



# The Salton Sea: A Status Update

MAC TAYLOR  
LEGISLATIVE ANALYST  
AUGUST 29, 2018

LAO 



# Executive Summary

The Salton Sea is California's largest inland lake, located in Riverside and Imperial Counties. In this report, we discuss the changing conditions in and around the Sea, their statewide importance, and the Legislature's role in overseeing projects to reduce potential negative effects on public health and wildlife.

***The Salton Sea is Highly Saline, Gradually Shrinking.*** The Salton Sea was created in 1905 when a nearby irrigation canal carrying Colorado River water breached and water overflowed into the lakebed for nearly two years. In the subsequent years, agricultural runoff from farms in the Imperial Valley has fed the Sea and prevented it from fully drying up. However, over the past several decades, changes in agricultural water use practices by farmers have gradually diminished inflow into the Sea. As a consequence, the Sea has slowly been shrinking. The Sea is also highly saline—more than 50 percent saltier than the Pacific Ocean. This is partially due to the high salinity of the agricultural runoff water that is the Sea's primary source of replenishment. Additionally, because the Sea is a terminal lake with no outlet to the ocean, water that enters it can only depart through evaporation, leaving salts behind. The Sea, therefore, will continue to become increasingly saline over time.

***Water Transfer Agreement Will Reduce Salton Sea Inflow.*** In 2003, multiple parties—including the state and three water districts in the region—entered into a series of agreements to address longstanding issues regarding usage of Colorado River water. These agreements are known collectively as the Quantification Settlement Agreement (QSA). The QSA includes an agreement to transfer water that was historically used to irrigate farm fields near the Sea to two Southern California water districts for residential uses. By reducing the amount of water available for agricultural uses in the Imperial Valley, these transfers have the effect of decreasing the amount of fresh water that runs off fields into the Sea. This, in turn, will expedite the rate at which the Sea both shrinks and becomes more saline.

***Changes at the Salton Sea Pose Public Health and Environmental Risks.*** Absent mitigation, the reduction in inflow to the Salton Sea could lead to significant negative impacts on both public health and on wildlife. Specifically, as the Sea shrinks, an increasing amount of dry, dusty lakebed will become exposed. Some of this dust contains toxic elements that were transported through agricultural runoff, such as arsenic and selenium. Due to the high winds and arid climate around the Sea, this fine dust can become airborne, thereby increasing the amount of particulate matter in the air in the Imperial and Coachella Valleys. This is dangerous for surrounding residents—particularly children and the elderly—as over time, particulate matter can become trapped in the lungs and cause asthma attacks, bronchitis, and lung diseases. Additionally, the shrinking Sea will impair wildlife habitats. As wetland habitat has been lost to development throughout California and northern Mexico, many bird species have come to rely on the Sea for food, rest, and nesting—particularly during their annual migrations. Hundreds of thousands of birds use the Sea as a stopover point each year. As the Sea evaporates, and thereby becomes more saline, conditions will become increasingly inhospitable for the fish upon which migratory birds depend as a source of food.

Anticipating these potential effects associated with the QSA, the state required that the reductions in water flowing into the Sea be delayed to provide the state time to develop a long-term response plan. The requirement to provide those additional flows, however, expired at the end of 2017.

**State Bears Primary Financial Responsibility for Responding to Changes at the Salton Sea.** Through the QSA agreements and implementing statute, the state of California has assumed much of the responsibility for responding to—and mitigating against—the potential negative impacts around the Salton Sea associated with the QSA water transfers. Specifically, the three primary water agencies that were party to the QSA are responsible for spending \$133 million in 2003 dollars to begin to mitigate the effects of the water transfers, and the state has committed to implementing and funding the additional activities necessary to address public health and wildlife impacts.

**State Recently Developed Plan and Has Funding Available for Near-Term Management Activities . . .** Despite 15 years having passed since the QSA, the state has only recently made notable progress in preparing to address the potential impacts at the Salton Sea. Specifically, in 2017, the state released a ten-year plan to guide state projects at the Salton Sea and address potential public health and environmental effects over the next decade. Some projects will provide both habitat and dust suppression benefits, while some are primarily to control dust emissions. The plan includes annual targets for acres of projects to be implemented, and the State Water Resources Control Board issued a water rights order requiring the state to meet those goals. (The order specifies that if the state fails to meet the specified acreage goals in a given year, it must “catch up” the following year, and report on how it will address the deficiency.) A total of \$730 million has been authorized for Salton Sea mitigation and management activities from state, federal, and local sources, of which \$507 million remained unspent as of June 2018. Of this amount, \$280 million will be dedicated to begin implementing the projects in the state’s ten-year management plan. It is expected that additional funding will be necessary to fully implement the state’s plan.

**. . . But Plans and Funding for Longer Term Management Are Still Uncertain.** The state has not yet identified funding sources for the ongoing operations and maintenance of the Salton Sea projects it plans to construct over the next ten years, estimated to total between \$8 million and \$10 million per year at full implementation. Moreover, the state has not yet developed a plan—or cost estimates or funding sources—for how it will respond to continuing changes at the Salton Sea past 2028.

**Legislature Has Important Oversight Role.** After many years of inaction, activities at the Salton Sea are showing promising signs of progress. However, as the rate at which the Sea is shrinking begins to ramp up, the Legislature will want to ensure that the state remains on track to meet its obligations and avoid negative public health and environmental effects. In this report, we highlight key implementation and fiscal issues for the Legislature to monitor that will indicate whether the state is on track to manage negative impacts at the Salton Sea in the coming months and years.

## INTRODUCTION

---

Although the Salton Sea is a lake located in an area of Southern California with a relatively sparse population, changing conditions in and around the Sea have statewide importance. This is due both to the potential for significant negative impacts to public health and the environment, as well as to the fiscal and programmatic commitments the state has made to try to prevent such impacts. Effectively responding to conditions at the Salton

Sea represents a considerable and costly challenge for the state in the coming years.

This report provides a status update on conditions and activities at the Salton Sea. We describe the state's role and obligations, as well as funding and cost estimates associated with activities at the Sea. We conclude by highlighting some key issues for the Legislature to monitor in the coming years to ensure the state is effectively meeting its goals for the Salton Sea.

