

**2017-2018 ANNUAL REPORT
(July 1, 2017 - June 30, 2018)**

**MPWMD MITIGATION PROGRAM
WATER ALLOCATION PROGRAM ENVIRONMENTAL IMPACT REPORT**

**MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
Prepared April 2019**

I. EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND:

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

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

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

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

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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 Carmel River Mitigation Program fee under a separate agreement with MPWMD through June 2010. The District and Cal-Am have negotiated an annual funding agreement that funded part of the 2016-2017 mitigation program. In April 2017, the MPWMD resumed collection of its user fee from Cal-Am ratepayers. The District's other revenue sources were used to fund the remainder of the program.

The California Environmental Quality Act (CEQA) (Pub. Res. Code 21081.6) requires that the MPWMD adopt a reporting or monitoring program to insure compliance with mitigation measures when implementing the Water Allocation Program. Findings Nos. 387 through 404 adopted by the Board on November 5, 1990 describe mitigation measures associated with the Water Allocation Program; many entail preparation of annual monitoring reports. This 2017-2018 Annual Report for the MPWMD Mitigation Program responds to these requirements. It covers the fiscal year period of July 1 through June 30. It should be noted that hydrologic data and well reporting data in this report are tabulated using the water year, defined as October 1 through September 30, in order to be consistent with the accounting period used by the SWRCB.

This 2017-2018 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 2017-2018 (July 1, 2017 through June 30, 2018, unless otherwise noted). Monitoring results, where applicable, are also presented. Tables and figures that support the text are found at the end of each section in the order they are introduced in the text.

ACCOMPLISHMENTS:

Many activities are carried out as part of the MPWMD Mitigation Program to address the environmental effects that community water use has upon the Carmel River and Seaside

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Groundwater Basins. Highlights of the accomplishments in FY 2017-2018 for each major category are shown in **Table I-2**.

OBSERVED TRENDS, CONCLUSIONS AND/OR RECOMMENDATIONS:

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

General Overview

Overall, the Carmel River environment with respect to riparian vegetation, river flow, and aquifer levels is in better condition today than it was in 1990 when the Allocation Program EIR was prepared. This improvement is evidenced by increased riparian habitat and higher water tables in the Carmel Valley alluvial aquifer. However, the steelhead fishery was rebounding until the onset of the 2012-2015 drought. During and after the drought, steelhead numbers declined to levels similar to those seen in previous droughts. Then in 2017, with abundant winter rains, adult steelhead were observed in the system and the District did not have to rescue juvenile steelhead in the mainstem of the Carmel River. However, rescues were carried out in the tributaries. Rescues resumed in the summer of 2018.

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 17 out of 27 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 in most years, harming habitat for listed fish and frog species. The presence of the one existing dam, flood-plain development and water diversions to meet

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community and local user needs continue to alter the natural dynamics of the river. Streambank restoration projects may be significantly damaged in large winter storm events, and some people continue to illegally dump refuse into the river or alter their property without the proper permits. Thus, the Mitigation Program (or a comprehensive effort similar to it) will be needed as long as significant quantities of water are diverted from the Carmel River and people live in close proximity to it.

Water Resources Monitoring Program

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

There is limited storage of surface water on the Carmel River. Los Padres Reservoir, completed in 1948, holds 1,667 AF of storage (without flashboard), based on 2017 survey data. In addition, San Clemente Reservoir (SCR), completed in 1921, was removed in the fall of 2015 by order of the Department of Water Resources (DWR) due to seismic safety concerns.

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 periods of more favorable hydrologic conditions and the adoption of improved water management practices that have tended to preserve higher storage conditions in the aquifer. In WY 2018, Carmel Valley Alluvial Aquifer storage decreased compared with recent years as this year was classified as "below normal."

