



# Santa Clara Valley Water District

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**File No.:** 17-0527

**Agenda Date:** 8/22/2017

**Item No.:** \*2.7.

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## BOARD AGENDA MEMORANDUM

### **SUBJECT:**

Issues Facing the District's Imported Water Supply and the Delta Ecosystem.

### **RECOMMENDATION:**

Receive and discuss information on the issues facing the District's imported water supply and the Delta ecosystem.

### **SUMMARY:**

This agenda item provides an opportunity for the Board and the public to receive information on the status of the Delta ecosystem and the factors impacting imported water supplies. It also describes potential consequences of maintaining the status quo by taking no action to address the risks to the Delta and the sustainability of water supplies derived from it.

The Delta ecosystem is impacted by several factors including loss of native habitat, proliferation of invasive species, and the operation of upstream reservoirs to protect against flooding and provide water supply. Diversion of water upstream of the Delta and within the Delta, as well as exports from the Delta, contribute to unnatural flow patterns, reduced outflow, changes to water quality, and trapping of fish in pumping facilities.

Delta water quality is also impacted by wastewater discharges, urban and agricultural runoff, and legacy contaminants. The combination of these factors has resulted in population declines of several native fish species and a history of increasing regulatory restrictions that have decreased Santa Clara County's State Water Project (SWP) and federal Central Valley Project (CVP) water supplies (collectively, SWP/CVP water supplies) over the past several decades to protect fish and water quality. SWP/CVP water supplies are also at risk from increased salinity intrusion due to climate change, including sea level rise, and seismic threats to its fragile levee system.

### **Overview of Agenda Memo**

- A. Importance of Imported Water Supplies to Santa Clara County
- B. Factors Affecting the Delta Ecosystem and SWP/CVP Water Supplies
  - B.1 Levee stability
  - B.2 Climate change and subsequent sea level rise

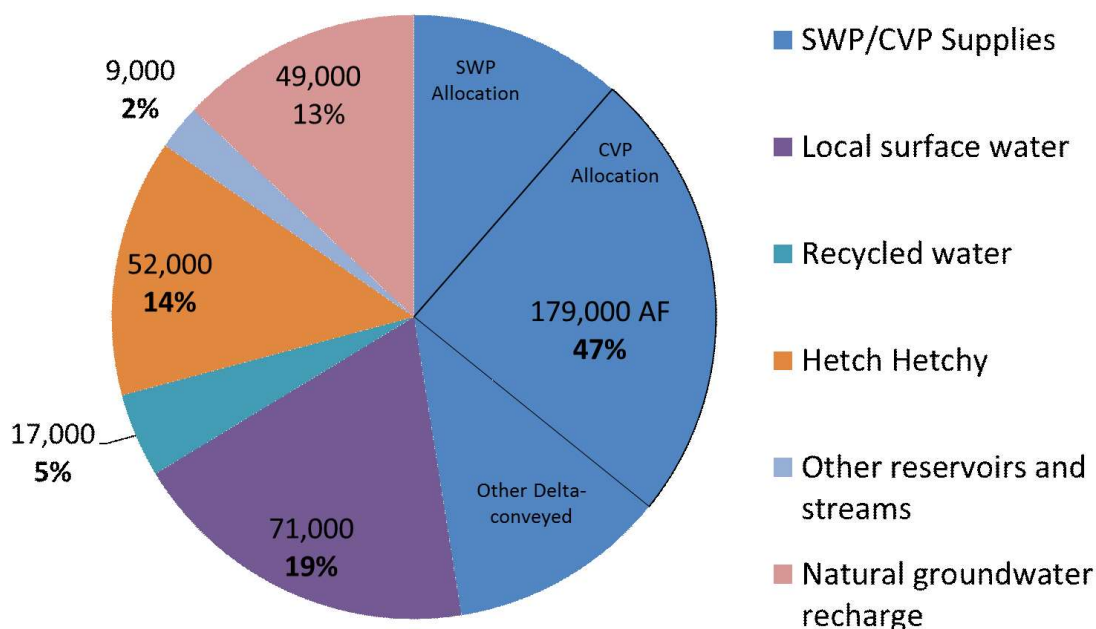
- B.3 Increasing regulatory restrictions to protect fish and water quality
- B.4 Ecosystem Status
- C. Ongoing Delta Activities

### A. Importance of Imported Water Supplies to Santa Clara County

Imported water supplies are critical for sustaining the communities and businesses of Santa Clara County and protecting the region from irreversible land subsidence. On average, 40% of the County's water needs are met by diverting water from the Sacramento-San Joaquin Delta. Another 15% of supply needs are satisfied by diversions upstream of the Delta by the San Francisco Public Utilities Commission's Regional Water System.

