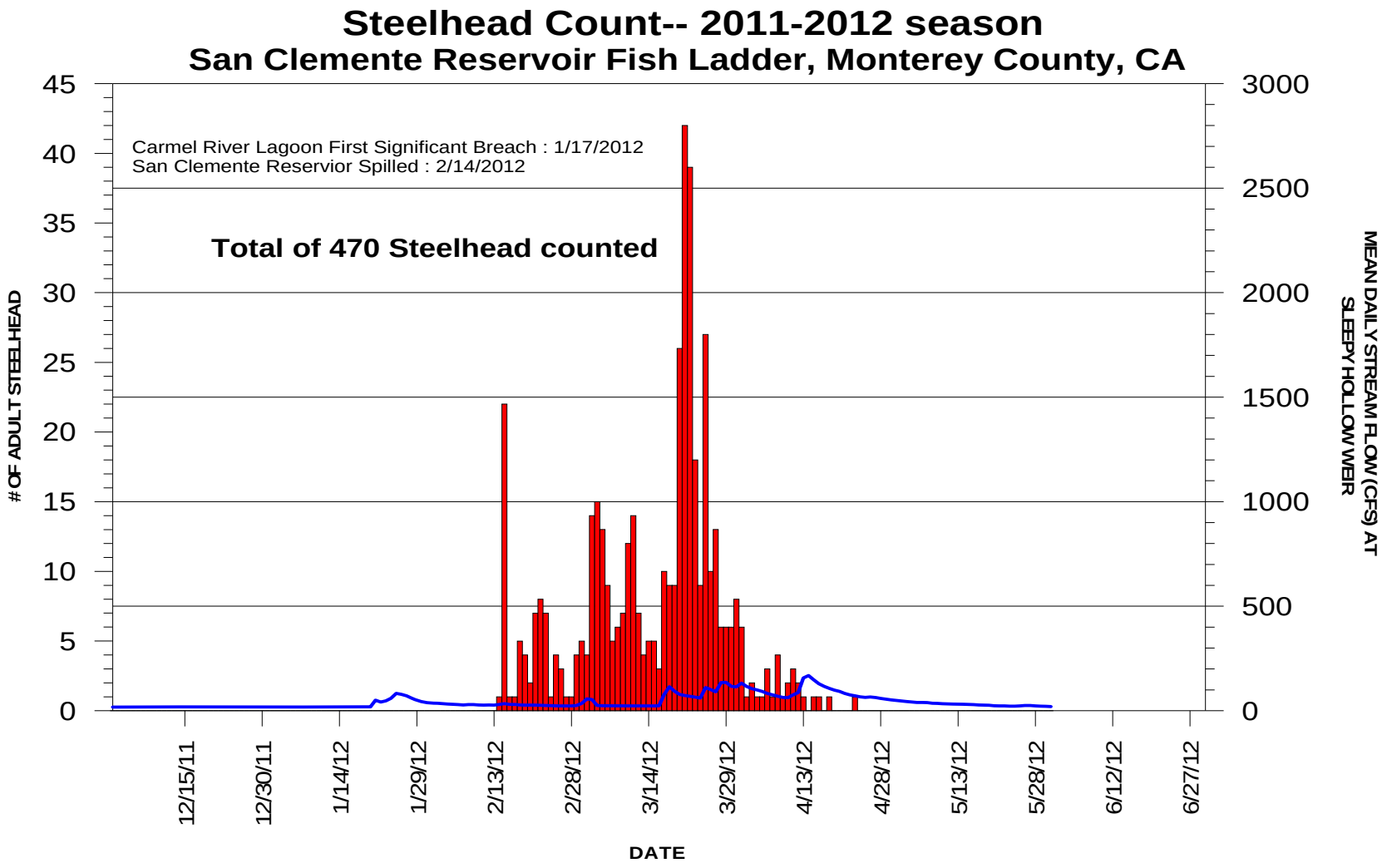


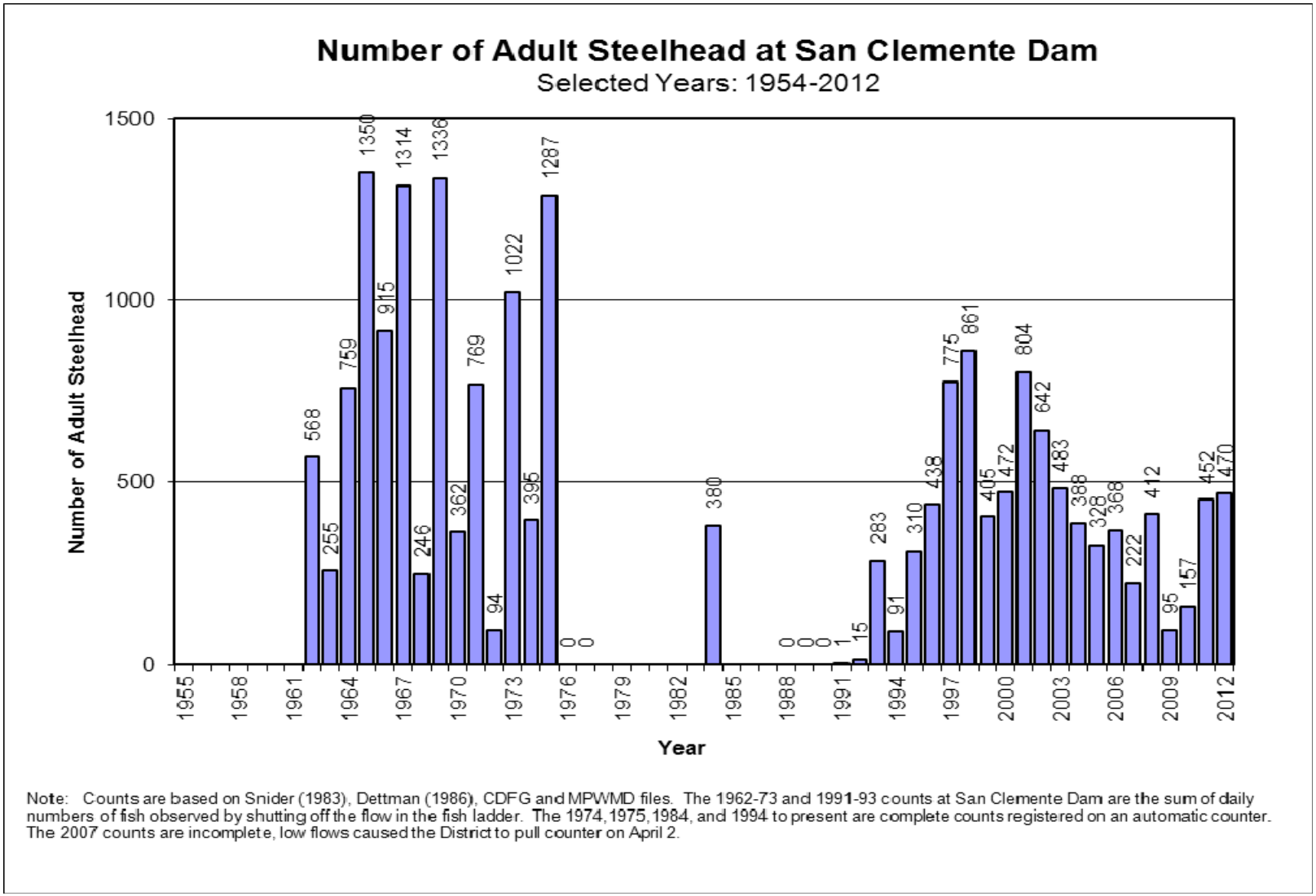
Figure XVI-5



* Streamflow measured at MPWMD Sleepy Hollow Weir gaging station

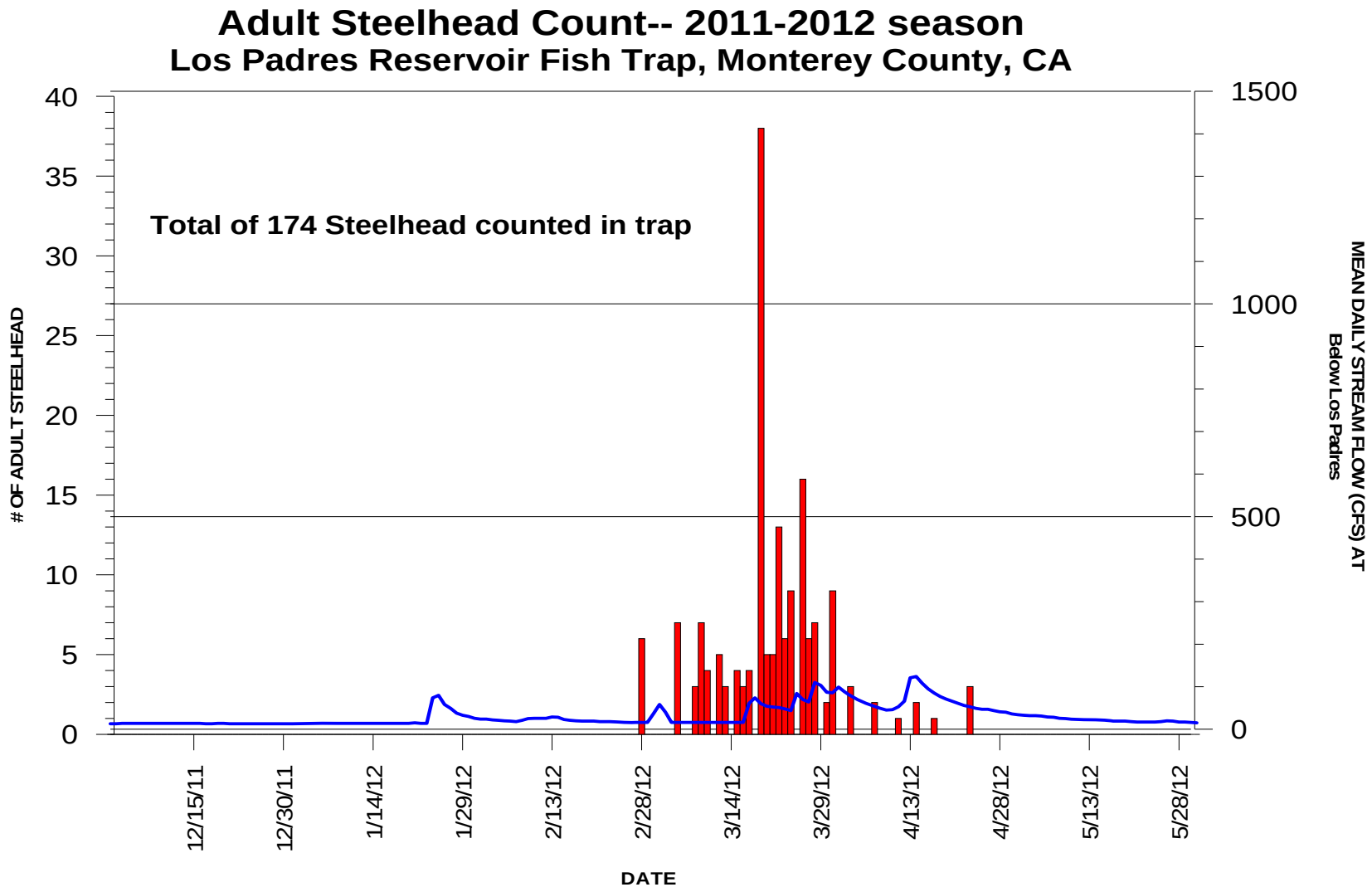
Figure XVI-6

Number of Adult Steelhead at San Clemente Dam



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 1994 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-7



