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Salton Sea Restoration

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SUMMARY

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Salton Sea Restoration

The Salton Sea—a lake located in Southern California—is the largest inland water body in the state. The sea has few natural inlets of water and no natural outlets, and it is largely sustained by agricultural runoff from farmlands in the Imperial and Coachella Valleys. In recent decades, agricultural runoff to the Salton Sea has diminished due to changes in agricultural production, evaporation, and reduced precipitation, causing the sea to shrink and increase in salinity. High salinity levels, combined with greater concentrations of nutrients and toxins, have altered the sea's ecosystem and surrounding habitat, making it difficult for most fish and bird species to survive. The Salton Sea's diminishing size also has exposed lake bed (i.e., *playa*) around the sea's shoreline; this playa contains toxic substances that circulate in the air and impair local and regional air quality.

Over time, federal, state, and private entities have developed proposals to manage and restore parts of the Salton Sea. These efforts have common objectives, including controlling salinity, maintaining some of the sea's habitat, and stabilizing sea water levels. The current and most prominent restoration initiative, the Salton Sea Management Program (SSMP), was released by the State of California in 2017. The SSMP's first phase is being implemented from 2018 to 2028. The initiative includes activities to convey water to the Salton Sea, reduce salinity in the sea, and restore approximately 30,000 acres of exposed playa. Phase 1 is estimated to cost $420 million. Some federal agencies, such as the Bureau of Reclamation, are collaborating with the State of California to implement the SSMP.

The federal role in restoring the Salton Sea is limited to a handful of projects that address issues on lands in and around the sea that are managed by federal agencies, including the U.S. Fish and Wildlife Service, Bureau of Reclamation, Bureau of Land Management, and Department of Defense. Unlike in areas such as Lake Tahoe, the Everglades, and the Chesapeake Bay, the federal government does not have a comprehensive program to restore the Salton Sea.

The scope and content of plans to restore the Salton Sea have generated debate among stakeholders and within Congress. Some stakeholders contend that the sea should not be restored; they argue that the area's geological history demonstrates a pattern of water bodies naturally shrinking, disappearing, and reforming over time, and they assert that the Salton Sea is following a similar process. Other stakeholders argue that restoring the Salton Sea is worthwhile because of the sea's ecological significance as a large wetland along the Pacific Flyway, role in providing habitat for fish and wildlife, and economic importance to the region. Some stakeholders also note that restoration might mitigate the effects of increasing playa exposure, which is linked to regional airborne pollution. Congress may consider these and other issues related to restoring the Salton Sea, including the nature and extent of federal involvement in restoration; how (or if) the federal government should collaborate with the State of California in restoration efforts under the SSMP; and what (if any) federal responsibilities exist for mitigation of airborne toxins that occur due to exposed playa on federal lands.

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Introduction

The Salton Sea—an inland terminal lake in Southern California near the U.S.-Mexican border—is the State of California's largest lake (see **Figure 1**). Throughout geologic history, water bodies have formed, disappeared, and reformed in the Salton Basin. The most recent version of the sea was created when a canal gate on the Colorado River broke in 1905, allowing water to flow into the Salton Basin for two years and accumulate into the Salton Sea. After its formation, the sea was sustained by agricultural runoff from farmlands in the Imperial and Coachella Valleys.[1] It was developed for sport fishing by the state and, until the late 1960s, had a high diversity of birds and wildlife.

The Salton Sea's ecosystem has deteriorated steadily over time, due largely to declining water levels caused by evaporation, reduced precipitation, and decreasing water inflows (including reductions in agricultural flows from irrigation).[2] Lower water levels have caused the sea to shrink, resulting in an increase in its salinity levels and the exposure of lake bed (i.e., *playa*).[3] High salinity levels, combined with toxic concentrations of substances in soils and runoff, have led to disease and widespread mortality of fish and birds. In addition, they have raised concerns related to the effect of exposed playa on air quality due to aerosolized toxins in surrounding areas.[4]

Federal involvement in the Salton Sea stems in part from the Bureau of Reclamation's (Reclamation's) development of the Colorado River, which facilitates transfers of Colorado River water to the Imperial Valley for irrigation. After being diverted to irrigate agricultural lands, this water drains into the Salton Sea. Lands in and around the sea have been federally reserved as a repository for drainage. Federal lands in and around the Salton Sea include the Sonny Bono Salton Sea Wildlife Refuge, owned and operated by the U.S. Fish and Wildlife Service (FWS); submerged lands owned by Reclamation and the U.S. Bureau of Land Management (BLM); and various lands owned by the Department of Defense.[5]

[1] Salton Sea Authority, *Timeline of Salton Sea History*, July 29, 2020, at http://saltonseaauthority.org/get-informed/history/. Hereinafter, Salton Sea Authority, *Timeline*.