The District's Delta supplies are conveyed by the State Water Project (SWP) and Central Valley Project (CVP), which together are a critical component of the District's water supply portfolio, providing over 90% of the water supply to the District's three drinking water treatment plants, recharging the County's local groundwater basins to ensure sustainable supplies, and protecting local surface water and groundwater reserves. During critically dry years and long term droughts, the County's dependence on SWP/CVP water supplies increases as local reserves diminish, as seen in Figure 1 for the period from 2007 to 2015, which included several drought years.

**Figure 1. Average Santa Clara County water supply sources from 2007 to 2015**



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## **B. Factors Affecting the Delta Ecosystem and Imported Water Supplies**

Several reports have highlighted that the existing conditions, management, and uses of the Delta are unsustainable. For example, a group of past Delta Lead Scientists, describing the challenges facing the Delta, stated, *"The current arrangement for addressing this combination of complexity, uncertainty, and change is unsustainable, as evidenced by both declines in native species and dissatisfaction with water deliveries."*

Similarly, a Blue Ribbon Task Force convened by Governor Schwarzenegger to *"develop a durable vision for sustainable management of the Delta"* described the situation as, *"The current condition and uses of the Delta are unsustainable. Rising sea levels will lead to intrusion of salt water farther upriver in the Delta, altering the ecology of fish and plants and contaminating waters withdrawn for diversion to agriculture and urban uses. Inevitable floods will inundate vast areas, overwhelm levees, destroy property and infrastructure, and endanger lives in flood-prone areas. Less certain but potentially more catastrophic earthquakes could profoundly alter the physical geography of vast areas of the Delta, obliterating settled areas with major flooding, destroying bridges, levees, roads, power transmission, gas pipelines, and buildings."*

Likewise, the Public Policy Institute of California, a nonprofit, nonpartisan think tank concluded, *"The most striking of these themes is that business as usual is unsustainable for current stakeholders. The combined effects of continued land subsidence (that is, sinking land elevations), sea level rise, increasing seismic risk, and worsening winter floods make continued reliance on weak Delta levees imprudent and unworkable over the long term."*

The State and United States Geological Survey have predicted high probabilities of a major earthquake in the next 25 years that could cause catastrophic levee failure and significant impairment of water deliveries due to salinity intrusion. These risks are exacerbated by sea level rise and other effects of climate change. For the past decade, protected fish species have declined and ongoing concern over the health of the Delta estuary has led to increasing regulatory restrictions that have reduced the amount of water that could be diverted from the existing Delta channels for delivery to Santa Clara County and other agencies south of the Delta. These concerns and others have been summarized in an October 2016 handout developed by the Public Policy Institute of California Water Policy Center, provided in Attachment 1.

### **B.1 Levee stability**

An important risk to the current Delta uses, including reliable water supply conveyance through the Delta, is the state of the levees and their vulnerability to failure due to earthquakes, floods, sea level rise, and other natural events. There are over 1,100 miles of levees in the Delta, some protecting land that is now 10 to 25 feet below sea level. The Delta Stewardship Council recently estimated that 69% of the land within the Delta is protected by levees that do not meet today's flood control standards. Many more levees also do not meet current seismic standards, and the United States Geological Survey estimates there is a 72 percent chance of a major earthquake occurring in the San Francisco Bay area before 2043. Additionally, climate change scenarios predict even greater threats

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in the future. Earlier snow melts, more extreme storm events, sea level rise, and continued land subsidence will put additional strain on the Delta levees.