* Streamflow measured at MPWMD Below Los Padres gaging station

Figure XVI-8

Number of Steelhead at Los Padres Dam

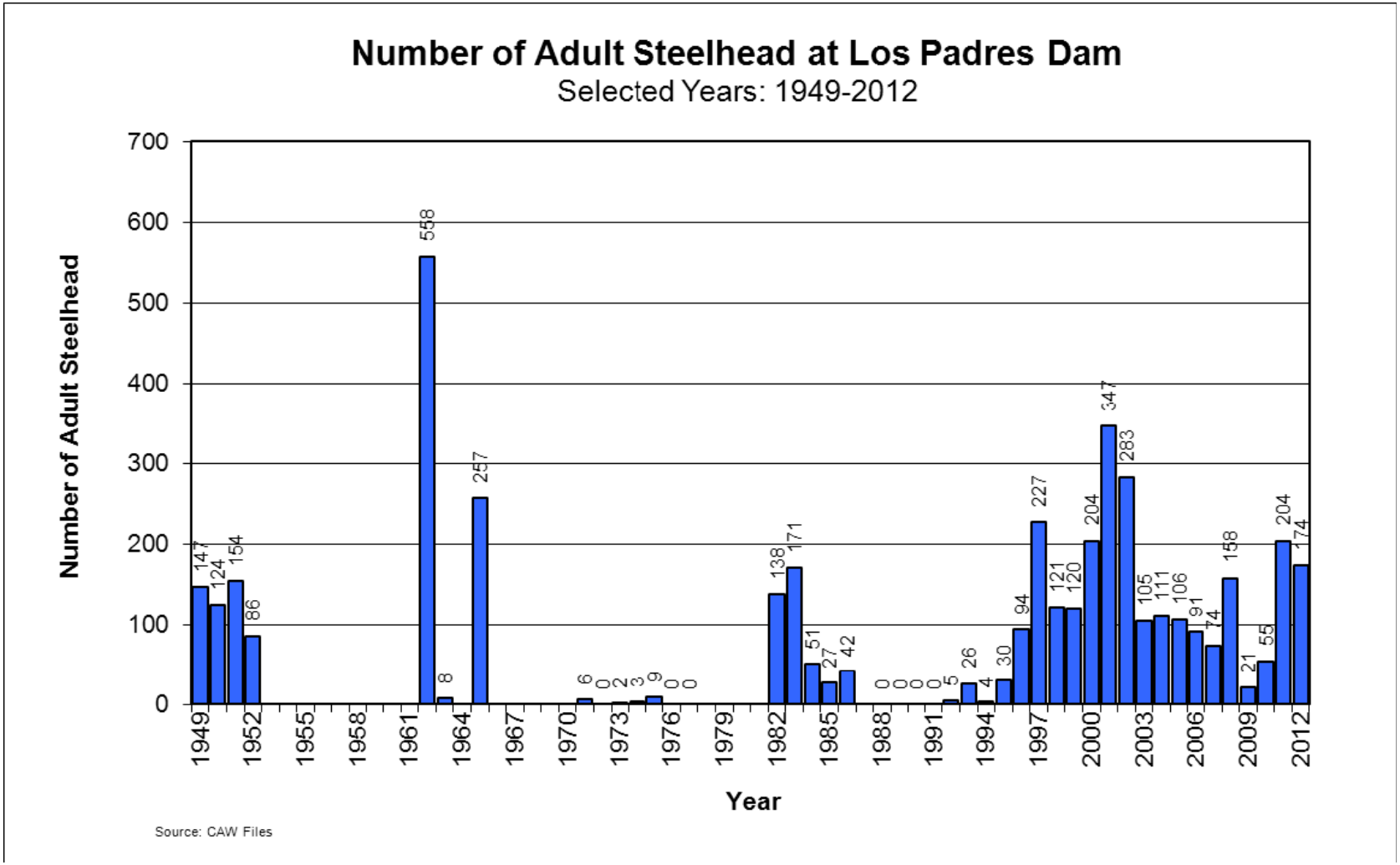


Figure XVI-9

Carmel River – Fall Juvenile Steelhead Population Density

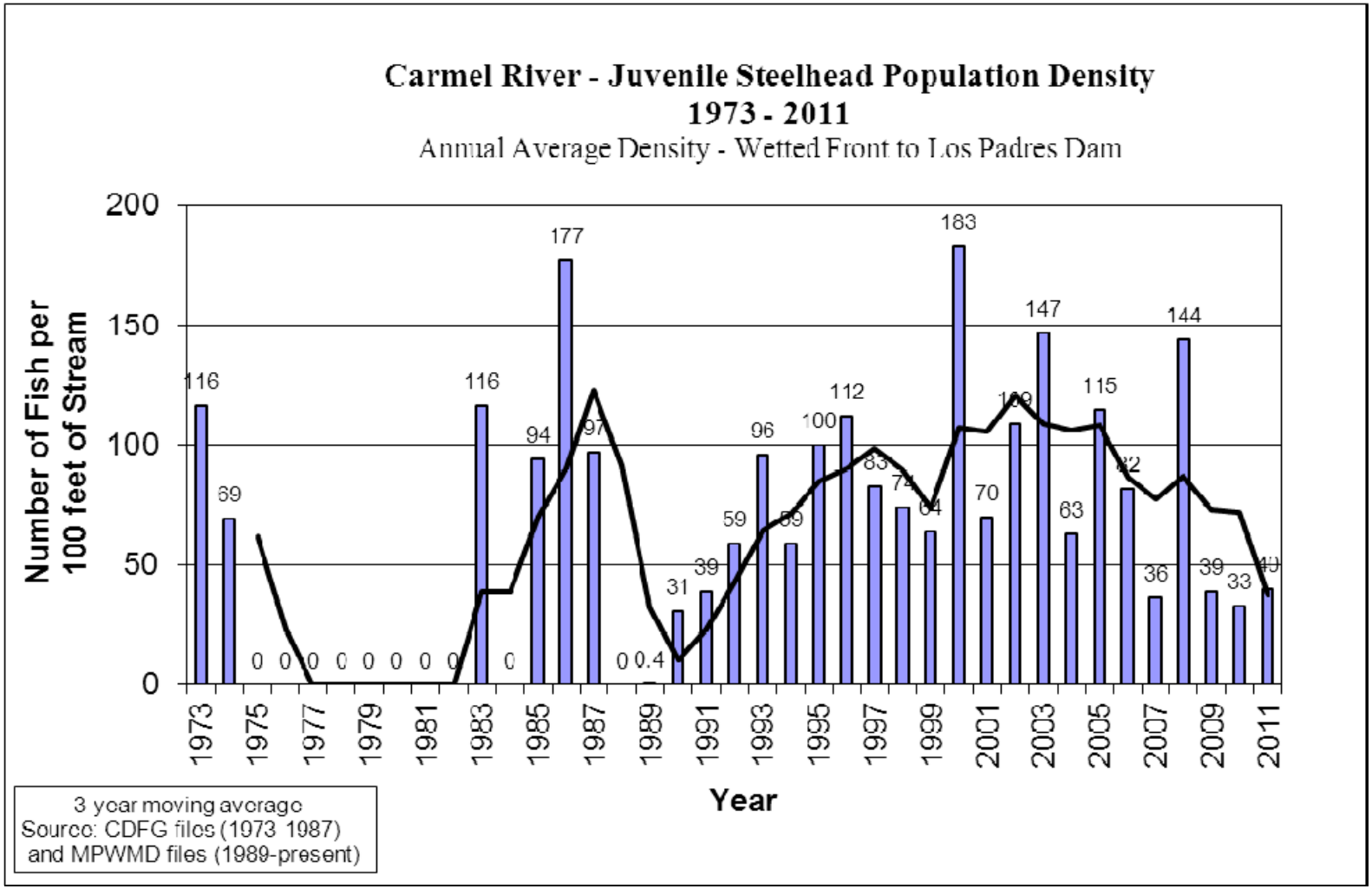


Table XVI-1a

Number of Juvenile Steelhead Rescued in the Mainstem Carmel River, by Age Group and General Location, Rescue Year 2011.

Age Group	General Location	MPWMD August 2011	CRSA 2011
Young-of-the-Year	Mainstem	1,670	0
Age 1+	Mainstem	81	0
Smolts	Lagoon and Lower River	0	0
Adults	Mainstem and Lagoon	0	0
Mortalities	Mainstem	0	0
Totals		1,751	0
Percentage Mortality		0.0	0

Table XVI-1b

Release Locations of Juvenile Steelhead Rescued in the Mainstem Carmel River - Rescue Year 2011.

RELEASE LOCATION	RIVERMILE	# OF FISH TRANSPLANTED
Carmel River Lagoon	0.1	0
SHSRF	17.1	1,734
Garland Park	10.8	17
TOTAL		**1,751**

NOTE: River miles are approximations.

Table XVI-2

SLEEPY HOLLOW STEELHEAD REARING FACILITY

Fish Rearing Summary: August 15, 2011 - November 8, 2011

Holding Location	# Fish Stocked [1]	# Morts (Disease)[2]	# Morts (Unaccount-ed for) [3]	Total # Released	% Survival	Mean Fork Length (mm)	Mean Condition Factor (K)	# by Release Location	Notes
Rearing Channel **2** Pools (smaller YOY)	1,370	133	101	1,136	82.9	148	1.16	321-Quail Condos 813-RSC Well 2- Rancho Canada	Smallest Young-of-year (YOY) fish rescued
Rearing Channel **1** Pools (Medium YOY)	240	40	4	196	81.7	191	1.17	196- Hacienda	Medium sized YOY fish were graded out after quarantining and placed in a separate pool.
Rearing Channel **1** Pool (Lrg 1+ Juvs)	75	13	1	61	81.3	246	1.17	61- Ranch Canada	Fish were ~ 2 yrs old at release.
Totals	**1,685**	**186**	**106**	**1,393**	**83%**	**174**	**1.17**	**1,393 river (100%)**	
		11%	**6%**	**83%**					

Notes:

1. Fish were segregated in separate RC pools by size/age at the start of the rearing season.
2. Disease was primarily bacterial infection (*Flavobacterium columnare*), but there were minor outbreaks of *Ich.* 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_g/L_{mm}^3). The heavier a fish for a given length, the higher its condition factor (K). ($x\,10^{-5}$)

Table XVI-3

Sleepy Hollow Steelhead Rearing Facility, Fish Rearing Summary - 2011.