## OVERVIEW OF THE SALTON SEA

---

**History of the Salton Sea.** The Salton Sea is California's largest inland lake, stretching about 35 miles long and up to 15 miles wide, with a water surface of approximately 360 square miles—almost twice the surface area of Lake Tahoe. As shown in **Figure 1** (see next page), the Sea is located in Riverside and Imperial Counties, in southeastern California. The Sea is a terminal lake, which means that it has no outlet to the ocean. Over the past several thousand years, the Sea has intermittently both filled and dried up in this location. This happened when, through natural processes that occurred over time, the Colorado River changed course and spilled water into the lake bed, followed by the water eventually evaporating away when the river shifted course again. The modern Sea was created in 1905 when a nearby irrigation canal carrying Colorado River water breached and water overflowed into the lake bed for nearly two years. In the subsequent years, agricultural runoff from farms in the Imperial Valley fed the Sea, preventing it from fully drying up as had occurred in the past. However, over the past several decades, changes in agricultural water use practices by nearby farmers—including increased efficiencies such as replacing sprinklers with drip irrigation—have gradually diminished inflow into the Sea. As such, the Sea has slowly been shrinking.

The land under the Salton Sea is a patchwork of ownership spread across three primary entities: the federal government (mostly the Bureau of

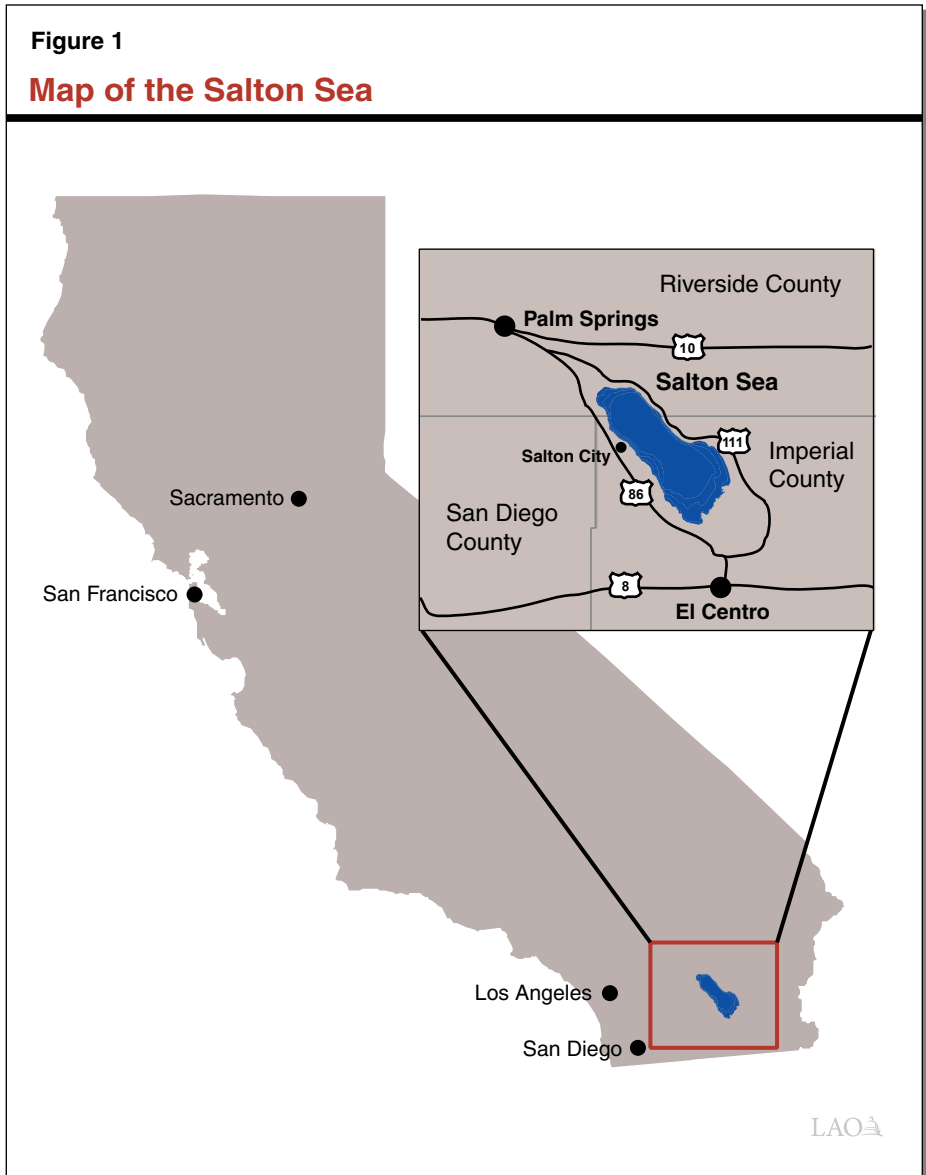
Reclamation and the Bureau of Land Management), the Imperial Irrigation District (IID), and the Torres Martinez Desert Cahuilla Indians.

**Sea Was Once a Recreational Destination.** In earlier decades—particularly between the 1940s and 1960s—the Sea was a popular recreational area. Because of the warm winter climate, proximity to Southern California cities, large size, and active fishery, the Sea became a popular destination for tourism, fishing, and water sports. The California Department of Fish and Wildlife (CDFW) stocked the Sea with a variety of sport fish, and a number of communities were established around the shores of the Sea for both permanent residents and tourists. Some sources cite that at its recreational peak, the Salton Sea was drawing 1.5 million visitors annually—at the time, more than Yosemite National Park. However, due to episodes of flooding, fish die-offs, and some of the other trends described in this report, tourism over recent decades has largely faded away.

**Sea Is Extremely Saline.** While the modern Sea started off as a relatively fresh water body in 1905, it is now more than 50 percent saltier than the Pacific Ocean. This is partially due to the high salinity of the agricultural runoff water that has been the Sea's primary source of replenishment for the past century. Additionally, because the Sea has no outlet to the ocean, water that enters the Sea can only depart through evaporation, leaving salts behind. The Sea therefore has and will continue to

become increasingly saline over time.

**Sea Provides Important Bird Habitat.** Despite being a relatively new water body in geologic terms, the Sea has become an important habitat area for a large number of birds. As wetland habitat has been lost to development throughout California and northern Mexico, many bird species have come to rely on the Sea for food, rest, and nesting—particularly during their annual migrations. More than 270 species of birds use the Sea on a regular basis, including many that state and/or federal law have identified as being threatened or endangered. The Salton Sea National Wildlife Refuge—now named for Sonny Bono—was established in 1930 for waterfowl and other migratory birds. Hundreds of thousands of birds use the Sea as a stopover point on their migrations each year.