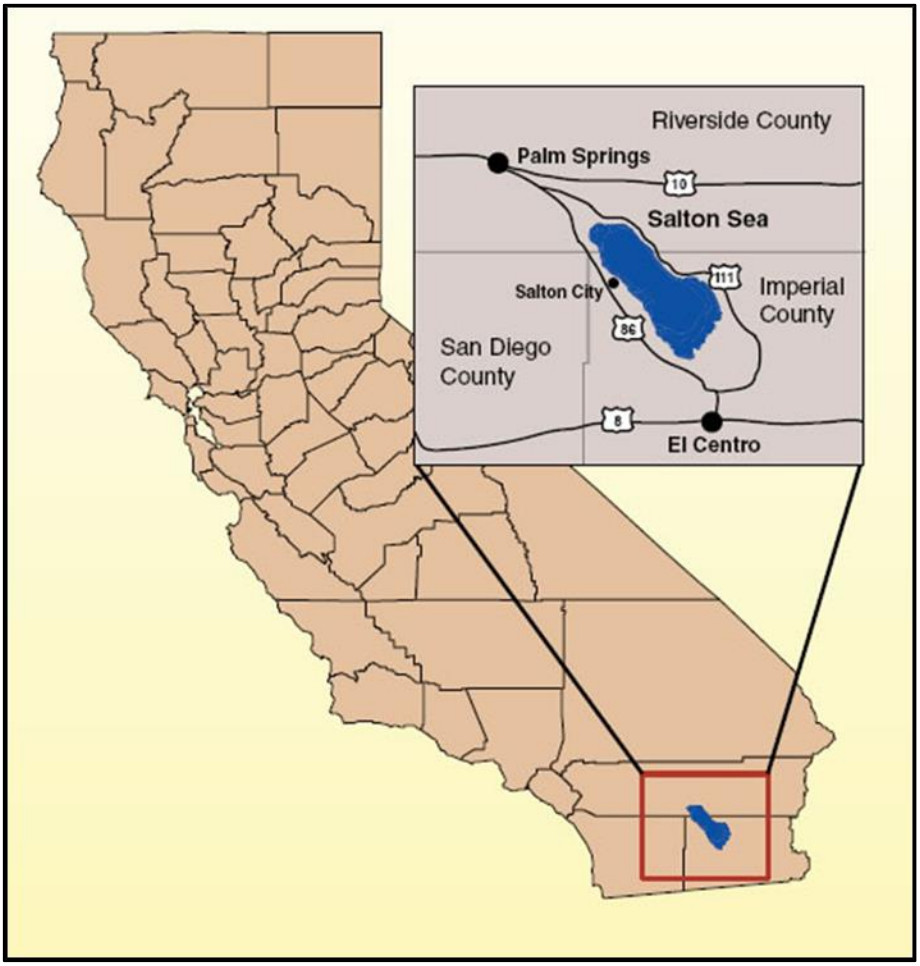
[2] Michael J. Cohen and Karen H. Hyun, *HAZARD: The Future of the Salton Sea with No Restoration Project*, Pacific Institute, May 2006, at http://www.pacinst.org/wp-content/uploads/2013/02/report15.pdf.

[3] D. A. Barnum et al., *State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea*, U.S. Geological Survey, Workshop Report, 2017, at https://pubs.usgs.gov/of/2017/1005/ofr20171005.pdf. Hereinafter, Barnum et al., *State of the Salton Sea*. Playa is exposed seabed in and around the Salton Sea.

[4] Rachel Ellers, *The Salton Sea: A Status Update*, California Legislative Analyst's Office, August 29, 2018, at https://lao.ca.gov/Publications/Report/3879.