Sleepy Hollow Steelhead Rearing Facility- 2011 Rearing Season						
Pool #	**Number Sampled**	**Avg Fork Length (mm)**	**Avg Weight (g)**	**Avg K Factor**	**Fish Age (at stocking)**	**Date Sampled**
2	30	246	175	1.17	Yearling	11/7/2011
3	60	191	89	1.17	Medium-YOY	11/4/2011
8	60	149	46	1.15	YOY	11/2/2011
9	60	147	43	1.18	YOY	11/1/2011
Overall- Avg YOY	180 (11%)	162	59	1.17		
Overall-Avg Yearling	30 (40%)	246	175	1.17		
Total Facility	210 (12%)	174	75	1.17		

Table XVI-4

Sleepy Hollow Steelhead Rearing Facility
Fish Release Location Summary - 2011.

Release location	RM	# Released	% of Total
Rancho Canada Well	3.1	63	5
Hacienda	3.5	196	14
RSC Well	3.7	813	58
Quail Condos	4.2	321	23
Total		**1393**	100

Table XVI-5

2012 Red Survey - Overall Observed Numbers
Garza's Cr. Confluence (RM 12.5) to D/S end Rancho Canada Golf Course (RM 2.0)

Redds	58
Spawning Pairs	2
Single Adults	14
Kelts	0
Carcasses	1

Smolts	20
Juveniles	~20
Fry	None seen yet
Adult Migration Barriers	Several critical riffles, 1 log jam at 20 cfs
Smolt Migration Barriers	One log jam, several shallow riffles

Upstream of the Narrows
(Boronda Br to Robinson Canyon Br)

Redds	35
Spawning Pairs	1
Single Adults	7
Kelts	0
Carcasses	0

Downstream of the Narrows
(Robinson Canyon Rd Br through RCGC)

Redds	23
Spawning Pairs	1
Single Adults	7
Kelts	0
Carcasses	1

Table XVI-6

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**
Station Ave (#/ft)	**0.15**	**0.51**	**0.61**	**0.84**	**1.08**	**1.14**	**0.95**	**0.64**	**0.47**	**0.55**	**0.83**	**1.34**	**0.81**	**4,263**
Station Ave (#/mile)	**792**	**2,693**	**3,225**	**4,443**	**5,686**	**5,993**	**5,040**	**3,377**	**2,488**	**2,891**	**4,393**	**7,056**		
Overall Station Averages:													**0.76**	**4,006**

[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

u/beverly/excel/popsurvey/stat linial density1990_11 updated 102811

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 District is serving as the lead agency to facilitate an update and implement the 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 FY 2011-12, 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. The total cost of the project, including local agency match, will be about $1.6 million and will be completed by the end of 2013.