A massive levee failure in which multiple Delta islands are flooded could significantly disrupt the export of water supplies through the Delta. According to DWR, a major earthquake could cause as many as 20 islands to flood simultaneously and such an event could shut down the SWP/CVP Delta pumps for up to a year and a half, depending on when and where the failure(s) occurred, with potentially severe impacts on Santa Clara County and the California economy. There is a lack of information regarding the extent to which exports may be restored beyond the outage period, or what the long term response plan may be. A key point is that the impact from a major failure event may continue well past the time that deliveries of imported water are restored, especially if the County's groundwater reserves are depleted in response to the outage. Until these reserves are replenished, the County is more vulnerable to subsequent dry periods and the risk of supply shortage increases.

A massive levee failure event would also have significant impacts on the Delta ecosystem. Effects include the physical change from confined channels to large open water spaces and an increase in salinity levels as bay water intrudes further into the Delta to fill the breeched islands. These changes could have both positive and negative effects depending on the individual species and its tolerances. As we saw following the Jones Tract levee failure in 2004, other water quality changes are likely to accompany the flooding of islands including increased algal blooms forming in the shallow, relatively stagnant, nutrient rich water. These blooms could be beneficial or harmful depending on the algal species produced and its density. There also could be increased contaminant loads as agricultural, residential, and commercial/industrial properties are flooded.

The cost to upgrade the levees varies depending on the level of protection provided. DWR has identified 951 miles of Delta levees that offer insufficient flood protection for Delta communities and water supplies conveyed through the Delta, estimating that it would cost about \$2 billion (in 2005 dollars) to mitigate that concern.

Addressing seismic stability is much more costly. DWR estimates that it would cost between \$19 million and \$38 million (2005 dollars) per mile to construct seismically-resistant setback levees along Middle River which would only protect a portion of the SWP/CVP supplies conveyed through the Delta.

Justifying the cost of upgrading the levees can be difficult since the cost of upgrading most of the levees exceeds the economic value of the land they protect. Simply upgrading Delta levees would provide little to no protection for fish, no protection to water supplies from pumping restrictions to protect fish, and no protection against water quality degradation from sea level rise and other climate change effects. In addition, upgraded and strengthened levees may discourage habitat restoration in the Delta.

### *B.2 Climate change and subsequent sea level rise*

Climate change is expected to have a significant but uncertain impact on future water supplies, including SWP/CVP supplies, and a negative impact on native fish species. One area of concern is the effect of climate changes to the Delta watershed itself. A rise in average temperatures would

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cause more precipitation to fall as rain instead of snow, and cause snow to melt earlier and more rapidly. Climate change is also expected to lead to more frequent and extended droughts and potentially more frequent and intense floods.

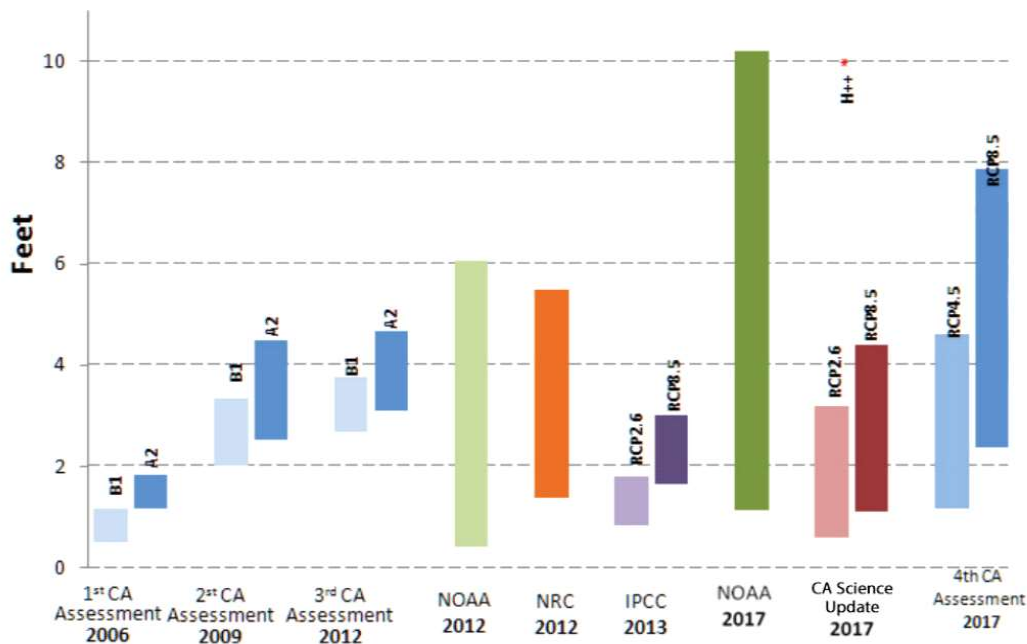
Migration and spawning of many endangered and threatened fish species are cued by storm flows. To protect these fish from being drawn into the pumps or into the south Delta where native fish habitat is poorer, the resource agencies have imposed restrictions on these pumps during the wet winter and spring months when there is the most water in the system available to divert. If climate change results in more short-term storm flows during winter and spring months during which Delta pumping is restricted to protect fish, the District's imported water supplies would likely be significantly impacted since the existing Delta conveyance system has limited ability to capture surplus storm flows.