## A CHANGING SALTON SEA

**2003 Colorado River Agreement Will Reduce Salton Sea Inflow.** In 2003, the state, the federal government, Indian tribes, and a number of water districts in the region entered into a series of agreements to address longstanding issues regarding usage of Colorado River water. These agreements are known collectively as the Quantification Settlement Agreement (QSA). The Legislature also enacted a package of legislation to help implement the QSA. The QSA includes an agreement to transfer 300,000 acre-feet of

water from IID—which uses Colorado River water to irrigate farm fields near the Sea—to two other Southern California water districts (the Coachella Valley Water District and the San Diego County Water Authority) for residential uses. (An acre foot is the amount of water that would cover an acre of land at a depth of one foot.) To accommodate the QSA transfer, IID has reduced its water use by increasing efficiencies and fallowing some fields. By reducing the amount of water available for agricultural uses in the Imperial Valley, these

transfers have the effect of decreasing the amount of water that runs off fields into the Sea. Specifically, due to both the QSA transfers and longer-term reduction trends, annual inflow to the Sea is projected to drop from 1.2 million acre-feet in 2003 to between 700,000 and 800,000 acre-feet after 2020. Therefore, while the Sea has been both shrinking in size and increasing in salinity for many decades, the decrease in inflow resulting from the QSA water transfers will expedite these trends. As we discuss later, state regulatory agencies also imposed a number of requirements to mitigate the potential effects of the QSA.

**State Water Board Order Delayed Impacts of Water Transfers.** Anticipating the potential effects of the QSA, the State Water Resources Control Board (SWRCB) required that the reductions in water flowing into the Sea be delayed. Specifically, the board issued a water rights order in 2002 requiring that for 15 years, IID had to continue to provide inflow water to the Sea at levels sufficient to maintain the salinity levels that would have existed absent the transfer. This was intended to provide the state time to develop a long-term plan to address the effects of the QSA transfers. The requirement to provide mitigation flows expired at the end of 2017.

**Absent Mitigation, Changes Could Have Significant Negative Impacts on Both Public Health . . .** As the Sea shrinks, an increasing amount of dry lake bed—referred to as “playa”—becomes exposed. In many areas, this playa is covered with fine sediments that have been deposited at the bottom of the Sea. Some of this dust contains toxic elements that were transported through agricultural runoff, such as arsenic and selenium. Due to the high winds and arid climate around the Sea, this fine dust can become airborne, thereby increasing the amount of particulate matter in the air in the Imperial and Coachella Valleys. Over time, particulate matter can become trapped in the lungs—causing asthma attacks, bronchitis, and lung diseases. Particulate matter is particularly dangerous to children and the elderly. The air quality around the Sea is already poor, due to existing airborne particulate matter from the surrounding desert, agricultural activities, and the nearby city of Mexicali, Mexico. The

region consistently fails to meet federal air quality standards designed to protect public health. Unless action is taken to suppress the potential additional emissions of fine dust from newly exposed playa, the regional air quality and public health risks are likely to significantly worsen as the Sea shrinks.

**. . . And on Wildlife.** The shrinking Sea will also impair wildlife habitats. Specifically, as the Sea evaporates and thereby becomes more saline, conditions become increasingly inhospitable for the fish upon which migratory birds depend as a source of food. In addition to higher levels of salts, a decline in fresh water inflow will also increase the proportions and influence of other nutrients that agricultural runoff brings to the Sea (such as nitrogen and selenium), which will worsen water quality and negatively impact fish and birds. The increased proportion of such nutrients has already led to algae growth in the Sea, which has proven fatal for fish under certain conditions. For example, in a single day in August 1999, 7.6 million tilapia died from oxygen depletion due to the combined effects of heat, salinity, and algae. According to news reports from that period, the resulting blanket of dead fish along the north side of the Sea was ten miles long and three miles wide. Moreover, a retreating Sea will dry out the established vegetation and wetlands that exist along the edges of the Sea, degrading that habitat for birds as well as the fish and insects that they eat. These changes threaten the survival of the hundreds of thousands of birds that depend on the Sea as a key stop-off along the Pacific Flyway.

Additionally, desert pupfish—an endangered species under both the federal and state endangered species acts—live in creeks and drainage ditches around the Sea. While the pupfish do not live directly in the Sea, these fish are known to migrate between creeks and drainage ditches through the Sea’s shoreline waters. As the shoreline recedes, these pupfish populations may become isolated from one another. This would reduce the genetic diversity of existing pupfish populations, which could make them less able to adapt to disease or other environmental stresses. It would also prevent existing pupfish populations from moving back and forth between habitat areas as

conditions change. Both of these impacts could reduce the species' long-term chance of survival.

***Shrinking Sea Also Affects Local Economy.***

The changing Salton Sea has and will continue to have significant impacts for local residents. The Sea's increase in salinity, combined with the high levels of nutrients from agricultural runoff and resulting growth of algae, has already led to some negative effects for residents. These include repeated and sometimes significant fish die-offs, as noted above. Additionally, the algae and nutrients in the Sea often cause it to emit a distasteful sulfurous odor when temperatures are high. These types of unpleasant conditions have contributed to a significant decline in recreation and tourism over the past several decades—which has correspondingly depressed home values and limited

job opportunities and economic development around the Sea. For example, census data indicate that median home prices in Salton City, the largest town along the Sea, dropped by 24 percent between 2010 and 2016 (from \$113,500 to \$86,600), compared to about an 11 percent drop in statewide median home prices across the same period. The unemployment rate for the region around the Sea is also significantly higher than the statewide average. The expedited pace of the Sea's retreat and increased salinity resulting from the forthcoming decline in fresh water inflow is likely to exacerbate negative conditions around the Sea and associated economic effects. Moreover, as the Sea shrinks it will increasingly leave formerly lakeside houses and boat docks stranded far from the water, further depressing their desirability, recreational utility, and resale value.