[5] For a more detailed accounting of land ownership in and around the Salton Sea, see U.S. Bureau of Reclamation, "General Salton Sea and Vicinity Land Ownership and Management Map DRAFT," April 16, 2015, at https://www.usbr.gov/lc/region/programs/SaltonSeaOwnershipMap.pdf.

Figure 1. Map of Salton Sea and Vicinity in the State of California



Source: California Legislative Analyst's Office, "Restoring the Salton Sea," at http://www.lao.ca.gov/2008/rsrc/salton_sea/salton_sea_01-24-08.aspx.

The Salton Sea—which has higher salinity levels than the ocean—provides permanent and temporary habitat for many species of plants and animals, including several endangered species. It also serves as a recreational area for the region.[6] Interest in the Salton Sea's ecological health has increased since 2003, when the Quantification Settlement Agreement (QSA) was approved by several water districts in California, the State of California, and the U.S. Department of the Interior (DOI) and signed into California law.[7] The QSA required California to gradually reduce its consumption of Colorado River water from 5.2 to 4.4 million acre-feet (MAF) per year through voluntary agriculture-to-urban water transfers and other water efficiency measures. The implementation of this QSA has resulted in less water flowing into the Salton Sea, thus accelerating the sea's ecological decline. The water districts participating in the QSA agreed to

[6] Barnum et al., *State of the Salton Sea*, p. 4.

[7] Imperial Irrigation District (IID), Metropolitan Water District of Southern California, and Coachella Valley Water District, *The Quantification Settlement Agreement and Related Agreements and Documents*, October 10, 2003, at http://www.sdcwa.org/sites/default/files/files/QSA_final.pdf.

contribute funding toward the mitigation and restoration of the Salton Sea, as well as to provide 200,000 acre-feet per year of Colorado River water through December 31, 2017.[8]

The Salton Sea's fate is connected to drought response plans for the Colorado River. The Imperial Irrigation District (IID), a major irrigation district in Southern California whose lands border the Salton Sea, is the largest water rights holder on the Colorado River and a major advocate for Salton Sea restoration. IID refused to approve the 2019 Drought Contingency Plan for the Lower Colorado River Basin without assurances related to restoration of the Salton Sea.[9] Although the plan eventually was approved and enacted without IID's formal consent, future negotiations in the Salton Basin that involve IID may be necessary in the coming years.[10]

Over time, several federal, state, and private entities have developed proposals to manage and restore parts of the Salton Sea, with projected costs typically in the billions of dollars. These efforts have common objectives that include controlling salinity, maintaining some amount of habitat, and stabilizing water levels. The current and most prominent effort, the Salton Sea Management Program (SSMP), was released by the State of California's Salton Sea Task Force in 2017.[11] Phase 1 of the program began in 2018 and is scheduled to be implemented until 2028. Phase 1 includes projects and activities that aim to convey water to the Salton Sea, reduce salinity, and restore approximately 30,000 acres of exposed lake bed. Phase 1 is estimated to cost $420 million, with long-term costs still unknown. Absent the full implementation of a comprehensive plan to restore the Salton Sea, one study estimated the long-term social and economic costs to society of a deteriorating sea could approach $29 billion.[12]

In addition to the Salton Sea's connection to water allocation negotiations in the Colorado River Basin, congressional concern for restoring the sea stems in part from other factors. Areas of congressional interest may include the management of federal lands in the area, the Salton Sea's value as habitat for federal and state-listed endangered species and for migrating and resident bird species, the use of the sea as a reservoir for agricultural drainage and recreation, and air quality issues of exposed playa, among others.[13] Some Members of Congress have expressed concerns over air pollution from exposed lake beds as the Salton Sea's shorelines recede.[14]

There is no consensus regarding whether to restore the Salton Sea. Some contend the sea should not be restored.[15] They argue that the area's geological history demonstrates a pattern of water bodies naturally shrinking, disappearing, and then reforming over time and predict the Salton Sea

[8] An acre-foot is enough water to cover one acre with a foot of water, or 271,330 gallons.

[9] IID, "IID Board President Erik Ortega Statement on DCP Federal Legislation," press release, April 2, 2019, at https://www.iid.com/Home/Components/News/News/681/30?npage=2&arch=1.