Climate change may also impact SWP/CVP supplies by shifting the timing of inflows into the major SWP and CVP reservoirs. The California Water Commission's future modeling of 2030 and 2070 climate change impacts show that winter precipitation is shifting from snow to rain because of increasing temperatures, which causes reservoir inflows to increase in winter and decrease in spring. The percent of annual inflow to Trinity, Shasta, Folsom, and Oroville Reservoirs occurring from December through March (indicating rainfall runoff) is 48% for historical hydrology, 56% for 2030, and 62% for 2070. This shift in the timing of inflows reduces total annual reservoir storages since more inflow would occur in winter when the reservoir operation guidelines preclude storing the additional inflow. Combined with increased release requirements for salinity management in the Delta due to sea level rise, these lower reservoir storages lead to decreases in SWP and CVP project allocations. The Water Commission's modeling predicts that SWP allocations decrease from an average of 63% under historical hydrology to 62% for 2030 and 57% for 2070. CVP Municipal and Industrial (M&I) allocations decrease from 80% historically to 77% for 2030 and 71% for 2070. CVP Agricultural allocations decrease from 50% historically to 44% for 2030 and 29% for 2070.

A future warming trend also does not bode well for many of the Delta's native fish species. A recent study by researchers at UC-Davis found that 82% of native California fish species would be classified as highly vulnerable to climate change if current trends continue.

Another area of concern is that climate change will cause a rise in the average sea level. A 2012 report by the National Research Council (NRC) projects an average sea level rise of 0.5 foot by 2030, 1.0 foot by 2050, and 3.0 foot by 2100 for the San Francisco Bay relative to 2000. These are the projections used by the State for the California WaterFix analysis. While the 2012 NRC projections are well regarded, it is also important to recognize that other reputable models have projected different results, ranging from 0.5 to 10 feet by 2100 (Figure 2). The District uses the high-end of the 2011 US Army Corps of Engineers' projections (not depicted on Figure 2), for the Shoreline Project and other District flood modeling, which are comparable to the 2012 NRC projections.

***Figure 2. A comparison of sea level rise projections by 2100.***



**Source:** California Ocean-Protection Council Science Advisory Team. 2017. Rising Seas in California an Update on Sea-Level Rise Science.

**Reports:**

CA Assessments: Periodic reports on the potential impacts of climate change in California. Reports are sponsored by the California Energy Commission and the California Environmental Protection Agency.

NOAA: National Oceanic Atmospheric Administration report for the National Climate Assessment.

NRC: National Research Council report.

IPCC: Intergovernmental Panel on Climate Change report.

CA Science Update: Report by the California Ocean Protection Council and the California Natural Resources Agency.

**Scenarios:**

B1: Lower emission scenario.

A2: Medium-high emission scenario.

RCP: Representative concentration pathways emission scenarios.

2.6 = Stringent emission reductions.

8.5 = No significant effort to reduce emissions.

H++: Extreme sea level rise scenario reflecting rapid ice sheet loss.

Rising sea levels will create several risks for the current through-Delta conveyance approach. Without additional freshwater releases to the Bay, sea level rise will increase the salinity of water in the Delta above concentrations protective of drinking water and irrigation. DWR projects that a one foot rise in the sea level by 2050 will require a 7-10% reduction in SWP/CVP exports to prevent salt water intrusion.