In addition, MPWMD facilitated the expansion of the Regional Water Management Group (RWMG) to include the Marina Coast Water District (MCWD) and the Resource Conservation District (RCD) of Monterey County in order to continue the development and implementation of the IRWM Plan in the Ord Community. The RWMG is comprised of representatives of the Big Sur Land Trust, City of Monterey, Monterey County Water Resources Agency, Monterey Regional Water Pollution Control Agency and MPWMD. The RWMG executed a Memorandum of Understanding concerning implementation of the IRWM Plan in 2008. The MOU is proposed to be formally amended in 2013 to include MCWD and the RCD as part of the RWMG. 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 2011-2012 are summarized above in Sections II (Hydrologic Monitoring), V (Annual Low Flow MOA), VI (Quarterly Budget), and VIII (Water 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 2011-2012

During Fiscal Year (FY) 2011-2012, 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 Game and 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 eight sites (Ward Area, DeDampierre Area, West Garzas Well Area, Randazzo's Bridge Area, Scarlett Area, Red Rock Area, Rancho San Carlos Area, and Highway One Area);

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 2011-12 MPWMD staff assisted the property owner with installation of riparian cuttings. Due to budget constraints, MPWMD was unable to move forward with a restoration project to address the erosion problems in this reach.

Riparian Ordinance Enforcement Action – MPWMD followed up on a streambank repair at Carmel Valley Ranch that was a mitigation requirement for unauthorized placement of material on the streambank in 2009. MPWMD participated in meetings with Monterey County to resolve issues with unauthorized installation of gabion baskets at the Favalora property downstream of Boronda Road. Monterey County has not made a determination about placement of material within the floodway.

San Clemente Dam: The DWR and the U.S. Army Corps of Engineers finalized a combined EIR/EIS in 2008 concerning alternatives to remediate the safety deficiencies that have been identified at San Clemente Dam. DWR continued to direct CAW to draw San Clemente Reservoir down and maintain it 10 feet lower than the spillway, except between February 1 and May 31 (to allow for downstream migration of steelhead). The California Coastal Conservancy and other State and Federal agencies, along with citizens groups, support the Dam Removal and Reroute Alternative which consists of: storing sediment in the Carmel River portion of the reservoir; removal of the dam, and rerouting the Carmel River into San Clemente Creek. During FY 2011-12, MPWMD provided technical information about the watershed and the Carmel River to consultant groups involved with the project. MPWMD also 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 2011-2012. 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 2012. A total of 6.72 acre-feet (AF) of water were applied in 2012. In calendar year 2011, 3.93 AF was used to irrigate riparian vegetation. This compares to the 1994 irrigation total of 51.1 AF, when drought conditions prevailed. 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 2011, eight areas with virtually 100% vegetation encroachment in the channel bottom were selected for vegetation removal:

1. Ward Area (reach length approximately 200 feet, no loss of canopy): beginning in a reach just upstream of the Ward's private bridge RM 15.0; several large trees that had fallen in the main channel had their trunks notched (partially cut) with debris and branches trimmed. Several large sections of tree trunks were left in the flowing stream to provide large wood habitat.

2. De Dampierre Area (area approximately 800 feet^2): two debris piles on mid-stream gravel bars upstream of the De Dampierre area (Little League Ball Fields in Carmel Valley Village) at RM 14.2 were broken up using hand tools. Some minor willow trimming occurred to allow spreading of the large pieces of wood. Some wood was placed in the channel for large wood habitat.

3. West Garzas Area (area approximately 2,257 feet^2): beginning at approximately RM 12.3, upstream of California American Water's West Garzas Well, multiple trees encroaching into the active channel were trimmed back with some of the trunks placed in the channel to provide large wood habitat.

4. Randazzo's Bridge Area (area approximately 2,000 feet^2): beginning at a private bridge known as Randazzo's Bridge at RM 10.1 and in a reach approximately 200 feet upstream of the bridge; trees were trimmed that were encroaching into the active channel.

5. Scarlett Area (area approximately 300 feet^2): a reach approximately 200 feet upstream of the Scarlett Area (approximately RM 9.0) was opened up. Multiple trees which had fallen across the channel had their branches trimmed.

6. Red Rock Area (area approximately 180 feet^2): beginning approximately at RM 8.2 at the upstream end of the Red Rock Restoration Project; trees blocking the channel on a gravel bar were thinned. Some trees were placed in the flowing stream to provide large wood habitat. The rest of the branches were chipped.

7. Rancho San Carlos Bridge Area (area approximately 1,000 feet^2): beginning approximately at RM 3.9 just upstream of Rancho San Carlos Bridge encroaching vegetation was trimmed back.

8. Highway One Bridge Area (area approximately 300 feet^2): beginning approximately 100 feet downstream of Highway One Bridge at River Mile (RM) 1 encroaching vegetation was trimmed back.

A total of approximately 710 lineal feet of stream encompassing approximately 0.19 acres in the channel bottom was affected by the vegetation removal.

In addition to erosion hazard reduction, vegetation management objectives include removing trash and inorganic debris from the river channel. During FY 11-12, 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 2013. 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 and graduate students at California State University Monterey Bay. Topics included information on the Monterey Peninsula Water Resource System, 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 2012, 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 for the majority of the monitoring season, and towards the end experienced increases in moisture stress (defoliation) as the water table dropped. 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, San Clemente Dam safety, 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 1992 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 2012. 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. Recently, 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. 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 4.5 feet high (see **Figure XVII-3**). It is possible that high flows are passing under the pipe encasement. When the pipe encasement was installed, the top was buried two feet below the riverbed. 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. The District also filed an application with the California Department of Fish and Wildlife to renew a long-term Routine Maintenance Agreement (RMA) to conduct regular maintenance and restoration activities. The District hopes to operate under a new RMA by the fall of 2013.

Monitoring Program

Vegetative moisture stress fluctuates depending on the rainfall, proximate stream flow, 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 no matter what happens with the San Clemente Dam. 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 is tentatively scheduled to begin in the summer of 2013. 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. In the interim, DWR has directed CAW to draw San Clemente Reservoir down and maintain it 10 feet lower than the spillway, except between February 1 and May 31 (to allow for downstream migration of steelhead). The draw down results in fine material prograding (moving downstream) toward the dam and eventually over the spillway (see **Figure XVII-5**).

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 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 FY 2011-12, 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. The total cost of the project, including local agency match, will be about $1.6 million and will be completed by the end of 2013.

In addition, MPWMD facilitated the expansion of the Regional Water Management Group (RWMG) to include the Marina Coast Water District (MCWD) and the Resource Conservation District (RCD) of Monterey County in order to continue the development and implementation of the IRWM Plan in the Ord Community. The RWMG is comprised of representatives of the Big Sur Land Trust, City of Monterey, Monterey County Water Resources Agency, Monterey Regional Water Pollution Control Agency and MPWMD. The RWMG executed a Memorandum of Understanding concerning implementation of the IRWM Plan in 2008. The MOU is proposed to be formally amended in 2013 to include MCWD and the RCD as part of the RWMG.

Funding from the IRWM grant program 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.mpwmd.dst.ca.us/Mbay_IRWM/Mbay_IRWM.htm

Table XVII-1

Monthly Irrigation Water Use During 2012

(Values in Acre-Feet)

Project Site	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total
DeDampierre	0.000	0.000	0.000	0.000	0.072	0.243	0.214	0.203	0.165	0.130	0.226	0.002	**1.255**
Trail and Saddle	0.090	0.053	0.055	0.064	0.209	0.156	0.172	0.324	0.230	0.282	0.094	0.000	**1.729**
Begonia	0.013	0.015	0.007	0.007	0.024	0.027	0.036	0.028	0.027	0.029	0.008	0.000	**0.221**
Reimers	0.123	0.000	0.000	0.031	0.025	0.064	0.129	0.080	0.081	0.049	0.000	0.000	**0.582**
Cypress	0.000	0.000	0.000	0.092	0.000	0.000	0.089	0.365	0.338	0.271	0.000	0.000	**1.155**
San Carlos (Dow)	0.000	0.032	0.000	0.084	0.126	0.315	0.366	0.337	0.329	0.129	0.055	0.000	**1.773**
TOTAL WATER USE IN ACRE-FEET FOR DISTRICT RESTORATION PROJECTS IN 2012 =													**6.715**