[10] The Drought Contingency Plans for the Colorado River were authorized under P.L. 116-14.

[11] State of California Department of Water Resources, California Natural Resources Agency, and California Department of Fish and Wildlife, *Salton Sea Management Program*, 2017. Hereinafter, 2017 SSMP.

[12] Michael J. Cohen, *Hazard's Toll: The Costs of Inaction at the Salton Sea*, Pacific Institute, September 2014, p. vi, at https://pacinst.org/publication/hazards-toll/. Hereinafter "*Hazard's Toll*." Costs are estimated to come from public health issues, loss in recreation and ecological values, loss in property values, and potentially losses in agricultural productivity.

[13] Letter from Representative Raul Ruiz to Representative Raul M. Grijalva and Representative Jared Huffman, September 18, 2019.

[14] U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Efforts to Restore the Salton Sea*, hearing, 116th Cong., 2nd sess., September 24, 2020. Hereinafter, Congressional Hearing, *Restore Salton Sea*, 2020.

[15] Michelle Nijhunis, "Accidental Refuge: Should We Save the Salton Sea?" *High Country News*, June 19, 2000, at http://www.hcn.org/issues/181/5865/print_view.

will follow a similar process. These stakeholders assert that countering this natural process would be expensive and ultimately not worth the cost.[16] Some others are not in favor of restoration because they argue that the present-day Salton Sea was artificially created and should have a low priority for restoration.[17] These opponents contend that restoration funds should instead be used to restore other natural wetlands in California, such as the Sacramento and San Joaquin Rivers' Delta confluence with San Francisco Bay, or to manage forests to reduce wildfires.[18] By contrast, some stakeholders note that the value of restoring the Salton Sea lies in the sea's ecological significance as a large wetland along the Pacific Flyway and a habitat for fish and wildlife, as well as its potential to stimulate economic development in the region through tourism, recreation, and energy development.[19]

This report provides background on the Salton Sea and its relation to water resource issues in the Colorado River Basin. The report also describes the Salton Sea's current status, efforts to restore parts of the sea and mitigate the effects of its decline, and the roles of the State of California and the federal government in facilitating these efforts.

Background on the Salton Sea

The Salton Basin, an area below sea level where the Salton Sea is located, has supported many lakes and water bodies throughout its geological history. The last of these water bodies was Lake Cahuilla, a water body larger than the Salton Sea, within the basin that formed from sedimentation in the Colorado River Delta. The lake existed during the Holocene epoch, periodically drying and refilling. It last dried up approximately 400 years ago.[20] Beginning in 1901, irrigation canals were dug to divert a portion of the Colorado River to irrigate agricultural fields in the Imperial Valley, which is within the Salton Basin.[21] In 1905, water broke through a canal headgate, causing a two-year uncontrolled release of Colorado River water from the canal into the area that is now the Salton Sea. The sea formed within a closed basin with no outlets (i.e., a terminal lake), which is its present condition.

Subsequent development of the Colorado River by the federal government (including construction of the Hoover Dam and the All-American Canal) provided additional support for transfers of Colorado River water to the Imperial Valley. After being diverted to irrigate agricultural lands in the Imperial Valley, this water drained into the Salton Sea and replenished freshwater lost to evaporation. In the 1920s, President Coolidge issued public water and reserve orders for the federal withdrawal of lands related to the Salton Sea, leading to an increasing federal land ownership stake in the area.[22] These lands were designated as a repository for

[16] For example, see Statement of Hon. Tom McClintock, in U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Efforts to Restore the Salton Sea*, 116th Cong., 2nd sess., September 24, 2020. Hereinafter, Statement of Hon. Tom McClintock.

[17] Statement of Hon. Tom McClintock.

[18] Statement of Hon. Tom McClintock.

[19] Statement of Hon. Jared Huffman, in U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Efforts to Restore the Salton Sea*, 116th Cong., 2nd sess., September 24, 2020. Hereinafter, Statement of Hon. Jared Huffman.

[20] Salton Sea Authority, *Timeline*.

[21] Robert H. Boyle, "Life—or Death—for the Salton Sea?," *Smithsonian* (June 1996), pp. 87-93.