In contrast, storage conditions in the coastal portion of the Seaside Groundwater Basin have not been stable in recent years, in particular with respect to the deeper Santa Margarita aquifer, from which over 80 percent of the Cal-Am production in the Seaside Basin is derived. This downward trend in water levels reflects the changed production operations in the Seaside Basin stemming primarily from changed practices after SWRCB Order 95-10. The increased annual reliance on production from Cal-Am's major production wells in Seaside, along with significant increases in non-Cal-Am use, have dramatically lowered water levels in this aquifer, and seasonal recoveries have not been sufficient to reverse this trend.

To address this storage depletion trend, the District initiated efforts in the 2000-2001 timeframe to prepare a Seaside Basin Groundwater Management Plan in compliance with protocols set by the State of California (AB 3030, as amended by SB 1938). This process was superseded by litigation filed by Cal-Am in August 2003, requesting a court adjudication of water production and storage rights in the Seaside Basin. The District participated in all litigation proceedings as an intervening "interested party". The Superior Court held hearings in December 2005 and issued a final adjudication decision in March 2006, which was amended through an additional court filing in February 2007. The final decision established a new, lower "natural safe yield" for the Basin of

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

The ASR water supply efforts in 2017-2018 included: (1) continued work with regulatory and land use agencies on expansion of the Phase 1 Santa Margarita ASR site; (2) continued work on the utility water system for the Phase 2 ASR Project at the Seaside Middle School site; (3) coordination with Cal-Am and other parties to construct the necessary infrastructure for the ASR project expansion; and (4) continued implementation of a Memorandum of Understanding (MOU) with Cal-Am on operation and maintenance at 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

- **Adult Steelhead**

Previous redd surveys below San Clemente Dam (SCD) confirm that the spawning habitat in the lower river has improved considerably over the last 20 years and many adults now spawn there instead of the upper watershed. In addition, juvenile steelhead rescued by the District from the lower river that survive to adulthood may be more likely to return to the lower river to spawn rather than migrate upstream.

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

- Variable river and flow conditions effects on all steelhead life stages including adult steelhead, as migration may be limited or blocked and spawning reaches may dry early;
- adverse ocean conditions with increased water temperatures off the coast of California, and degraded ocean water quality likely affecting the abundance of food resources and possibly even the survival of returning steelhead;
- variable lagoon conditions, caused by artificial manipulation of the sandbar and/or naturally occurring periods of low winter flows; and
- low densities of juvenile fish affecting subsequent adult populations.

• Juvenile Steelhead

Long-term monitoring of the juvenile steelhead population at eleven sites along the mainstem Carmel River below Los Padres Dam (LPD) shows that fish density continues to be quite variable both year to year and site to site from less than 0.10 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 2018 reporting period, the average population density remained less than the long-term average of 0.67 fpf for the Carmel River, likely due to the recent drought, poor habitat conditions in the lower river, and low numbers of returning adults.

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

Positive Factors:

- General improvements in streamflow patterns, due to favorable natural fluctuations, exemplified by relatively high base-flow conditions between 1995 and 2012 and the very wet conditions in 2017;
- 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 LPD, the increased availability of ASR and Sand City desalinated water in the summer, and extensive conservation measures, all help provide increased streamflow;
- restoration and stabilization of the lower Carmel River's stream banks, providing improved riparian habitat (tree cover/shade along the stream, an increase in woody debris and the associated invertebrate food supply) while preventing erosion of silt/sand from filling gravel beds and pools;
- extensive juvenile steelhead rescues by the District over the last 29 years, now totaling

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437,528 fish through 2018;

- rearing and releases of rescued fish from the Sleepy Hollow Steelhead Rearing Facility (SHSRF) of 97,600 juveniles and smolts back into the river and lagoon over the past 22 years (16 years of operation), at sizes generally larger than the river-reared fish, which in theory should enhance their ocean survival.