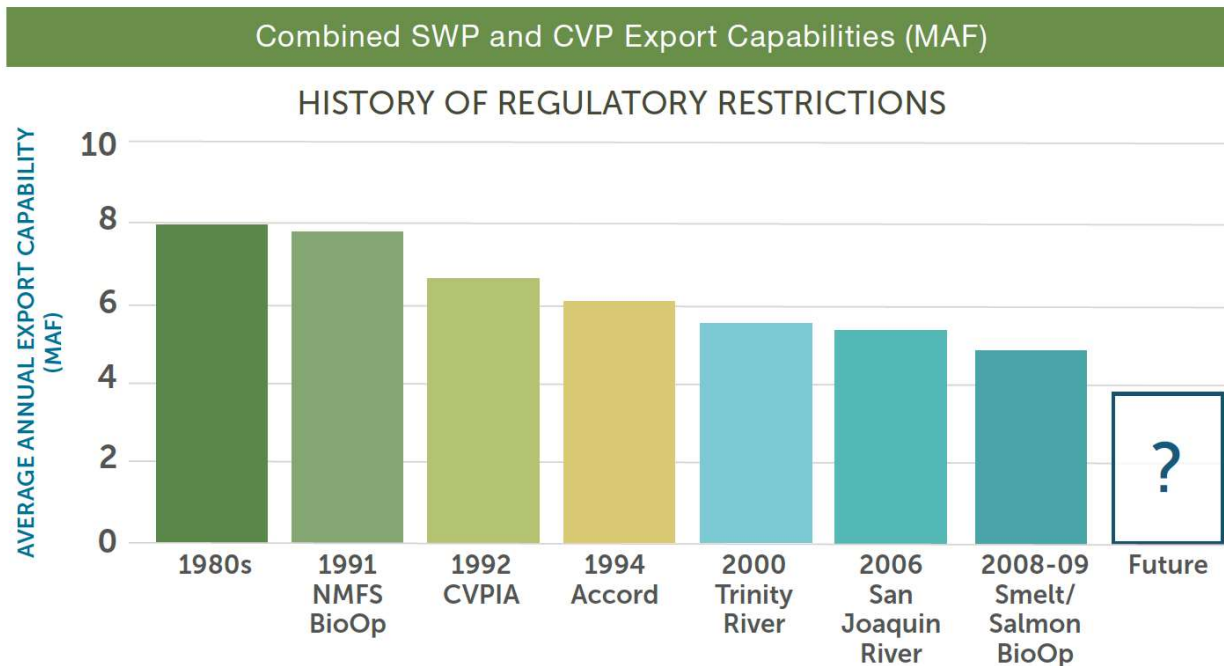
Rising sea levels will also increase the risk of levee failure due to increased pressure and internal seepage.

### *B.3 Increasing regulatory restrictions to protect fish and water quality*

Since 1990 there has been a steady increase in regulatory restrictions that have decreased

SWP/CVP exports to protect fish and water quality, as depicted in Figure 3 below. Regulations have been put in place to respond to fish entrainment, unnatural flow patterns, and water quality issues.

**Figure 3. History of regulatory restrictions.**



Water supply allocations to both the SWP and CVP have been a lot more variable and lower in the years since these additional regulations were imposed, as shown in Figures 4 and 5.