[22] Salton Sea Authority, *Timeline*.

agricultural, subsurface, and surface water drainage. As a result, lands in and around the sea are managed by a patchwork of federal, state, and local owners.

The Salton Sea was a popular destination for sport fishing and tourism as late as the 1950s, but a combination of factors led to a gradual decline of these activities. Changes to the sea, including the flooding of some resort areas and wildlife habitat, bird and fish die-offs, and health threats of untreated water, led to a decline in recreation and development around the Salton Sea in the 1960s. Since then, water levels in the sea have declined steadily, exposing contaminated playa and leading to high salinity levels in the water. The Salton Sea also contains high levels of nutrients, which can lead to large-scale algal blooms, and toxic levels of selenium and dichlorodiphenyldichloroethylene (DDE).[23] Some scientists assert that these toxins, coupled with high salinity, are likely to further degrade water quality.[24]

The Salton Sea provides habitat, including open water, estuaries, salt marshes, and riparian corridors, for various fish and wildlife species. The most ubiquitous fish species in the sea today is the tilapia (*Oreochromis mossambicus*), which was introduced to the area in the 1960s to control weeds in agricultural ponds. In addition, the Salton Sea is home to the endangered desert pupfish (*Cyprinodon macularius*), the only native fish species in the sea. Few fish can survive in the sea's current hypersaline waters. According to scientists, deteriorating water quality adversely affects invertebrate life in the sea, such as pileworms and barnacles, two key components of the sea's food web.[25] The Salton Sea also is an important stop for thousands of birds on the Pacific Flyway, many of which rely on its fish and invertebrates for sustenance during their migration.[26]

Federal lands in and around the Salton Sea are managed by the Department of Defense (DOD) and several agencies within DOI. These lands include drainage areas and refuges for fish and wildlife. For example, the Sonny Bono Salton Sea National Wildlife Refuge was established in 1930 to provide wintering habitat for waterfowl and migratory birds.[27] It supports more than 400 species of resident and migratory birds, of which more than 50 are species of special status (including 3 listed under the Endangered Species Act).[28] Reclamation and BLM manage submerged lands and lands around the sea. Some of those lands border the sea's edges and increasingly are being exposed due to receding water levels. The playa in and around the sea is covered with fine sediments, some of which contain toxic substances, such as selenium and arsenic, deposited both naturally and by agricultural runoff. When the exposed lake beds dry, winds can blow up and transport dust, thereby impairing local and regional air quality.

Health of the Salton Sea Ecosystem

The ecosystem properties of the Salton Sea are largely determined by its water level, chemical concentrations (including salinity), and the balance between the rates of evaporation and water inflow.

[23] A chemical compound formed by the breakdown of DDT.

[24] Barnum et al., *State of the Salton Sea*, p. 8.

[25] Barnum et al., *State of the Salton Sea*, p. 3.

[26] Barnum et al., *State of the Salton Sea*.

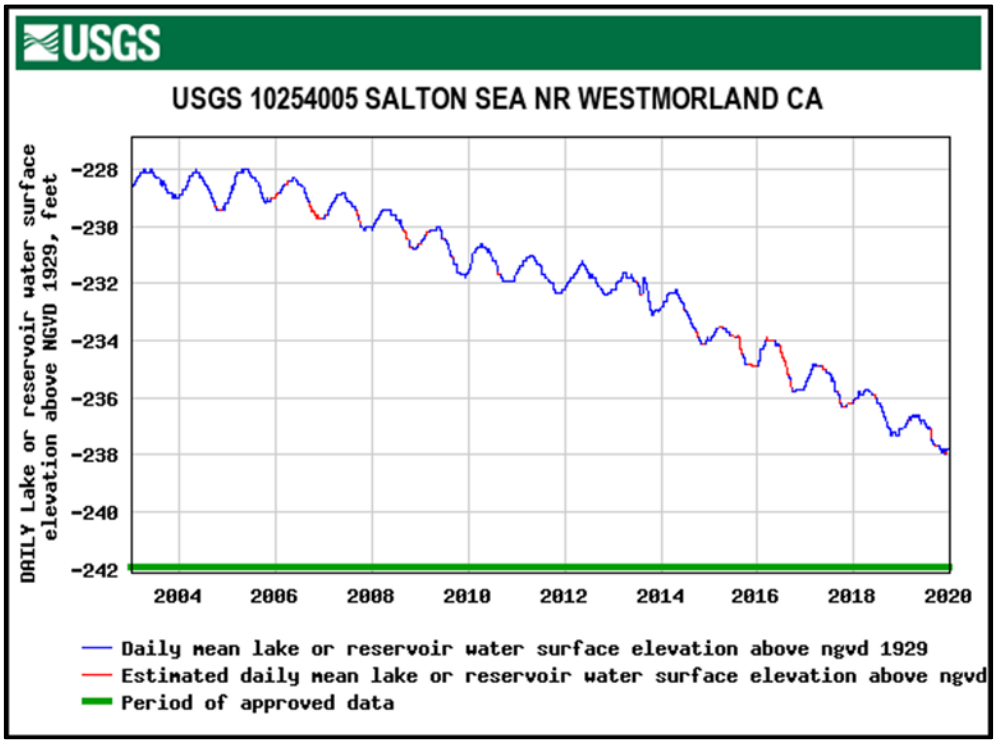
[27] This refuge was established in 1930 as the Salton Sea Wildlife Refuge and was renamed the Sonny Bono Salton Sea National Wildlife Refuge in 1998.