## THE STATE'S ROLE AT THE SALTON SEA

---

***Many Agencies Have a Role to Play at the Salton Sea.*** Numerous agencies at all levels of government are involved in responding to conditions at the Salton Sea. The principal agencies and their major roles are described in **Figure 2**. As shown, both state and local agencies are implementing activities to address the impacts of changing conditions at the Sea. Many of the local agency responsibilities result from mitigation and environmental permitting requirements associated with the QSA, which we discuss in greater detail below.

In addition to the agencies displayed in the figure, other state and federal regulatory agencies monitor the potential environmental impacts of conditions at the Salton Sea and issue permits authorizing activities. These include regional air districts, the California Air Resources Board, the Colorado Regional Water Resources Control Board, the federal Environmental Protection Agency, the federal Fish and Wildlife Service, and the United States Army Corps of Engineers. Additionally, there are numerous nongovernmental organizations that advocate for certain activities at the Salton Sea, including environmental groups, local community

groups, and groups representing agricultural stakeholders.

***State Bears Primary Financial Responsibility for Responding to Changes at the Salton Sea.***

As required by the QSA, the three QSA water agencies are responsible for spending \$133 million in 2003 dollars to begin to mitigate the effects of the water transfers, and the state has committed to implementing and funding the additional activities necessary to address public health and wildlife impacts. (As discussed later, because the QSA agencies are making their expenditures over a period of many years, their total funding obligation is estimated to ultimately total around \$288 million, including interest.) These commitments were codified through several pieces of legislation implementing the QSA, including Chapter 613 of 2003 (SB 654, Machado), which specified the environmental mitigation spending requirement for the QSA agencies. The legislation also stated that “any future actions to restore the Salton Sea will be the sole responsibility of the State of California.” These state responsibilities are focused on responding to public health and wildlife-related impacts. While statute requires the state to *consider* local economic impacts, it does not



assign fiscal responsibility to the state to address any such impacts that may result from a shrinking Salton Sea. Addressing such concerns would fall under the jurisdiction of local governments and community organizations. (The box on the

next page discusses the terms frequently used to distinguish between local and state responsibilities.)

***State Has Spent Many Years Considering Options, but Few Projects Underway.*** Despite 15 years to plan between the QSA in 2003 and the

**Figure 2**

**Agencies With Major Responsibilities at the Salton Sea**

Entity	Role
<b>Local</b>	
<b>Imperial Irrigation District (IID)</b>	As a party to QSA, transfers up to 300,000 acre-feet per year of its water to CVWD and SDWA. Helps fund the mitigation projects required by the QSA permits and implements those projects for the QSA JPA. One of the largest landowners in the region. Delivers Colorado River water to irrigate farmland in the Imperial Valley near the Salton Sea.
<b>Coachella Valley Water District (CVWD)</b>	As a party to QSA, receives up to 100,000 acre-feet of additional water per year from IID. Helps fund the mitigation projects required by the QSA permits and serves as legal counsel for the QSA JPA. Delivers water for irrigation and domestic uses in the Coachella Valley near the Sea.
<b>San Diego County Water Authority (SDWA)</b>	As a party to QSA, receives up to 200,000 acre-feet of additional water per year from IID. Helps fund the mitigation projects required by the QSA permits and handles administration and finance for the QSA JPA.
<b>QSA JPA</b>	JPA including IID, CVWD, SDWA, and the state Department of Fish and Wildlife. Administers funding for implementing the mitigation activities required by QSA permits.
<b>Salton Sea Authority</b>	JPA including IID, CVWD, the Torres-Martinez tribe, and Imperial and Riverside counties. Partners with other entities to develop projects to restore the Sea.
<b>State</b>	
<b>Natural Resources Agency</b>	Serves as lead agency overseeing and guiding state’s Salton Sea activities. Coordinates and negotiates with other local, state and federal agencies.
<b>Department of Water Resources</b>	Implements most of state’s restoration projects at the Sea, including engineering and design, contracting, construction, and operations and maintenance.
<b>State Water Resources Control Board</b>	Responsible for protecting water quality and water rights, including by: issuing permit for QSA water transfers, imposing certain permit conditions (such as provision of mitigation water for 15 years), and requiring that the state construct specified amounts of projects at the Sea each year.
<b>Department of Fish and Wildlife</b>	Helps design Salton Sea habitat projects, will develop and implement wildlife monitoring program for constructed habitat. Issues regulatory permits for projects at the Sea as required by state law. Administers Salton Sea Restoration Fund.
<b>Tribal</b>	
<b>Torres-Martinez Band of Desert Cahuilla Indians</b>	Largest private landowner of property around the Sea, including roughly half of the land under the Sea. Partners with other agencies on restoration projects, including pilot wetland project on tribal land at north end of Sea.
<b>Federal</b>	
<b>Bureau of Reclamation</b>	Owens significant amount of land under and around the Sea.

QSA = Quantification Settlement Agreement and JPA = Joint Powers Authority.

end of the temporary inflow to the Sea in December 2017, the state has not yet implemented any major management projects at the Salton Sea. In 2007, the California Natural Resources Agency (CNRA) released a study of eight potential approaches to restoring the Sea, and recommended a “preferred alternative” to the Legislature with a corresponding cost of \$9 billion. Funding constraints—including those associated with the severe recession that followed—rendered this plan infeasible. In the subsequent years, the state has given out some grants for partner agencies to implement small pilot projects at the Sea, but state activities have primarily been focused on studying options and

conducting reviews of potential environmental impacts. In 2014, frustration with the slow pace of management activities led IID to petition SWRCB to amend its original QSA-related water rights permit and require the state to begin implementing a management plan, leading to corresponding SWRCB action in 2017. **Figure 3** displays these and other significant events at the Salton Sea. As shown in the figure, the state only recently adopted—and began funding—a plan for making significant progress on management activities. We describe this plan in the next section.