**Figure 4. Historical SWP water supply allocations.**



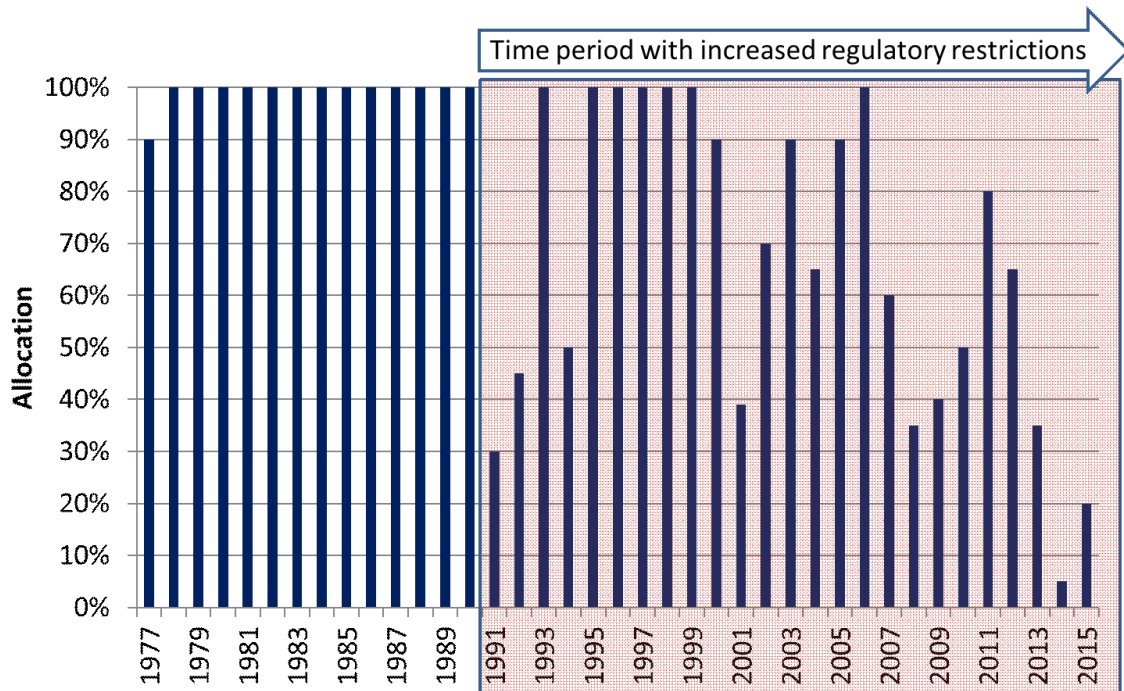
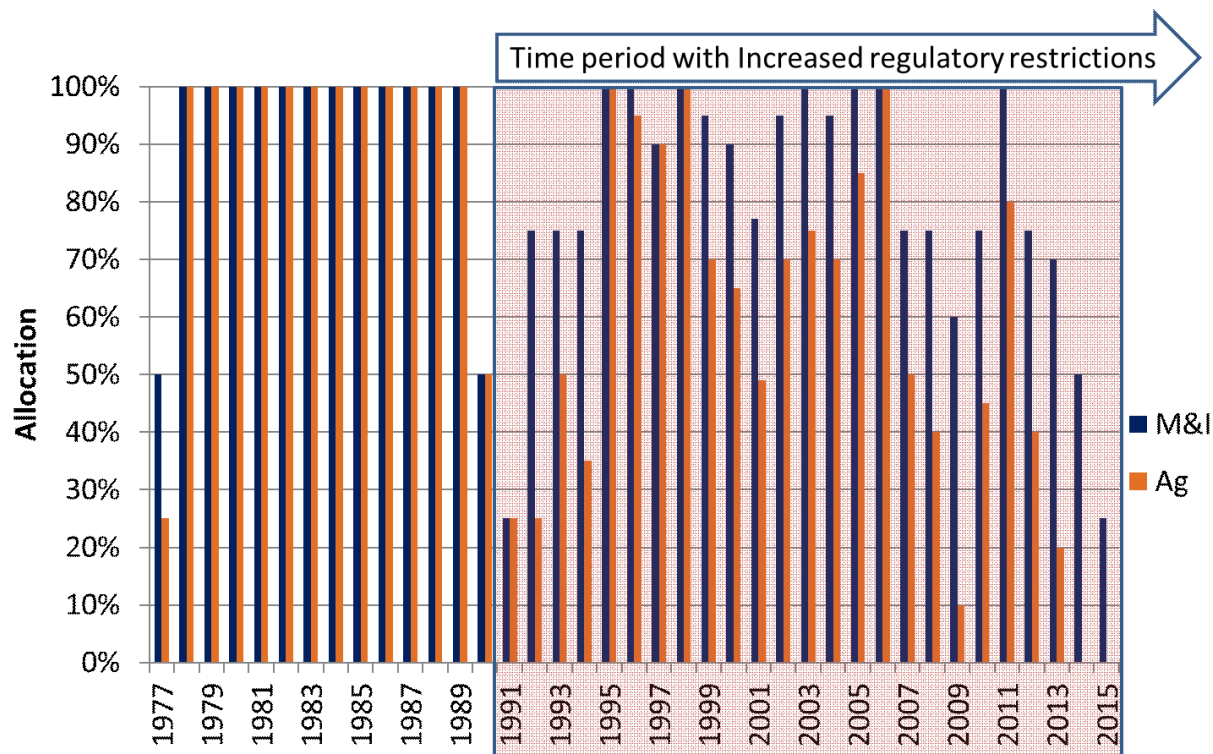


Figure 5. Historical CVP water supply allocations.