[28] U.S. Fish and Wildlife Service, *Bird Life, Sonny Bono Salton Sea National Wildlife Refuge Complex*, at https://www.fws.gov/saltonsea/Bird%20List.html.

Inflows to the Salton Sea

Historically, nearly 75% of the water flowing into the Salton Sea came from agricultural runoff originating in California's Imperial and Coachella Valleys; the other 25% came from rain and other surface inflows.[29] Agricultural inflows into the sea have declined steadily as water levels have dropped since 2003, due in part to the QSA and in part to evaporation (**Figure 2**). Declining water levels have increased playa exposure, which was nearing an estimated 25,000 acres at the end of 2019 (**Figure 3**).[30]

Figure 2. Salton Sea Elevation, 2003-2020



Source: U.S. Geological Survey, National Water Information System: Web Interface, at https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005.

Notes: There has been an approximately 10-foot reduction in water surface elevation since 2003. NGVD = National Geodetic Vertical Datum (see https://www.ngs.noaa.gov/datums/vertical/national-geodetic-vertical-datum-1929.shtml).

Total average annual inflow to the Salton Sea between 1950 and 2015 was estimated at approximately 1.3 MAF;[31] average annual inflow prior to the 2003 QSA implementation was

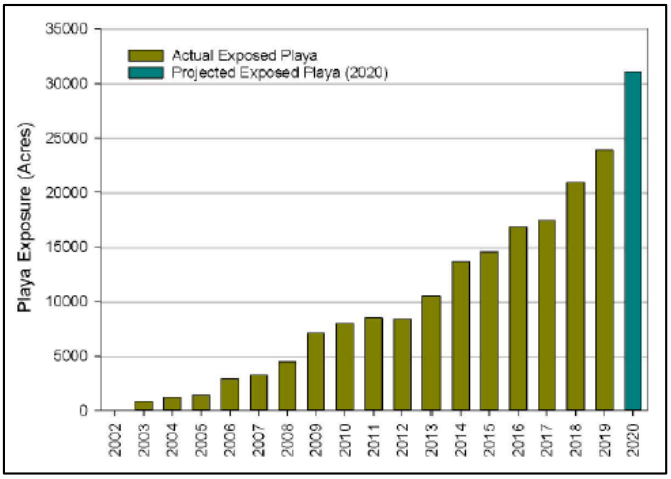
[29] Michael Cohen, Jason Morrison, and Edward Glenn, *Haven or Hazard: The Ecology and Future of the Salton Sea*, Pacific Institute for Studies in Development, Environment, and Security, February 1999, p. 10.

[30] California Natural Resources Agency, *2020 Annual Report on the Salton Sea Management Program*, February 2020, p. 31, at http://saltonsea.ca.gov/wp-content/uploads/2020/02/2020-Annual-Report_2-21-20-v3.pdf. Hereinafter, *2020 Salton Sea Management Program Annual Report*.