### Defining Mitigation, Management, and Restoration Projects

As discussed throughout this report, a number of different agencies at both the local and state levels are undertaking projects in response to the changes occurring at the Salton Sea. While many of these projects have similar goals, statute and stakeholders often distinguish between them—and how they are funded—using different terms. Such terms include:

- **Mitigation Projects.** Salton Sea *mitigation* projects are often referred to as those undertaken by the three water agencies that were party to the Quantification Settlement Agreement (QSA) in response to QSA-related environmental permitting requirements. As a condition of approving the QSA water transfers, state and federal regulatory agencies conducted environmental reviews and required that the participating water agencies—the Imperial Irrigation District, Coachella Valley Water District, and San Diego County Water Authority—implement specific actions to mitigate the resulting impacts. These included providing additional inflow water to the Sea until December 2017, developing marsh habitat areas, and implementing a defined air quality monitoring and dust mitigation program. The agencies’ responsibilities for funding these mitigation activities, however, are capped at \$133 million (in 2003 dollars).
- **Restoration or Management Projects.** Stakeholders commonly refer to the additional actions necessary to address the impacts of a shrinking Sea after the QSA parties have fulfilled their required mitigation expenditure levels as either *restoration* or *management* projects. The state agreed to assume the remaining financial responsibility for addressing these potential impacts.

This semantic distinction between the locally funded and state-funded activities, however, is somewhat misleading. The state does not plan to “restore” the Sea to its original conditions, and its planned activities to decrease the potential harmful effects of the water transfers are somewhat similar to those being undertaken by the QSA agencies. As such, all of these activities could accurately be described as mitigation. Yet because statute and many stakeholders use different labels to distinguish between local and state efforts, to avoid confusion we refer to state-funded activities as “management projects” throughout this report.

Figure 3

## Timeline of Significant Events at the Salton Sea



**1905**

Modern Salton Sea formed by floodwaters from breach in Colorado River canal; breach repaired nearly two years later.



**1930**

Salton Sea Wildlife Refuge established for protection of ducks, geese, and shore birds.



**1950**

Due to increasing recreational activity, salt water game fish introduced to the Sea.



**1999**

Due to deteriorating conditions at the Sea, 7.6 million fish die in one day from oxygen depletion resulting from combination of heat, salinity, and algae.



**2003**

Quantification Settlement Agreement (QSA) signed and companion legislation enacted. Required transfer of water from Imperial Irrigation District to San Diego County Water Authority and Coachella Valley Water District, established a fixed amount of funding for Salton Sea mitigation projects, and designated additional management activities as state responsibility.

**Plan**

**2007**

Restoration plan developed by California Secretary for Natural Resources with \$8.9 billion “preferred alternative” approach; no legislative action taken.



**2014**

Petition submitted by Imperial Irrigation District to State Water Resources Control Board to modify QSA-related water rights permit in order to “hold the [state] to its obligation to restore the Salton Sea.” Proposition 1 passed by California voters, authorizing \$80 million for Salton Sea management activities.



**2015**

Salton Sea Task Force established by Governor to identify short- and medium-term goals for responding to conditions at the Sea.

**Plan**

**2017**

State’s Salton Sea Management Program established and associated *Phase I Ten-Year Plan* released. Stipulated order adopted by State Water Resources Control Board, requiring implementation of state’s management plan and annual construction goals. Fifteen-year requirement to provide mitigation water inflows to the Sea ends.



**2018**

Proposition 68 passed by California voters, authorizing \$200 million for Salton Sea management activities.

LAO

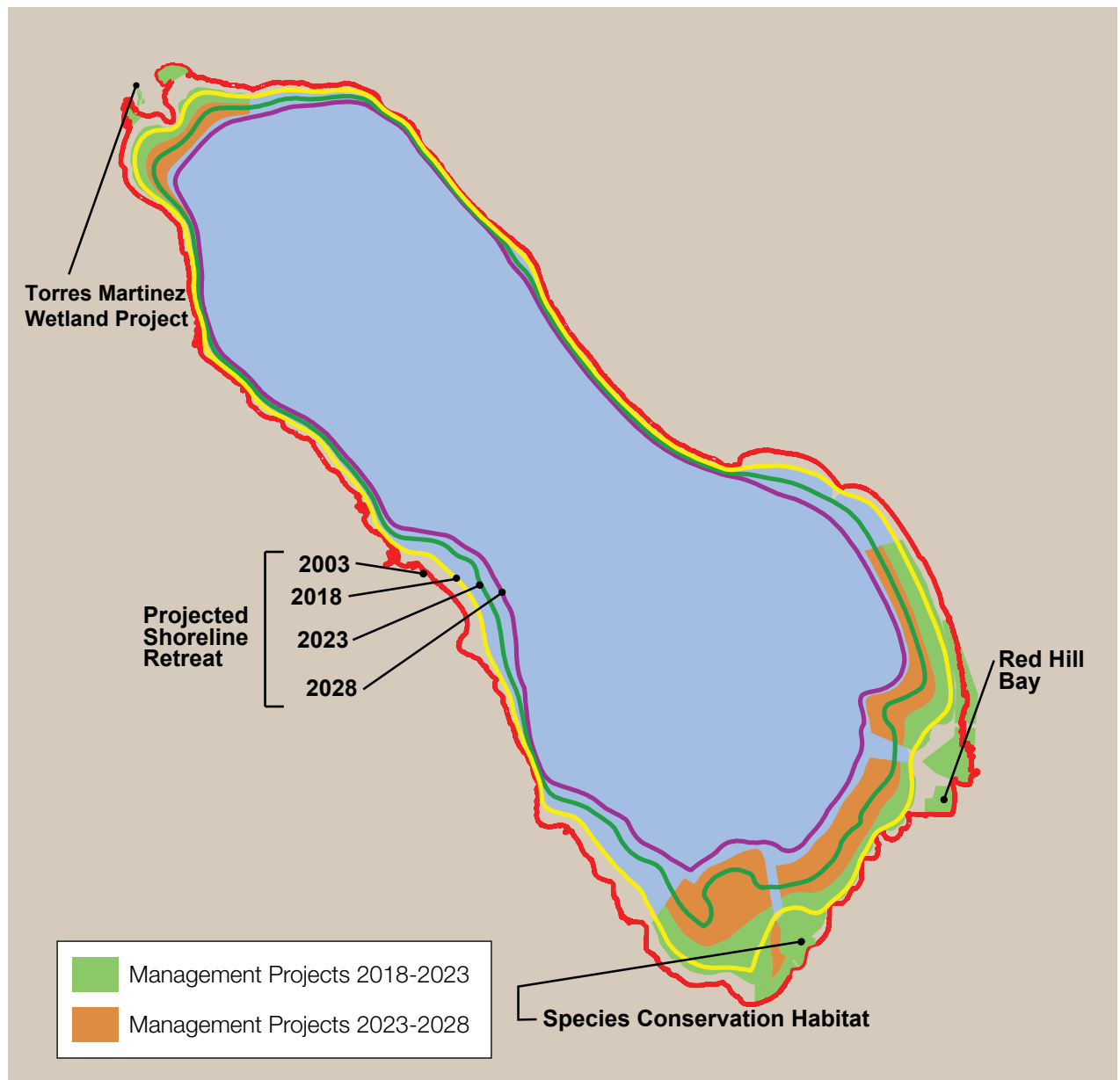
# TEN-YEAR MANAGEMENT PLAN

**State Recently Developed Ten-Year Management Plan.** In 2017, the state established the Salton Sea Management Program—led by CNRA in collaboration with the Department of Water Resources (DWR) and CDFW—and published

the *Phase I Ten-Year Plan* (the Plan) to guide state projects at the Salton Sea and address potential public health and environmental effects over the next decade. **Figure 4** displays the planned areas of focus for state activities, as well as how the