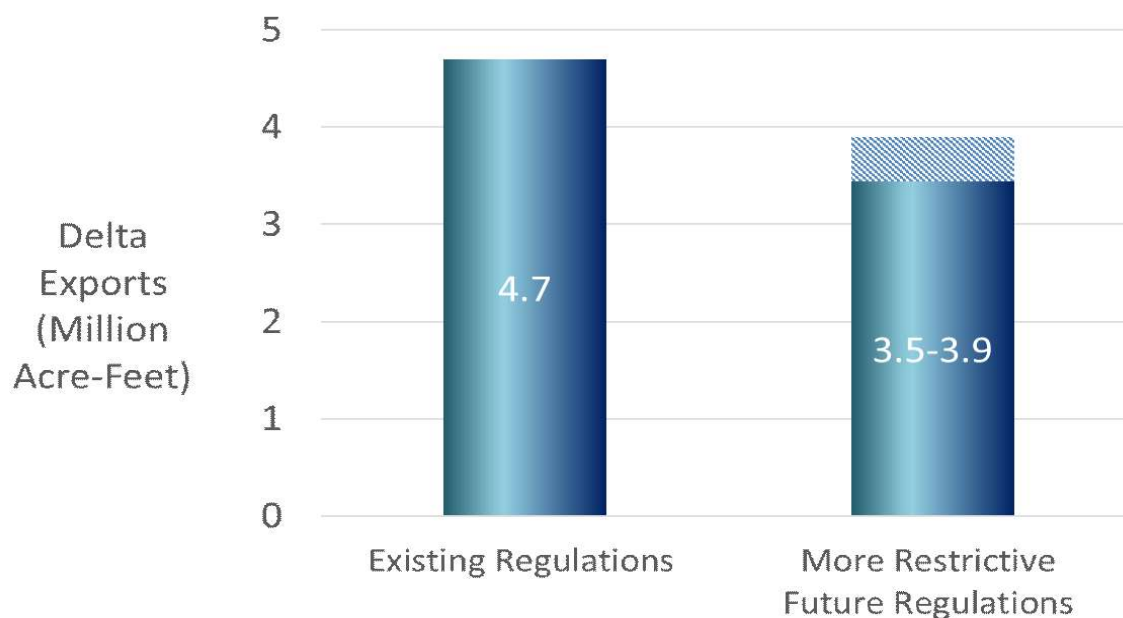




The condition of key fish species protected under the federal and State endangered species acts have continued to decline, and regulatory agencies have taken increasingly conservative stances that limit the ability to export water supplies from south Delta channels. It is likely that additional regulatory restrictions will be placed on the SWP and CVP that further limit the District's access to its imported water supplies.

Accordingly, the criteria that were developed in coordination with the fish and wildlife agencies for SWP/CVP operations with the proposed California WaterFix include additional restrictions to protect fish in the south Delta, beyond those that exist today. If those restrictions were to be imposed without the WaterFix, modeling by DWR indicates that existing long-term average SWP/CVP water deliveries south of the Delta would decrease from 4.7 million acre-feet per year (MAF/Y) to 3.5 - 3.9 MAF/Y as shown in Figure 6. The lower end of this range corresponds to a scenario in which a greater level of outflow and export restrictions are imposed, a condition that has been identified as the "High Outflow Scenario." The upper end represents a smaller increase in export restrictions.

**Figure 6. Long-term annual average SWP/CVP deliveries south of the Delta (SOD)**



The State Water Resources Control Board is also considering changes to existing regulations through its periodic review of the 2006 Sacramento-San Joaquin Bay-Delta Water Quality Control Plan (Bay-Delta Plan). The update to the Bay-Delta Plan is part of a phased review that will likely impact the reliability of the SWP and CVP, which are responsible for meeting many of the flow and water quality objectives in the Bay-Delta Plan. Any changes to the plan could have significant impacts on the District's imported water supplies. Revisions to the plan may also affect a broad suite of other water users, including senior water rights holders such as the San Francisco Public Utilities Commission (SFPUC). Reductions in SFPUC supplies during drought years could cause its Santa Clara County wholesale customers such as the cities of San Jose, Santa Clara, Sunnyvale and

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Milpitas to pump more groundwater, requiring the District to provide additional supplies for recharge.