Figure XVII-1

Riparian Irrigation Totals

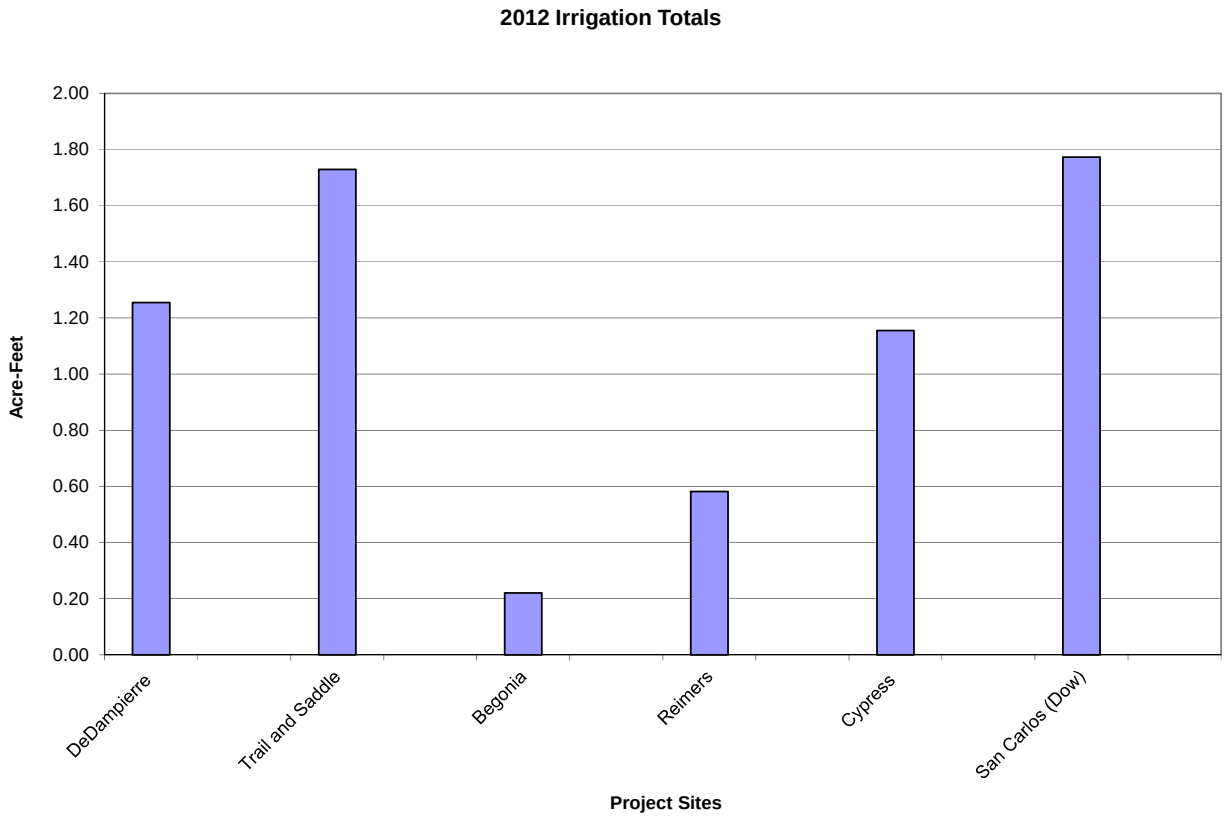
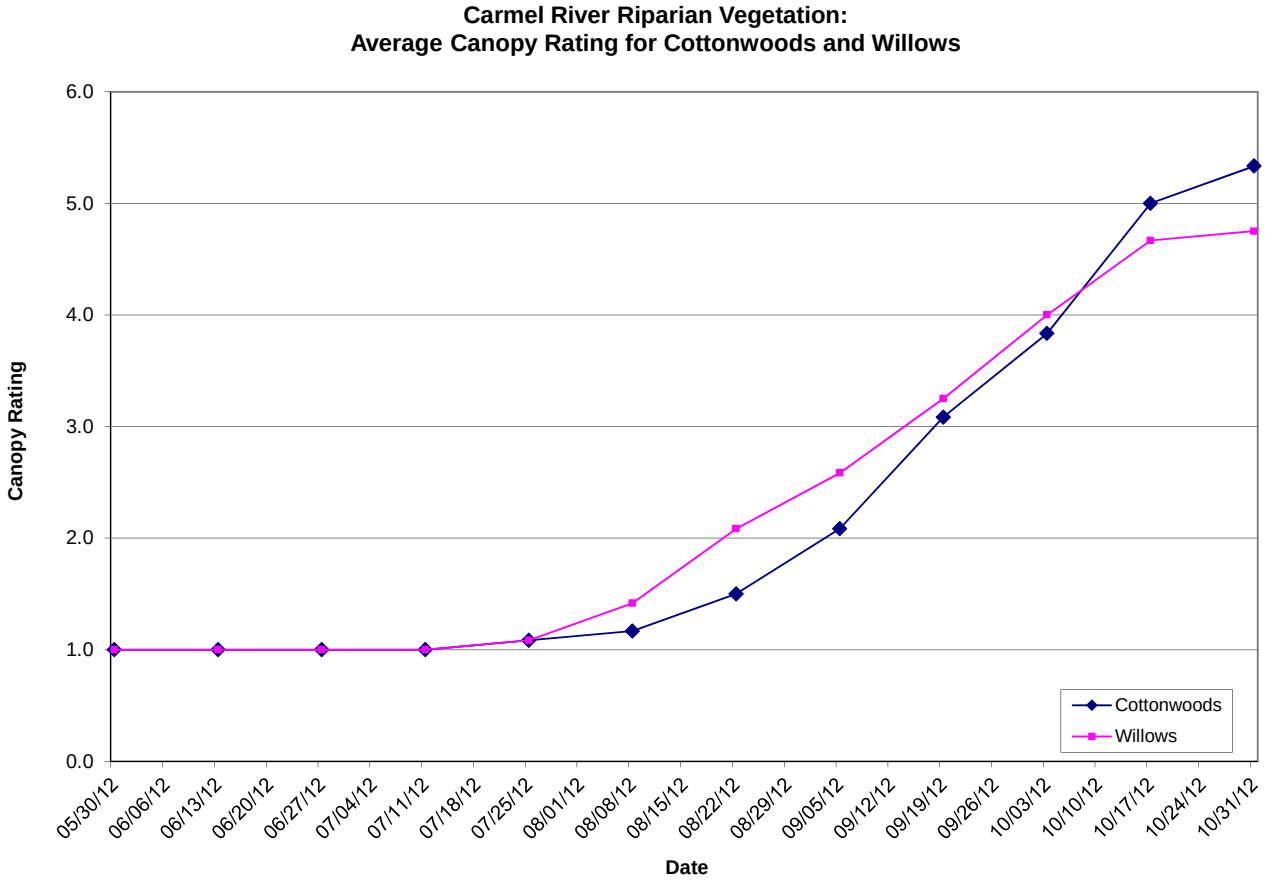


Figure XVII-2

2012 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

Figure XVII-5
San Clemente Drawdown Project

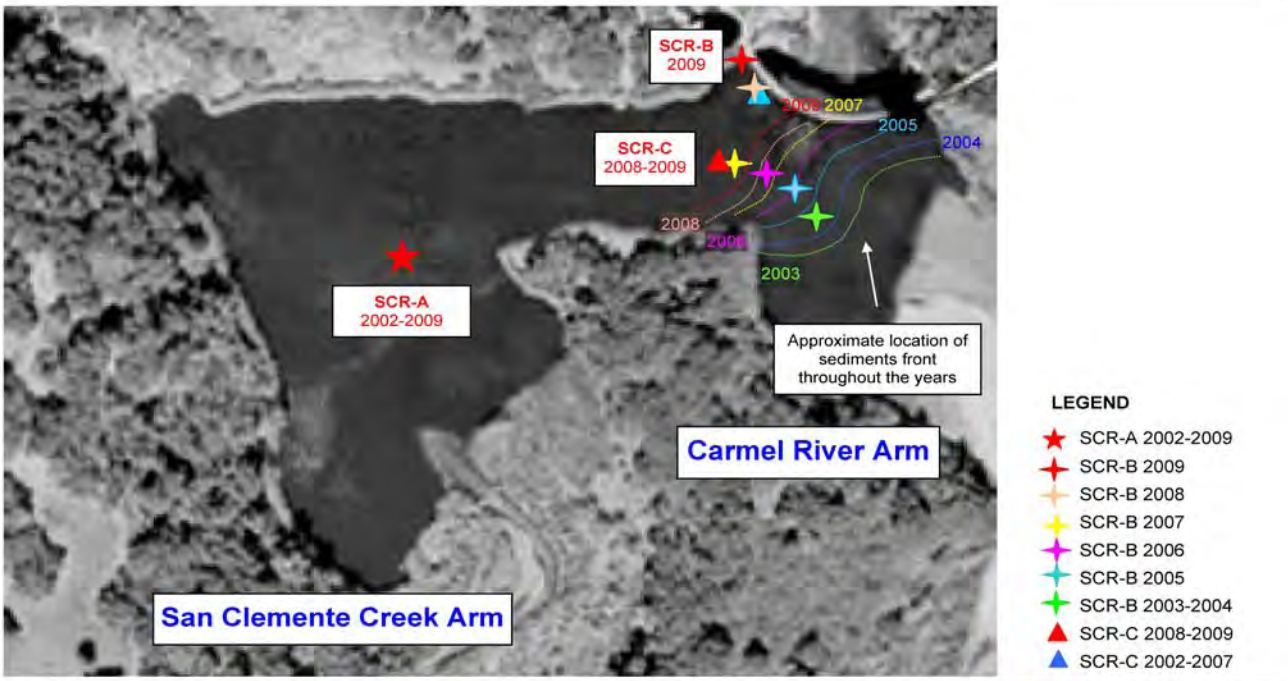


Figure 5-1 Estimated Locations of Water Quality Monitoring Stations SCR-A, SCR-B and SCR-C and Sediment Front in the San Clemente Dam Reservoir during the 2003 to 2009 Drawdown Operations

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, 2011 through June 30, 2012.