Negative Factors:

- variable lagoon conditions, including highly variable water surface elevation changes caused by mechanical breaching, chronic poor water quality (especially in the fall), and predation by birds and striped bass;
- barriers or seasonal impediments to juvenile and smolt emigration, such as intermittent periods of low flow below the Narrows during the normal spring emigration season;
- spring flow variability such as low-flow conditions that could dewater redds prematurely or high flows that could either deposit sediment over redds or completely wash them out;
- occasionally elevated fall temperature and hydrogen sulfide levels below LPD, and the increase in sediment from the SCD removal project;
- the potential for enhanced predation on smolts and YOY migrating through the sediment field above LPD; and
- invasive species: striped bass have recently (2015) started migrating up the river from the lagoon and are likely preying on juvenile steelhead. New Zealand Mud Snails (NZMS) were first discovered during BMI surveys at Red Rock (mid-valley) in 2016 and now comprise up to 62% of the BMI in the lower river. NZMS out compete native invertebrates and are a poor food item themselves for steelhead.

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

Riparian Habitat Mitigation

With the exception of the Rancho Cañada to Rancho San Carlos Road Bridge reach, the Carmel River streamside corridor has stabilized in nearly all reaches that were affected by a combination of increased groundwater extraction, extreme drought and flood events that occurred during the

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1970s, 1980s and 1990s. Prior to the 2016-17 winter high flows, a complex channel had developed in the lower 16 miles of the river 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, experienced vigorous natural recruitment in the channel bottom, which has helped to stabilize streambanks and diversify aquatic habitat. Areas that continue to be dewatered annually have less significant growth.

In areas with perennial flow, 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.

The Soberanes fire in the summer of 2016 combined with the removal of San Clemente Dam and high flows in the winter of 2016-17 proved to be a combination of events that significantly changed the river downstream of the former dam site. Quantities of silt, sand, and debris that had not been seen in the alluvial reach since high flows in 1998 were carried down from the fire-scarred upper watershed into the active channel. Past similar events during 1978-1983 and 1993-1998 contributed to substantial destabilization of streambanks in the lower 15.5 miles of the river; however, the 2016-17 event comes after significant reductions in annual diversions have been made and after long reaches of the river have been actively restored or passively recovered. Thus streambank instability was limited to the area downstream of Rancho San Carlos Road. Follow-up channel surveys by CSUMB indicate that the increased sediment load during the winter of 2017 were likely due to material being washed out from the Carmel River Reroute at the former San Clemente Dam site.

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 can exhibit unstable characteristics during high flows, such as sudden bank collapse, because of the lack of healthy vegetation that would ordinarily provide stability. The drought that began with Water Year 2013 (beginning October 2012) and ended in Water Year 2016 is an ongoing concern because of the past history of channel erosion and bank instability after severe droughts in 1976-77 and 1987-1991. Impacts to streamside vegetation can manifest themselves for several years even after the end of a drought.

Based on annual cross-section work by CSUMB, several areas have experienced a filling in of pools with sand. Absent high flows like those that occurred in 2017, it is likely that the sand will be winnowed out and sent downstream over the next several years. When river flows drop in late spring or early summer of 2019, District staff will investigate the overall scour and deposition of the streambed and report on this in next year's mitigation report. Current results still show many of the pools are still filled with sand.

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.

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

- increased encroachment of vegetation into the active channel bottom that can induce debris blockage, bank erosion and increased risks during floods,
- effects to areas with groundwater extraction downstream of Schulte Road,
- channel changes and erosion due to new supply of sediment from upstream associated with high flows, San Clemente Dam removal, and the Soberanes Fire in Water Year 2017,
- 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:

- Local, State and Federal agencies consider the Carmel River watershed to be a high priority area for restoration, as evidenced by the interest in addressing water supply issues, the removal of San Clemente Dam, proposed projects in the lower Carmel River, and continued oversight with the management of threatened species. Stringent avoidance and mitigation requirements will continue to be placed on activities that could have negative impacts on sensitive aquatic species or their habitats.
- Activities that interrupt or curtail natural stream functions, such as lining streambanks with riprap, have come under increasing scrutiny and now require significant mitigation offsets. Approximately 35% to 40% of the streambanks downstream of Carmel Valley Village have been altered or hardened since the late 1950s. Activities that increase the amount of habitat or restore natural stream functions are more likely to be approved or funded through State and Federal grant programs.
- Additional work to add instream features (such as large logs for steelhead refuge or backwater channel areas for frogs) can restore and diversify aquatic habitat.
- Major restoration projects completed between 1987 and 1999 have had extensive and successful work to diversify plantings. However, maintenance of irrigation systems is ongoing and requires extensive work in water years classified as below normal, dry and critically dry.
- The channel will change due to a new supply of sediment coming from upstream of the old San Clemente Dam and additional sources of sediment associated with the Soberanes Fire of 2016.

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 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 2018, MPWMD renewed its long-term permits with the U.S. Army Corps of Engineers and the California Regional Water Quality Control Board for routine maintenance and restoration work. In 2014, the District also renewed a long-term Routine Maintenance Agreement (RMA) with the California Department of Fish and Wildlife to conduct regular maintenance and restoration activities in the Carmel River.

Monitoring Program

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

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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 from 2018 avian point count surveys indicate that the District's 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 will pass into the lower river in the foreseeable future now that San Clemente Dam has been removed. District staff are already seeing signs of additional sediment in the Carmel River below Esquiline Road Bridge associated with high flows in Water Year 2017.

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 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.

MPWMD adopted the 2014 Update to the 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 IRWM Plan combines strategies to improve and manage potable water supply, water conservation, stormwater runoff, floodwaters, wastewater, water recycling, habitat for wildlife, and public recreation.

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

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implement a comprehensive solution to water resource problems in the planning region. The Monterey Peninsula region is expecting to take advantage of about \$4.3 million from Prop 1 IRWM funds over the next several; years. In 2018, \$252,693 was awarded to the region as a part of the Disadvantaged Community Involvement grant. A grant solicitation package for the first round of implementation projects is expected to be issued in the first half of 2019, and the Monterey Peninsula region will be applying for approximately \$2 million in grant funds.

More information about the IRWM Plan and the group of stakeholders in the planning region can be found at the following web site:

<http://www.mpirwm.org>

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 also continue to meet and discuss with other agencies the potential use of an existing California Department of Parks and Recreation (CDPR) agricultural well.

The District expanded its long-term monitoring around the lagoon in 1995 in an attempt to determine if the reduction in freshwater flows due to groundwater pumping upstream might change the size or ecological character of the wetlands. Demonstrable changes have not been identified. Because of the complexity of the estuarine system, a variety of parameters are monitored, including vegetative cover in transects and quadrats, water conductivity, and hydrology. It is notable that due to the number of factors affecting this system, it would be premature to attribute any observed changes solely to groundwater pumping. The following illustrates the Water Year (October 1 – September 30) classifications since 1995 in terms of total annual runoff.

Classification	Number of Years	Water Year
Extremely Wet	3	1995, 1998, 2017
Wet	2	2005, 2006
Above Normal	5	1996, 1997, 2000, 2010, 2011
Normal	5	1999, 2001, 2003, 2008, 2009
Below Normal	3	2004, 2016, 2018
Dry	4	2002, 2012, 2013, 2015
Critically Dry	2	2007, 2014

Thus, the hydrology of the watershed has been at least normal or better 63% of the time during that 24 year period. However, monitoring in 2014 occurred during a Critically Dry Water Year that followed two consecutive Dry Water Years, and 2015 was the first time a fourth year of