#### *B.4 Ecosystem Status*

The Delta no longer functions well for native fish species and most agree the status quo is not sustainable. The Delta was once a vast marsh and floodplain dissected by meandering, branching channels and sloughs that provided a dynamic habitat for a rich diversity of fish, wildlife, and plants. Since the early 1900s, historic conditions in the Delta have been modified by the dredging and reclamation of land for farming, by encroachment of urban development, and by changing flow patterns due to increased diversions upstream, within the Delta, and operation of the state and federal water projects. Today, less than 5 percent of the original wetlands remain and the rivers that once meandered through tree lined banks have been straightened, stripped of vegetation, and lined with large rocks. Changes to the Delta landscape have resulted in losses of fish spawning and rearing habitat, fish migration corridors, and food web production.

Unscreened diversions, polluted runoff, urban wastewater discharges, changing flows and sediment loads, and other factors have also contributed to the degradation of the Delta ecosystem. The profound physical changes in the Delta have also made it more hospitable to numerous invasive species such that a majority of the aquatic biomass in the Delta is non-native.

In addition, under the status quo, the existing pumps for the SWP/CVP create unnatural flow patterns in the south Delta. The pumps are located in the south Delta; however, a majority of the water comes from the Sacramento River watershed in the north. In order for the water in the Sacramento River to get to the pumps, it must flow south across the Delta and essentially upstream in Old and Middle Rivers. While these rivers naturally reverse flows twice daily with the tides, operation of the SWP and CVP pumps often cause the reverse flows to be stronger than the positive, downstream flows towards San Francisco Bay. Many believe that this increase in reverse flows confuses migrating fish like salmon and steelhead, and draws smaller, poorer swimming fish like Delta Smelt, toward the pumps and into the south Delta where habitat conditions are less hospitable.

Because of the location of the existing pumps in the tidal portion of the Delta where the rivers naturally ebb and flow, they also cannot be effectively screened to prevent fish from becoming pulled into them. As a result, the SWP and CVP now operate a complex array of louvers to direct fish that are pulled toward the pumps into collection tanks. Fish are removed from the tanks several times per day, transferred to trucks, hauled to areas in the Delta far away from the pumps, and released.

#### **C. Ongoing Delta Activities**

The policy of the State is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. The District's 2012 Water Supply Master Plan, adopted by the Board in October 2012, outlines a strategy for achieving long-term water supply reliability in Santa Clara County through 2035 by securing and optimizing the use of existing supplies and infrastructure, and meeting future increases in demand with water recycling and conservation. When implemented, the strategy would reduce reliance on water imported through the Delta from about 40% to 30% of the total

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county water supply.

With respect to Delta ecosystem improvements, the State has committed to several efforts including California EcoRestore which proposes to accelerate restoration of at least 30,000 acres of habitat by the year 2020. The State's intent is to continue restoring habitat beyond this initial target under the California EcoRestore program.

In addition, the California Natural Resources Agency has committed to taking a leadership role in implementing a couple strategies to improve conditions for Delta Smelt and Sacramento Valley salmon. The 2016 Delta Smelt Resiliency Strategy outlines 13 actions that can be implemented by the State within three years to benefit this endangered fish. The actions are in various stages of development, with some already implemented, such as the North Delta Food Web Adaptive Management Project, which aims to boost food production for the fish. Others, such as a plan to augment spawning habitat, are still in the conceptual stage. The Sacramento Valley Salmon Resiliency Strategy, which was just released in June of 2017, also outlines 13 actions the State intends to work with partners to fully implement by 2027. However, neither California EcoRestore nor the State's two resiliency strategies are expected to result in full recovery for these threatened and endangered fish species.

**FINANCIAL IMPACT:**

There is no financial impact associated with this item.

**CEQA:**

The recommended action does not constitute a project under CEQA because it does not have a potential for resulting in direct or reasonably foreseeable indirect physical change in the environment.

**ATTACHMENTS:**

Attachment 1: PPIC Delta Report  
Attachment 2: PowerPoint

**UNCLASSIFIED MANAGER:**

Jerry De La Piedra, 408-630-2257