A. Assist with Lagoon Enhancement Plan Investigations

Description and Purpose

The 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 2011-2012

During this period, the CDPR continued their native riparian plant re-vegetation efforts 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 provided hydrological data to the CAWD to aid them in evaluating and monitoring their efforts, funded by California American Water (CAW), to augment flow to the lagoon using recycled water. No treated waste water from the CAWD plant was released into the restoration area for percolation into the lagoon during this Reporting Year (RY). CAWD is exploring the potential to release recycled water directly to the lagoon 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 ground disposal and agricultural use, which would allow their release onto surrounding habitat to irrigate vegetation, but not directly

into the lagoon. CAWD completed its baseline monitoring for metals in this RY, on September 6, 2011. CAWD acquired funding from CDFG to undertake these studies in 2011-2013, but there were no progress reports released during this RY.

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 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. However, the river flowed to the lagoon year round in this RY. The lowest points of annual inflow were 3.1 CFS in the beginning of September 2011, and 1.1 CFS at the end of June 2012. Thus, the lagoon experienced far better than average 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 utilize what is known as its "Cal-Trans" well to provide irrigation water for its demonstration organic farm and riparian restoration areas adjacent to the south arm of the lagoon. Most if not all of the water is consumed in evapotranspiration of the crops or riparian vegetation, although some could theoretically percolate into the aquifer adjacent to the lagoon. CDPR feels (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 11.63 acre-feet of groundwater between July 2011 and June 2012 from their "Cal-Trans" well to serve the organic demonstration farm and irrigate the riparian restoration area. This was approximately 28% of the level of their use in the prior RY (2010-2011). CDPR also pumped a minor amount of water from their "Highway 1" well at CRSA's behest into the South arm of the Lagoon for a total of 2.11 acre-feet of water over the RY, 2% of what they produced the year before.

District staff are also usually involved in ongoing discussions under the auspices of the Carmel River Lagoon Technical Advisory Committee (CRL-TAC) regarding Monterey County Department of Public Works (MCDPW) breaching of the sandbar that forms each year between the lagoon and the ocean. The CRL-TAC remains operational, but no further meetings were held during this RY. Lagoon water levels frequently fall to less than two feet (NGVD 1929, measured in the south arm) after a breach. NMFS and CDFG 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 on July 25, 2011, when it closed naturally. Lagoon elevations remained above the minimum target of four feet from July 27, 2011 through all of the summer and fall until the first breaching by the MCDPW on November 25, 2011; longer than in any prior year since MPWMD's first records in Water Year 1992! Lagoon levels never got lower than 5.5 feet throughout the summer and fall, until they peaked on November 25, 2011 at just under 10 feet. The MCDPW's initial breaching effort managed to avoid lagoon evacuation any lower than approximately 6.5 feet. The lagoon

gradually recovered to approximately 10 feet by December 20, 2011, when MCDPW conducted a second minor breaching. The MCDPW's second breaching effort managed to avoid lagoon evacuation any lower than approximately 8.5 feet. River inflow to the lagoon was continuous throughout the summer, fall and winter of 2011.

For the first time this RY, the MCDPW conducted all breaching efforts under United States Army Corps of Engineers (USACoE) Regional General Permit #5. Pre-breaching preparation work and lagoon beach management efforts were done under Nationwide Permits #13 and 33.

During the current RY, the lagoon's water volume was relatively stable throughout the summer, fall, and early winter of 2011, from late-July through December. Water levels remained unusually high, between 5.5 to approximately 9.5 feet between July 27, 2011 and January 17, 2012. There was one significant saltwater wave over-wash event during this period on September 22, 2011, and other minor ones between August and November 2011. River inflow raised the lagoon water elevation to near 10 feet on November 25, and December 20, 2011, as well as on January 17, 2012, when the beach was mechanically breached each time by the MCDPW. The first two breaches in 2012 were through pre-graded outlet channels to the south constructed by MCDPW. The MCDPW closed off the first breach to avoid draining the lagoon, and the second breach closed off on its own without evacuating the lagoon. MCDPW then re-breached the lagoon twice in January 2012, after which they took no further actions. Subsequent to the final January 2012 breach, the lagoon elevation fluctuated between approximately 2 – 9.5 feet with the daily tidal cycle, until low flows allowed a cycle of continuous closures beginning February 1, 2012. The lagoon was closed approximately 85% of the time until it resumed a more natural daily tidal cycle of openings and closures on March 18, 2012. From March 18 through May 18, 2012, the lagoon often reached a daily minimum of approximately 1.1 feet or less, and rarely exceeded 6 feet of elevation. The lagoon was closed for the season by the MCDPW on May 18, 2012 under USACoE Nationwide Permit #27 and CDPR's CDFW 1602 Permit. CDPR was again unable to fund the artificial closure of the lagoon in 2012, to enhance habitat volume, and may not be able to do so for the foreseeable future due to the ongoing state budget crisis. The MCDPW is considering taking over the effort on a year by year basis, using a combination of its own Federal and CDPR's State permits. As a result of their mechanical closure, lagoon elevations peaked at approximately 8 feet on June 7, 2012 and began to decline thereafter.

The first winter storm sufficient to keep the lagoon open occurred January 21-27, 2012, when flows rose slowly to 63 cfs at the MPWMD Highway 1 Gage. The three initial breaches by MCDPW were necessitated solely by gradual accretions in lagoon volume caused by the unusual year-round base-flow into the lagoon. These flows ranged from only 9 – 19 CFS, with the higher values being produced by some very weak early winter storms. After the last artificial breaching by MCDPW on January 22, 2012 the lagoon went through a series of unassisted openings and closures, until mechanical closure by MCDPW on May 18, 2012. Flows during this period fluctuated between a low of 12 cfs to a high of only 190 cfs and back to 22 cfs during the few winter storms that occurred. Flows at the MPWMD Highway 1 Gage peaked with the eleventh winter storm to the mean daily high flow for the water year of 190 cfs on April 14, 2012. Flows then steadily declined during the remainder of the RY.

Winter ocean wave action built up the beach and closed the lagoon for more than 24 hours on approximately seven separate occasions in January through March 2012. Declining flows combined with ocean wave action then closed the lagoon for more than 24 hours approximately four more times during April and May, 2012. Thus the lagoon was closed approximately 97 of 174 days during 25 consecutive weeks, or approximately 56% of the time between its first opening on November 25, 2011 and its final mechanical closure on May 18, 2012.

The District is seeking 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. The CRL-TAC did not meet during this RY. 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 found during this RY.

The Monterey County Resources Management Agency (MCRMA) is the parent county agency for MCDPW. 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 MCDPW. This is the first RY where MCRMA/MCDPW 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 was unable to implement the permitted actions these last two RYs, and notified the CRL-TAC that this will likely continue to be the case in future RYs, until the State's fiscal situation improves. CDPR recommended that another agency with appropriate jurisdiction and funding take over the lagoon closure process, and the MCRMA/MCDPW are considering doing 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 2011-2012

The District has historically conducted three types of long-term monitoring each RY, 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 was resumed in July 2012.

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. 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.

Dramatic changes in vegetation were not observed between the summers of 1995 and 2012. 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.