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drought was ever monitored. Other natural factors that affect the wetlands include introduction of salt water into the system as waves overtop the sandbar in autumn and winter, tidal fluctuations, and long-term global climatic change. When the District initiated the long-term lagoon monitoring component of the Mitigation Program, it was with the understanding that it would be necessary to gather data for an extended period in order to draw conclusions about well production drawdown effects on wetland dynamics. It is recommended that the current vegetation, conductivity, topographical and wildlife monitoring be continued in order to provide a robust data set for continued analysis of potential changes around the lagoon. During this RY the District budgeted to replace the CDPR lagoon water-quality profiler that has been out of service for five years, with a stock one from a major vendor. However, since the Carmel Area Wastewater District (CAWD) plans to replace and underground their outlet pipe very soon, we delayed spending significant funds on what would be just a temporary installation at this time. The District intends to re-budget in RY 2020-2021 for the placement of a vertical profiler, once the new CAWD pipe is in place, and then restore continuous data collection during a future RY.

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 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. Substrate elevations at the cross sections remained relatively stable during WY 2018 compared to August 2017 conditions, likely related to below normal streamflow conditions. Since 1994, an apparent trend of overall loss in sand volume appears to be emerging, as south bank substrate elevations are close to the historic low. The sand loss or down-cutting observed at the cross sections 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 (HWY 1) for several miles, a trend believed to have begun in WY 2006. In the recent “Critically Dry” years of WY 2007 and 2014 and “Dry” years of WY 2012 and 2013, no significant changes were documented compared to the respective prior years. Water Year 2018 classified as “Below Normal”, resulted in no significant changes at the cross sections, thus it is concluded that substrate elevations at the cross sections generally do not change in these low-flow years, despite the regular occurrence of major lagoon mouth breaches in all of these years, except WY 2014. The “Extremely Wet” WY 2017 caused dramatic changes (scour) at the cross sections indicating that quantity of streamflow (peak flow and total volume) is likely the primary factor that controls significant substrate changes at the key cross sections.

Program Costs

Mitigation Program costs for FY 2017-2018 totaled approximately \$2.35 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 2017-2018 were \$0.18 million higher than the prior fiscal year due to increases in Mitigation Program costs. However, the overall costs have remained constant (average of \$2.30 million per year) for last five years. In the past, expenditures had trended upward due to expenditures for the Aquifer Storage Recovery (ASR) Project. ASR Project costs are no longer captured under Mitigation Program Costs. FY 2015-2016 expenditures were \$2.27 million; and FY 2016-2017 expenditures were \$2.17 million.

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During FY 2017-2018, revenues totaled \$3.73 million including user fees, tax revenues, grant receipts, investment income and miscellaneous revenues. The Mitigation Program Fund Balance as of June 30, 2018 was \$3.43 million.

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Table I-1

SUMMARY OF COMPONENTS OF MPWMD MITIGATION PROGRAM

July 1, 2017 - June 30, 2018

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
 - Pit tagging study
- Prevent Stranding of Fall/Winter Juvenile Migrants
 - Juvenile rescues
- Rescue Juveniles Downstream of Robles del Rio in Summer
- Operate Sleepy Hollow holding/rearing facility
- Monitoring Activities for Mitigation Plan
 - Juvenile population surveys
- Other Activities not required by Mitigation Plan
 - Spawning habitat restoration
 - Modify critical riffles

RIPARIAN VEGETATION AND WILDLIFE

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

LAGOON VEGETATION AND WILDLIFE

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

AESTHETICS

- Restore Riparian Vegetation (see above)

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

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Table I-2
Summary of MPWMD Mitigation Program Accomplishments: 2017-2018 Report