**Figure 4**

## Salton Sea Management Program Overview 2018-2028



LAO

footprint of the Salton Sea is expected to shrink over the coming decade. The Plan focuses on activities at the north and south ends of the Sea where the greatest playa exposure is expected and where water from agricultural return flows is more readily available to incorporate into management projects.

**Figure 5** shows estimates for the acreage of dry lake bed to be exposed in the coming years, alongside the Plan's acreage goals for projects. The actual playa exposure rates each year are likely to vary from these estimates based on factors such as heat, rainfall, and agricultural runoff. As shown, the state does not plan to undertake projects on every acre of playa as it is exposed. For example, between 2018 and the end of 2020, the state plans to construct projects on 3,500 acres, even though it estimates that 12,700 acres of playa will have become exposed during that period. This is because some of the exposed areas around the Sea may not be emissive—that is, the soil conditions may be such that dust is not likely to become airborne—or the land may be used for other purposes such as agriculture or geothermal energy. Additionally, the Plan states that a lag time of up to two years exists between when playa is exposed and when it may become emissive, allowing additional time for project implementation. The state's construction schedule reflects this

**Figure 5**

**Estimated Salton Sea Playa Exposure and Management Goals Over the Next Decade**

*From Salton Sea Management Program Phase I Ten-Year Plan*

Year	Acres of Newly Exposed Playa	Acres of Projects To Be Constructed
2018	3,500	500
2019	4,200	1,300
2020	5,000	1,700
2021	5,600	3,500
2022	5,500	1,750
2023	5,300	2,750
2024	4,900	2,700
2025	4,300	3,400
2026	3,900	4,000
2027	3,300	4,000
2028	2,800	4,200
<b>Totals</b>	<b>48,300</b>	<b>29,800</b>

additional time, with plans to undertake projects on about one-quarter of newly exposed playa in the first three years, growing to about 60 percent of cumulative exposed playa by the end of the ten-year period.

**Projects Would Provide Both Habitat and Dust Suppression.** **Figure 6** provides examples of the types of projects identified in the Plan. As described in the figure, some projects provide both

**Figure 6**

**Key Types of Salton Sea Management Projects**

- ✓ **Various Types of Habitat.** Habitats near the Salton Sea—including along the exposed shoreline—can be designed and constructed to serve the needs of a variety of species. These include wetland, riparian, shallow-water mudflat, and mid- to deep-water habitats. Project activities will include providing a permanent source of fresh or brackish water, constructing islands for nesting grounds, and constructing berms to hold water in ponds. Most of these types of habitat projects also provide dust suppression.
- ✓ **Dust Suppression.** A variety of projects can be implemented to minimize the amount of dust emitted from the playa. In addition to the habitat projects described above, other water-dependent dust suppression techniques include planting vegetation, applying water to help form a salt crust across the ground surface, and periodic flooding to keep the ground from drying out too much. Waterless techniques include tilling or roughening the ground surface, and applying a gravel cover.
- ✓ **Water Delivery Infrastructure.** Water management ponds and a distribution system can be constructed to bring less salty water to habitat projects. Ponds along the edges of the lakeshore will blend Salton Sea water and agricultural return flow water, creating brackish water with a lower level of salinity. A distribution system—including outlets, pumps, channels, and pipelines—will bring agricultural return flow water from nearby rivers to water management ponds and habitat and dust suppression project areas.

habitat and dust suppression benefits, while some are primarily to control dust emissions. The state may opt to implement projects primarily designed for dust suppression in areas not well-suited for habitat, and/or because in many cases they are easier and less costly to implement than habitat projects (which generally require provision of water). A key activity for developing functional habitats is to create ponds containing water with salinity levels that migrating birds—and the fish and insects upon which they feed—can tolerate. Construction is currently underway on two pilot habitat projects—Red Hill Bay and Torres Martinez Wetlands, both shown in Figure 4.

***Plan’s Annual Management Goals Formalized Through SWRCB Order.*** In response to the 2014 petition from IID, SWRCB approved a stipulated water rights order in November 2017 that revised the conditions of the permit approval that SWRCB granted for the QSA. Specifically, the order requires the state to meet the annual acreage goals included in the Plan and displayed in Figure 5. The order also requires that for each year, at least half of the project acres that the state constructs must provide habitat benefits for fish and wildlife; that is, no more than half of annual construction can be solely focused on dust suppression. Every year, SWRCB will hold a public meeting by March 31 to hear a progress report on the previous year, including updates on completed projects and the amount of acreage, as well as plans for the coming year and funding availability. The order specifies that if the state fails to meet the specified acreage goals in a given year, it must “catch up” the following year, and report to SWRCB on how it will address the deficiency.

In addition to the SWRCB order, implementation of the Plan is supported by an agreement with the federal government. Specifically, CNRA entered into a Memorandum of Understanding (MOU) with the federal Department of the Interior affirming that the state has the lead role in Salton Sea management efforts, and expressing mutual intent to try to support achievement of the goals in the Plan (such as by expediting permitting processes).