A more detailed discussion of the results of vegetation monitoring to date 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 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 year to the next. Nor have strong relationships between species composition or distribution and water management practices been identified. Nonetheless, staff anticipates continued monitoring of the wetlands in the future to determine 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 runoff at various locations including Highway 1, 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 were not conducted in either the spring of 2011 or 2012.

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 carried out by the California State Department of Parks and Recreation from 2005-2008, when monitoring it ceased due to ongoing budget constraints.

Special Studies during 2011-2012

- **Steelhead Population Monitoring**

MPWMD applied for and acquired ESA Section 10 coverage starting in 2009 to conduct a mark-recapture study as part of its semi-annual renewal of staff Scientific Collecting Permits from CDFG. These were renewed annually through 2012. No pre-breaching population census was conducted this RY in late November or early December 2011, since the lagoon was still fully connected to the river, and had water surface elevations mostly over seven feet. At these lagoon levels it is impossible to sample anywhere but on the back of the sand berm in the main lagoon, as the water is so high it inundates all the shoreline vegetation precluding staff from landing a beach seine anywhere but on the open sandy shore. The first ever planned post-lagoon closure study in was conducted on May 26, 28, and June 3, 2012. While the lagoon was still connected to the river during the study, surveys of the riffles at the head of the backwatered lagoon indicated it was infeasible for juvenile steelhead to escape the lagoon, and highly unlikely for any immigrants to was over the long shallow riffles to enter the lagoon during the study period. A valid mark-recapture population census of juvenile fish cannot be conducted when the lagoon is not functionally an isolated body of water, if fish can swim in and out of the lagoon freely, either to or from the ocean or the river. In three days of sampling and 25 total beach seine hauls District staff only caught and re-released a total of 31 fish; 5, 14, and 12 each day, respectively. District staff recaptured only one marked fish on the second day. As a result, it is not possible to make a Schnabel Population Estimate, and the Petersen Estimate based on only one mark recaptured in three days data, is unreliable at ~70-130 fish estimated for the lagoon's total population at the beginning of summer. It is very likely that the low numbers of fish seen were the result of striped bass predation the preceding spring while the lagoon was open.

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 been identified. 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 existing (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 needed to meet a portion of the municipal demand of the Monterey Peninsula during the summer. Nether treated water from the Carmel Area Wastewater District , nor any significant amount water from an existing agricultural well were 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 have been completed (see Section XVIII-A above). 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 alternative means to provide adequate volume will consider the implementation of the selected alternative in the final Lagoon Enhancement Plan.

In December 2009, CAWD estimated that a total of about $2.5 million would be needed to complete a project to augment lagoon volume from CAWD treatment plant water. Approximately 300 acre-feet per year could be made available. CAWD applied to the CDFG Fisheries Restoration Grant Program in early 2010 for Settlement Agreement funds to study the feasibility and potential impacts from this project. CDFG subsequently awarded a grant to CAWD and feasibility studies started in 2011, through 2013.

Implementation and Activities during 2011-2012

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 2012, staff completed the annual surveys of cross sections (XS) 1-4. Close inspection of the September 2012 XS surveys indicates very little change in lagoon substrate elevation at XS 2-4 from the previous year's surveys (September 2011) (Figure XVIII-3). The highest peak streamflow of WY 2012 recorded at the Carmel River at Highway 1 Bridge gage was only 207 cfs, so the small changes within the cross sections are not surprising.

Review of the entire cross sectional data set (Figure XVIII-2) shows that the September 2012 lagoon substrate elevations for XS 1-3 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 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 ground water 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 17-year period to date, for example, there have been two Extremely Wet (1995, 1998), two Wet (2005, 2006), five Above Normal (1996, 1997, 2000, 2010, 2011), and five Normal Water Year types (1999, 2001, 2003, 2008, 2009), in terms of total annual runoff. Thus, the hydrology of the watershed has been wetter than average 53% of the time, and at least normal or better 82% of the time during that period. 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 draw-down effects on wetland dynamics. It is recommended that the annual 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 1994-2012 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.

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

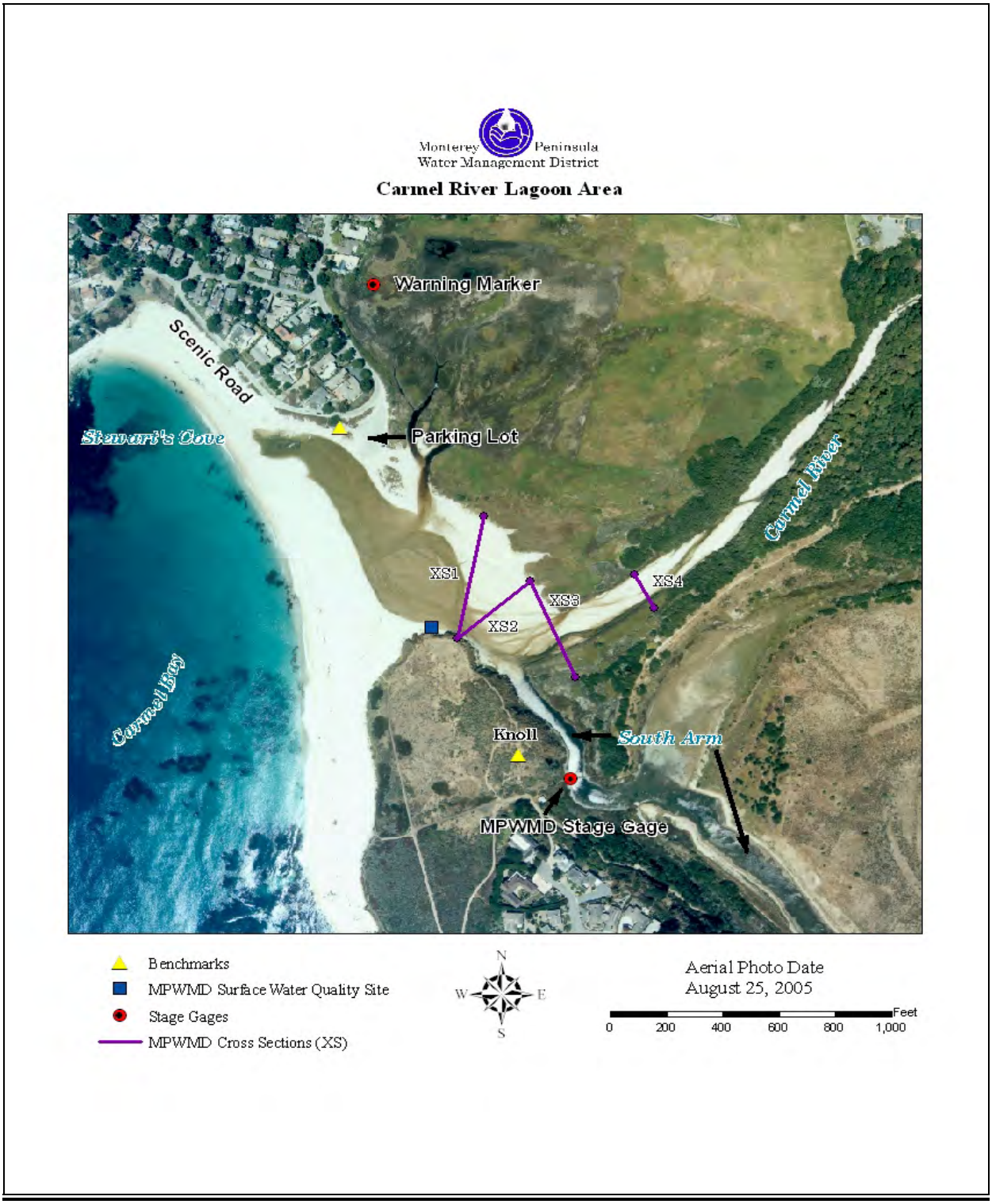


Figure XVIII-2
Carmel River Lagoon Cross Sections 1 through 4, based on Annual Surveys 1994-2012