MITIGATION ACTION	MAJOR ACCOMPLISHMENTS
Monitor Water Resources	Regularly tracked precipitation, streamflow, surface and groundwater levels and quality, and lagoon characteristics between Los Padres Dam and the Carmel River Lagoon, using real-time methods at numerous data collection stations. Maintained extensive monitoring network, and continuous streamflow recorders below the former 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	A total of 2,444 conservation inspections were conducted in FY 2017-2018. An estimated 13.73 acre-feet (AF) of water were saved by new retrofits verified this year in these two categories. For FY 2017-2018, a total of 1,674 applications for rebates were received, 1,238 applications were approved with the use of the rebate refund, as described in Section VIII. As of June 30, 2018, a total of 89.576AF of water remained available in the areas served by CAW, as described in Section IX. This includes water from pre- and post-Paralta Allocations and water added to a Jurisdiction's Allocation from Water Use Credit transfers and public retrofits.
Monitor Water Usage	Complied with SWRCB Order 95-10 for Water Year 2018.
Augment Water Supply	Long-term efforts to augment supply included: (1) Continued participation in the CPUC rate hearing process to review elements of the Monterey Peninsula Water Supply Project (MPWSP); (2) Participated in meetings intended to resolve concerns about MPWSP construction, operations, financing, management and oversight; (3) Participated on Technical Advisory Committee to the Monterey Peninsula Regional Water Authority; (4) Operated Aquifer Storage and Recovery (ASR) Phase 1 and 2 projects in WY 2018; (5) Held regular coordination meetings with Cal-Am regarding planned infrastructure upgrades to deliver water supply to the ASR project wells at full capacity; (6) Conducted additional work

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MITIGATION ACTION	MAJOR ACCOMPLISHMENTS
	<p>related to alternative desalination plant sites; (7) Provided technical support to Monterey One Water for the Pure Water Monterey Project; (8) Participated in CPUC hearing process on Cal-Am related rate requests.</p> <p>Other ongoing activities included: (1) Served as member of both the Seaside Basin Watermaster Board and as the Technical Advisory Committee; (2) Participation in a technical role regarding alternatives for Los Padres Dam and associated sediment management.</p>
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	<p>The surface flow of the Carmel River dropped below 10 cfs at the Highway 1 Bridge on May 18, 2018. In response to this decline, District staff began monitoring daily river conditions. Mainstem rescues began on June 25th and were conducted until October 3, 2018 between the Highway 1 Bridge (RM 1.0) and Schulte Bridge area (RM 6.7), and at the Trail and Saddle area (RM 13.3). During this period, staff conducted 32 rescue operations over 6.3 miles, yielding a total of 2,794 steelhead, including: 1,396 young-of-the-year (YOY), 1,383 yearlings (1+), 1 kelt and 14 mortalities (0.50%). Since 1989, District staff has rescued 437,528 steelhead from drying reaches of the Carmel River watershed. Compared to previous rescue seasons, total rescued fish in the 2018 dry season was only 34% of the 1989-2018 average of 14,584, as described in Section XVI.</p>
Riparian Habitat Program	<p>Continued revegetation efforts at exposed banks with little or no vegetation located between Via Mallorca and Esquiline Roads; Contracted to collect channel profile data and limited cross section data from the Carmel River for use in maintaining a long-term record and comparing to the past and future data; Made public presentations showing MPWMD-sponsored restoration work over the past 27 years; Continued long-term monitoring of physical and biological processes along the river in order to evaluate the District's river management activities; Continued the annual inspections of the Carmel River from the upstream end of the lagoon to Camp Steffani; Walked the entire river to observe and record erosion damage, conditions that could cause erosion, riparian ordinance infractions, and the overall condition of the riparian corridor; Continued enforcement actions to address serious violations of District</p>

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MITIGATION ACTION	MAJOR ACCOMPLISHMENTS
	riparian ordinances; Carried out vegetation management activities; Operated under Routine Maintenance Agreement with CDFW for MPWMD vegetation maintenance activities.
Lagoon Habitat Program	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. The District also surveyed and analyzed four bathymetric transects, participated in interagency meetings regarding management of lagoon in winter storm events (see also steelhead efforts that benefit lagoon) and monitored lagoon stage.
Aesthetic Measures	See Riparian Habitat Program measures in Section XVII.