[31] CH2M Hill, *Salton Sea Hydrological Modeling and Results*, Technical Report Prepared for Imperial Irrigation District, October 2018, p. 2-2, at https://www.iid.com/home/showdocument?id=17299. Hereinafter, CH2M Hill, *Salton Sea Hydrological Modeling*.

estimated at 1.2-1.3 MAF,[32] and annual inflows since QSA implementation have been as low as 1.0 MAF.[33] From 2014 to 2019, inflows declined minimally and averaged 1.07 MAF, despite the end of mitigation flows under the QSA.[34] Some project that the total annual average inflow to the Salton Sea from 2016 to 2077 will drop to a level of approximately 732,000 acre-feet per year if there is no restoration.[35] This drop is estimated to result in approximately 100,000 acres of exposed playa and likely would increase salinity, raise concentrations of toxins, and exacerbate effects on fish and wildlife.[36]

Figure 3. Historical and Projected Lake Bed (Playa) Exposure in the Salton Sea, 2002-2020



Source: California Natural Resources Agency *2020 Annual Report on the Salton Sea Management Program*, February 2020.

Salinity

Lower inflows into the Salton Sea are directly related to increasing salinity levels. High salinity combines with extreme eutrophication to cause fish kills in the sea. Eutrophication can result in anoxic conditions, leading to fish death.[37] High salinity also has caused massive die-offs of birds who feed on fish in the Salton Sea. In 1950, the sea reached salinity levels similar to the Pacific Ocean. At this time, the California Department of Fish and Game began transferring saltwater fish species to the sea. Salinity has increased in the sea ever since.

[32] IID, "Salton Sea," at https://www.iid.com/water/salton-sea.

[33] CH2M Hill, *Salton Sea Hydrological Modeling*, p. 2-2.

[34] Anticipating a shortage of flows to the Salton Sea due to the Quantification Settlement Agreement (QSA), the State Water Resources Control Board delayed the shortage for 15 years (2002-2017) by requiring mitigation flows to the Salton Sea.

[35] CH2M Hill, *Salton Sea Hydrological Modeling*, p. 5-3.

[36] CH2M Hill, *Salton Sea Hydrological Modeling*, Section 6.0, p. 6-1 to 6-10.

[37] *Anoxic waters* are waters with a total depletion of oxygen, an extreme version of hypoxia. Fish need oxygenated waters to survive; thus, anoxic conditions often are associated with large fish kills, sometimes observed in the Salton Sea. See B. Marti-Cardona et al., "Relating Fish Kills to Upwelling and Wind Patterns in the Salton Sea," in *Developments in Hydrobiology: The Salton Sea Centennial Symposium Developments in Hydrobiology*, ed. Stuart Hurlbert, vol. 201 (2008), pp. 85-95.

Salinity in the Salton Sea increased from approximately 45,600 milligrams/liter (mg/l) in 2003 to 69,000 mg/l in 2019.[38] These salinity levels are too high to support the sea's former diversity of fish, according to scientists.[39] If there is no restoration and trends in salinity continue, some studies suggest salinity in the Salton Sea could approximately double from 2018 by 2027 and triple by 2033.[40]

Fish and Wildlife

An increase in salinity has led to the loss of most fisheries in the Salton Sea. The sea's fish species are declining due to hypersaline conditions; the endangered desert pupfish is in decline in many parts of the sea, and scientists expect that increasing salinity eventually will cause the species to disappear.[41] The status of tilapia—the Salton Sea's other major fish species—is less clear, as these fish are more tolerant of high salinity conditions.[42] However, some scientists argue that tilapia might be reaching a tipping point due to hypersaline conditions and that a massive die-off might be imminent.[43] The numbers of fish-eating birds nesting in the Salton Sea area have fallen to record lows, but the population of some other birds that feed on invertebrates appears to have increased in recent years.[44] Some stakeholders argue that the ongoing loss of water into the sea will continue to degrade the ecosystem, habitat, and species by increasing salinity levels, producing higher concentrations of nutrients that lead to eutrophication and anoxia, and elevating water temperatures.[45]

Dust and Airborne Pollution

Dust from exposed playa around the Salton Sea contains toxic substances that affect human health. In October 2019, the Imperial County Board of Supervisors declared a local state of emergency at the Salton Sea due to harmful dust and air pollution originating from the sea and impairing air quality.[46] The country also has issued notices of violations of county regulations in 2020 to state agencies, federal agencies, and IID for not adequately controlling dust during the construction of the Red Hill Bay restoration project and for not adequately implementing dust control activities on exposed playa around portions of the Salton Sea.[47]

Some scientists support the premise that dust from exposed playa in the sea is the cause of respiratory issues in local communities. For example, a study directly connected declining water

[38] *2020 Salton Sea Management Program Annual Report*, p. 30. By comparison, average salinity of ocean water is approximately 35,000 mg/l.