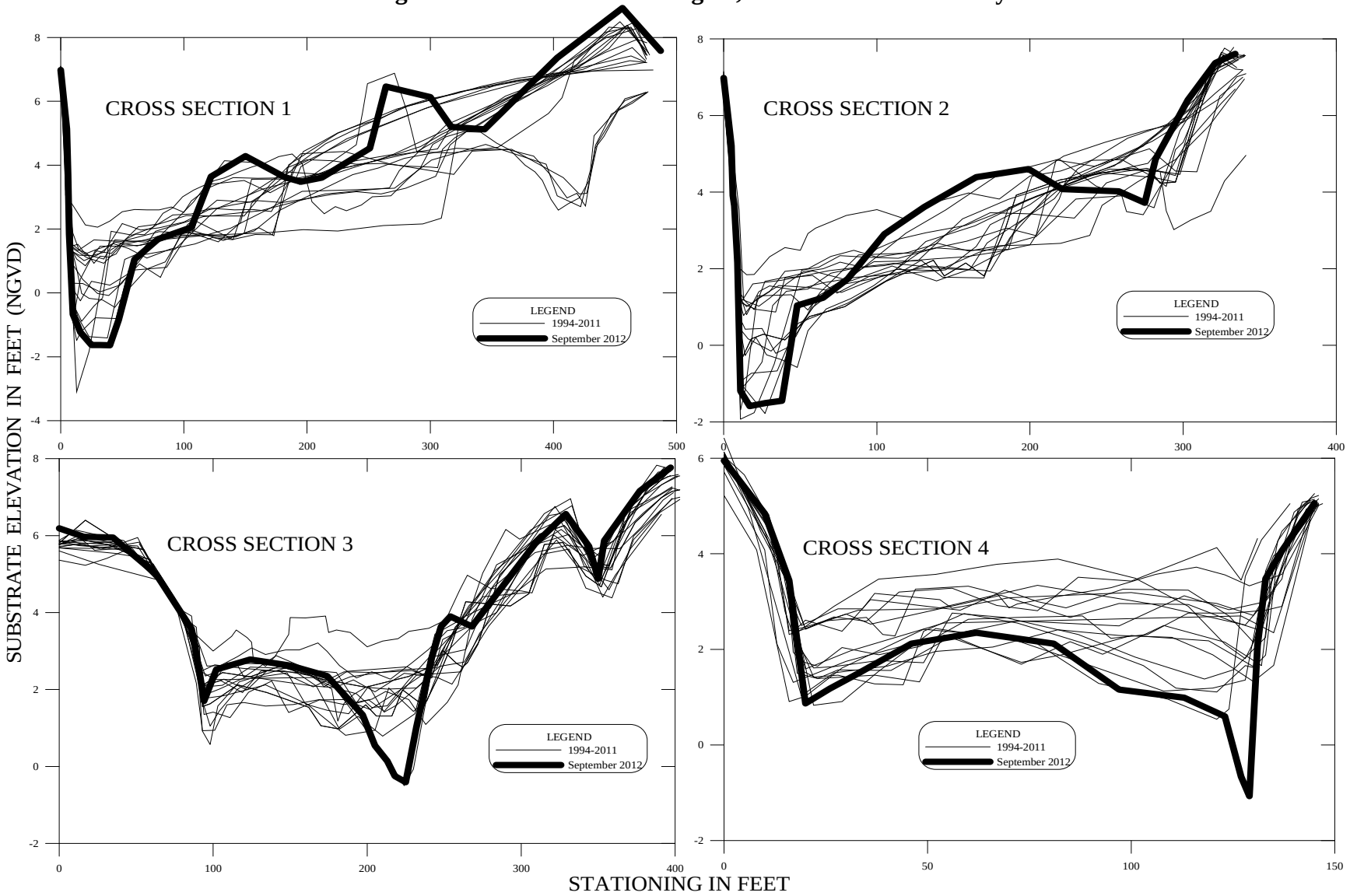
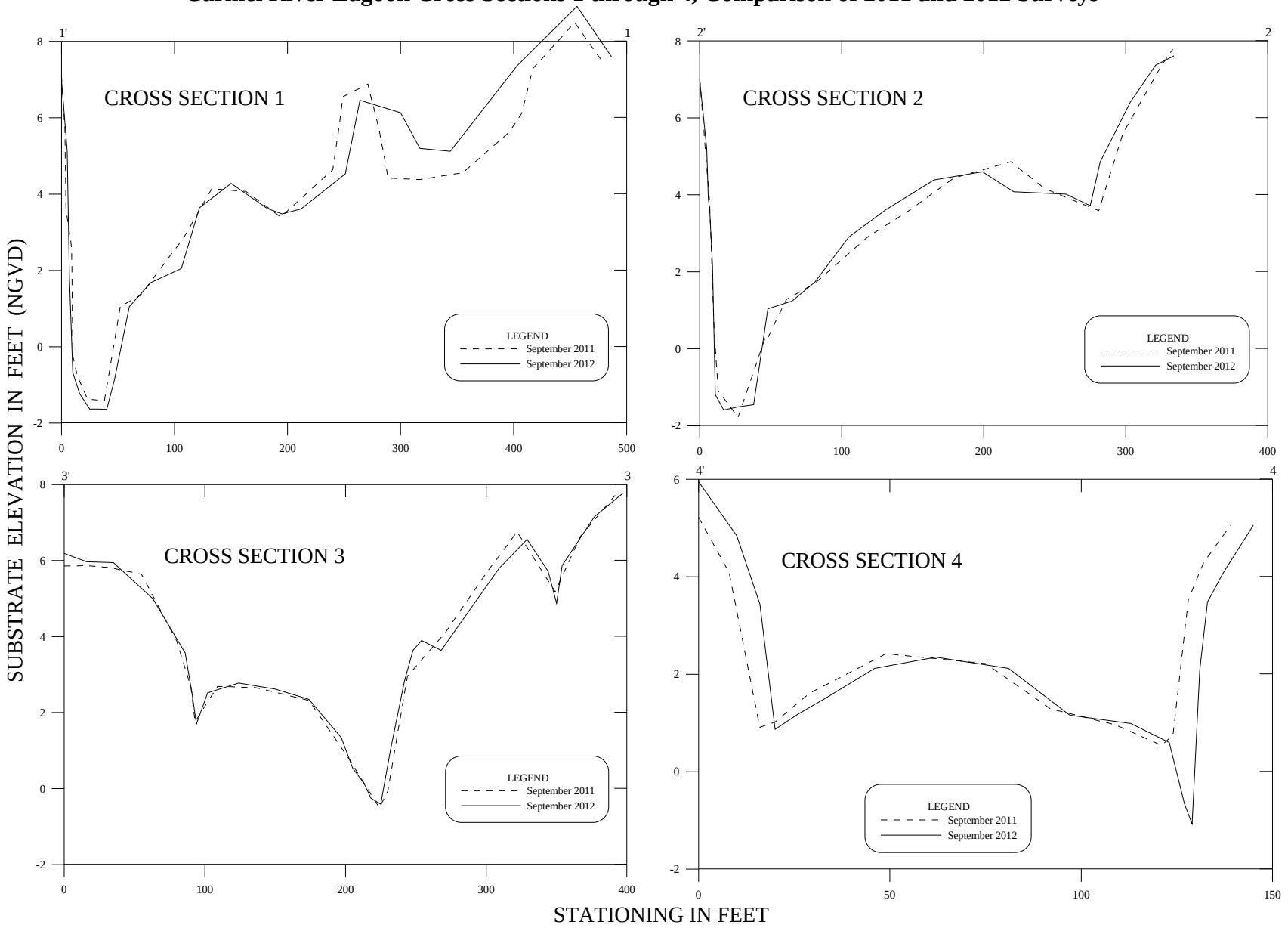


Figure XVIII-3
Carmel River Lagoon Cross Sections 1 through 4, Comparison of 2011 and 2012 Surveys



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 -- to implement the riparian habitat mitigation measures described above in Finding No. 393. Refer to Section XVII for information on riparian mitigation activities in the period July 2011 through June 2012.

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Prepared by Planning and Engineering Division
Finalized: October 1, 2009

XX. SUMMARY OF COSTS FOR MITIGATION PROGRAM, JULY 2011 THROUGH JUNE 2012

Mitigation Program costs for FY 2011-2012 totaled approximately $4.59 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 2011-2012 were $1.25 million less than the prior fiscal year largely due to capital expenditures for ASR. However, the overall costs have remained fairly constant (average of $3 million per year) for last five years. More recently, expenditures have trended upward due to expenditures for the Aquifer Storage and Recovery Project. FY 2009-2010 expenditures were $3.27 million; and FY 2010-2011 expenditures were $5.84 million.

During FY 2011-2012, revenues totaled $3.31 million including mitigation program revenues, tax revenues, reimbursements, interest and miscellaneous revenues. The Mitigation Program Fund as of June 30, 2011 had a deficit balance of ($488,632).

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XXI. REFERENCES

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