***Specific Project Activities to Be Determined Over Coming Years.*** The Plan does not contain a detailed list and timeline for specific projects

that will be undertaken across the full ten year period. Instead, it lays out a high-level schedule for target project locations and establishes the acreage goals described in Figure 5. CNRA and DWR have indicated they intend to develop a more detailed implementation plan as conditions—such as funding availability, Sea salinity levels, environmental permits, playa exposure, and land-use agreements with landowners—develop over the coming years. Additionally, the Plan states that future activities will be informed by lessons learned from projects that are currently underway. In initial years, the Plan states that work will focus on expanding the Species Conservation Habitat (SCH) project, shown in Figure 4 in the southwest region of the Sea. This project, on which construction is scheduled to begin by the end of 2018, will provide two ponds of brackish water for fish and bird habitat and dust suppression. The state has spent millions of dollars and many years planning for this project, and funding for initial construction has already been appropriated by the Legislature. According to the Plan, the SCH project will be expanded with additional ponds, address newly exposed playa, and help meet the Plan’s acreage goals for the next few years. The Plan states that such work could progress relatively quickly because environmental reviews and permitting have already been completed.

***Progress on Achieving Plan’s Goals Already Delayed.*** As shown in Figure 5, the state planned—and the SWRCB stipulated order required—construction of 500 acres of new projects by the end of 2018. The state envisioned meeting this goal by constructing the second, expanded stage of the SCH project. However, delays in negotiating land-use agreements from IID—which owns the land where the project will be constructed—mean that the first stage of that project likely will not begin until near the end of 2018. As such, the state will not even select a contractor for the second stage until 2019, and thus will fail to meet the SWRCB stipulated order goals. CNRA and DWR are in the process of revising their annual management targets accordingly and indicate that they plan to construct additional acres at the SCH project in the coming years in order to catch up to the cumulative requirement of 3,500 acres by the end of 2020.

**Long-Term Management Plans Not Yet Developed.** The state has not yet developed a plan for how it will respond to changes at the Salton Sea past 2028. Estimates suggest that the Sea will continue to shrink until around 2045, at which point it will become so salty that it will stop evaporating. The SWRCB stipulated order requires that CNRA develop subsequent ten-year management plans based on updated information midway through each current planning phase; as such, by 2022 it must develop a Phase 2 plan to address changes through at the Sea through 2038. The order also directs CNRA to develop a long-term management plan by the end of 2022.

The state has created a committee to begin developing these plans. In addition to the types of projects described in Figure 6, potential future projects under consideration include carving off the north part of the Sea to create a separate, more sustainable lake. (The Riverside County Board of Supervisors is considering creating an enhanced infrastructure finance district to help fund this “North Lake” proposal.) Additionally, CNRA solicited proposals for how the state might import water to the Salton Sea, and is considering the feasibility of incorporating ideas from the 11 responses it received into a long-term management strategy.

## FUNDING AND COSTS FOR SALTON SEA MANAGEMENT ACTIVITIES

---

**Over \$700 Million Has Been Authorized for Management Activities.** As shown in **Figure 7** (see next page), a total of \$730 million has been authorized for Salton Sea mitigation and management activities from state, federal, and local sources. This total represents funding that has been set aside or committed specifically for activities at the Salton Sea by voters, the Legislature, the federal government, and local water agencies. As shown, the bulk of this funding has come from voter-approved state general obligation bonds. Of the state funding that has been expended thus far, most has been used for planning activities including permitting and environmental reviews.

**Local Funding Provided by Three Water Agencies Associated With QSA.** The local funding displayed in the figure is shown in two categories, both of which represent required contributions from the three QSA water agencies. As noted earlier, the QSA included an agreement that IID, the Coachella Valley Water District, and the San Diego County Water Authority provide \$133 million in 2003 dollars to mitigate for the effects of the water transfers. This funding, which is estimated to total \$288 million over time including interest, is managed by the QSA Joint Powers Authority. The bulk of those expenditures thus far has been to provide mitigation water into the Sea through 2017.

Additionally, the QSA agreements required that the three agencies provide \$30 million in 2003 dollars into the “Salton Sea Restoration Fund” to be used for state-led restoration activities. This funding, which is estimated to total \$68.5 million over time including interest, is administered by CDFW.

**Significant Funding Remains Unspent.** As shown in Figure 7, more than two-thirds (\$507.5 million) of the total amount authorized remains unspent, largely because a significant amount (\$280 million) was only recently approved by voters through Proposition 1 in November 2014 and Proposition 68 in June 2018. Additionally, the multiyear payment schedule established for the required QSA mitigation payments means that nearly half of the required funding from the QSA Joint Powers Authority (\$130.5 million) has not yet been provided or expended. The QSA Joint Powers Authority estimates that two of its member agencies will make their final mitigation payments in 2025, and the third will do so in 2036.

**State Estimates Implementing Ten-Year Management Plan Will Cost \$420 Million.** As shown in **Figure 8** (see next page), the state estimates it will face costs of \$420 million to implement the goals included in the *Phase I Ten-Year Plan* and required by the SWRCB order. These costs reflect updated estimates from

**Figure 7**

**Funding for Salton Sea Mitigation and Management**

*As of June 2018 (In Millions)*

Source	Authorized	Unspent	Use
<b>State</b>			
Proposition 12 (2000)	\$4.8	\$4.8	Constructing Species Conservation Habitat (SCH) project.
Proposition 50 (2002)	33.6 <sup>a</sup>	9.7	Environmental Impact Report and related studies and planning activities, SCH project.
Proposition 84 (2006)	47.0	23.4	Staffing and planning activities; SCH project planning and design; partial funding for projects including Red Hill Bay, Seawater Marine Habitat Pilot, and Torres-Martinez Wetlands.
Proposition 1 (2014)	80.0	77.3	Projects to meet goals identified in Phase I Ten-Year Plan.
Proposition 68 (2018)	200.0	200.0	Projects to meet goals identified in Phase I Ten-Year Plan.
<b>Federal</b>			
NRCS (to Salton Sea Authority)	\$7.5	\$7.5	Agricultural dust suppression and wetlands projects.
NRCS (to state)	0.8	0.8	Planning activities.
<b>Local</b>			
QSA Joint Powers Authority	\$288.0	\$130.5	Various mitigation requirements associated with the QSA.
Salton Sea Restoration Fund	68.5	53.5	Various restoration activities.
<b>Totals</b>	<b>\$730.1</b>	<b>\$507.5</b>	

<sup>a</sup> The bond authorized \$58.6 million for various purposes in the Colorado River basin, of which \$33.6 million has been allocated specifically for activities at the Salton Sea.  
NRCS = National Resources Conservation Service and QSA = Quantification Settlement Agreement.

DWR as of August 2018, including addressing the SWRCB requirement that half of the acres completed each year provide a habitat benefit (which was not reflected in the original Plan). As shown, these estimates do not break out costs by year but rather by multiyear construction stages, and reflect an updated plan to construct slightly more (600 acres) than was included in the original Plan and SWRCB requirement.

As of the writing of this report, \$280 million is available from Propositions 1 and 68 to support the \$420 million in estimated costs. To date, the Legislature has appropriated \$110 million of this funding—\$80 million from Proposition 1 in the *2016-17 Budget Act* and \$30 million from Proposition 68 in the *2018-19 Budget Act*. Since project construction has not yet commenced,

only a small amount has been expended for staff and planning costs thus far. The state has not identified a funding source to support the remaining \$140 million in Plan implementation

**Figure 8**

**Estimated Costs for Implementation of Salton Sea Management Program Phase I Ten-Year Plan**

*From the Department of Water Resources, August 2018*

Period	Projects Constructed (in Acres)	Costs (in Millions)
2018-2019	2,068	\$3
2020-2022	11,318	206
2023-2026	8,253	107
2027-2028	8,776	104
<b>Totals</b>	<b>30,415</b>	<b>\$420</b>



costs—the difference between the \$420 million cost estimate and the \$280 million in bond funds authorized. However, Proposition 3 on the November 2018 ballot would provide an additional \$200 million in bond funds for Salton Sea management activities if it is approved by voters.

***Future Costs and Funding Sources Yet to Be Identified.*** The state also has not yet determined how it will fund either ongoing operations and maintenance costs or future management activities beyond 2028. DWR estimates that ongoing operations and maintenance costs will likely total between \$8 million and \$10 million annually once all of the Phase I projects are complete. These ongoing costs would be for activities such

as energy for pumping water to habitat ponds, staff time to monitor project conditions and effectiveness, addressing erosion of or damage to earthen berms, and replacing damaged or worn-out equipment. In the MOU between CNRA and the federal Department of the Interior, the federal government committed to pursuing \$30 million in federal funds to help with the state’s operations, maintenance, and monitoring costs. However, no such congressional appropriation has yet been made. Additionally, cost estimates and funding sources for addressing impacts at the Sea as it continues to shrink beyond the next ten years still are unknown because long-term management plans have not yet been developed.

## KEY ISSUES FOR LEGISLATIVE OVERSIGHT

---

### ***Legislature Has Important Oversight Role.***

After many years of inaction, activities at the Salton Sea are showing promising signs of progress. However, as the rate at which the Sea is shrinking begins to ramp up, the Legislature will want to ensure that the state remains on track to meet its obligations and avoid negative public health and environmental effects. The Legislature has several opportunities for exercising its oversight role, monitoring progress at the Salton Sea, and determining whether legislative intervention might be needed. These include legislative oversight hearings, consideration of future funding requests through the annual budget process, and reviews of CNRA’s required annual progress reports to SWRCB. If delays continue or other concerns arise, the Legislature could also request to receive intermittent or regular status updates directly from the administration. Below, we describe key issues for the Legislature to monitor in the coming months and years that will indicate whether the state is on track to manage negative impacts at the Salton Sea.

***Short-Term Management.*** While the state’s Phase I Plan lays out goals and high-level descriptions of potential projects, it does not contain a detailed description or timeline for exactly which projects will be undertaken. The Legislature will want to track implementation of the Plan to

ensure not only that the state is meeting its annual construction goals, but—more importantly—that it is achieving its larger objectives of avoiding negative health and environmental impacts over the coming decade. Specific questions for the Legislature to monitor in the coming months and years include:

- Is the state consistently achieving its annual acreage construction goals? If not, what are its remediation plans?
- Are there specific barriers that are impeding the state’s progress, and are there legislative actions that could help to address those challenges?
- Does the state have sufficient staffing and project management structures in place to achieve its goals?
- What criteria is the state utilizing to select the types and locations of projects to undertake each year?
- What monitoring processes is the state putting in place, and what indicators will it use to ensure it is effectively meeting its objectives? How will the state ensure that its efforts are successful in avoiding negative public health and environmental impacts?

- What adaptive management practices is the state putting into place to modify its approach and respond to new information or changing conditions? How will the state learn from the successes and challenges it has faced in its management efforts and ensure those lessons are incorporated into subsequent plans, projects, and activities?

**Long-Term Management.** Although the state has made significant progress over the past two years in its short-term planning efforts, it still lacks a plan for how it will manage changes at the Salton Sea that will occur after 2028. The Legislature will want to ensure that the state does not delay such planning efforts to the point where it faces risks to public health and the environment that could have been avoided. This is of particular concern given the state's track record of slow progress between 2003 and 2017 in planning for impending changes at the Sea. Key oversight questions include:

- Is the state making adequate progress on developing a long-term plan for the continually shrinking Sea?
- How are long-term planning efforts accounting for potential new developments and the possible impacts of climate change at the Sea, such as additional inflow reductions from

reduced Colorado River allocations, droughts, and hotter temperatures?

- Are there ways to ensure effective participation of relevant parties in the region—such as the federal government and local stakeholders—in long-term planning?

**Funding and Costs.** As noted earlier, how the state will fund future activities at the Salton Sea is still uncertain. Of particular concern is the lack of identified funding for ongoing operations and maintenance for the management projects the state plans to construct in the coming ten years. Questions for the Legislature to monitor over the coming months and years include:

- Have cost estimates for implementing the Phase I Management Plan changed?
- What are the estimated costs for long-term management activities at the Salton Sea?
- How will the state fund (1) remaining costs to implement the Ten-Year Plan; (2) ongoing operations, maintenance, and monitoring activities; and (3) long-term management activities?
- Are there other funding sources (such as federal funds) that could be attained to help supplement state funding?



## **LAO PUBLICATIONS**

---

This report was prepared by Rachel Ehlers and reviewed by Brian Brown. The Legislative Analyst's Office (LAO) is a nonpartisan office that provides fiscal and policy information and advice to the Legislature.

To request publications call (916) 445-4656. This report and others, as well as an e-mail subscription service, are available on the LAO's website at [www.lao.ca.gov](http://www.lao.ca.gov). The LAO is located at 925 L Street, Suite 1000, Sacramento, CA 95814.