[39] Testimony of Wade Crowfoot, California Secretary for Natural Resources, in U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Efforts to Restore the Salton Sea*, 116th Cong., 2nd sess., September 24, 2020. Hereinafter, Testimony of Wade Crowfoot.

[40] CH2M Hill, *Salton Sea Hydrological Modeling*, p. 6-7.

[41] *2020 Salton Sea Management Program Annual Report*, p. 28.

[42] *2020 Salton Sea Management Program Annual Report*, p. 28.

[43] Salton Sea Authority, *Frequently Asked Questions*, 2020, at https://saltonseaauthority.org/about/faq/.

[44] *2020 Salton Sea Management Program Annual Report*, pp. 28-29.

[45] Testimony of Wade Crowfoot.

[46] R. E. Kelley, Chairman of the Board of Supervisors, *County of Imperial, Proclamation of Local Emergency for Air Pollution at the Salton Sea*, Imperial County Board of Supervisors, October 22, 2019, at https://imperial.granicus.com/MetaViewer.php?view_id=2&event_id=1744&meta_id=251728.

[47] For example, see K. Kirby, "ICAPCD Issues Notice of Violation to Protect Public Health," *The Desert Review*, October 14, 2020.

levels in the Salton Sea to an increase in particulate matter and respiratory illnesses in surrounding communities.[48] At the same time, some scientists assert that it is difficult to assess how increasing playa exposure is impacting air quality, as monitoring data vary due to wind patterns and the location of monitoring sites relative to the sea. These scientists contend that air pollution in the region also can be caused by stirring up the surrounding desert and by other natural sources, and they recommend more studies.[49] According to the California Air Resources Board, migrating sand on the western shore of the Salton Sea is causing the highest particulate matter readings and may increase total lake bed emissions unless the sand is stabilized.[50]

The Salton Sea and the Colorado River

The restoration of the Salton Sea is connected to agreements that regulate the use and distribution of water from the Colorado River. One agreement calls for mandatory flows to the sea for a period of time, and the other agreement stimulated discussion among stakeholders about restoration.

Quantification Settlement Agreement

Under the 1922 Colorado River Compact, seven states in the western United States agreed to specified allotments of Colorado River water totaling 15 MAF per year, with California apportioned 4.4 MAF of this amount (the largest among the seven states). The states in the Upper Colorado River Basin include Colorado, Utah, Wyoming, New Mexico, and part of Arizona; the states in the Lower Basin include the rest of Arizona, California, and Nevada.[51] Historically, 75% (3.3 MAF per year) of California's water was diverted to the Imperial and Coachella Valleys in Southern California (i.e., areas with irrigation drainage to the Salton Sea), making these areas the largest users of Colorado River water in the basin. Through the early 1990s, California's use of Colorado River water was on average 800,000 acre-feet per year in *excess* of its allocation of 4.4. MAF, primarily because other states in the compact were withdrawing less than their shares. As other states increased their water consumption, the water available for California was reduced to avoid major water-delivery shortfalls. In 1996, the Secretary of the Interior required California to develop and enact a strategy to reduce its water consumption to its allocated levels. The result was the 2003 Quantification Settlement Agreement (QSA), which provided for reductions to California's use of Colorado River water.

The QSA incorporated several changes that affected the Salton Sea. The agreement finalized a 1998 proposed revised water right for the Colorado River Basin's largest water rights holder—IID—that directed 300,000 acre-feet per year of Colorado River agricultural diversions from IID to urban users in Southern California.[52] These reductions were agreed to on a long-term basis

[48] B. A. Jones and J. Fleck, "Shrinking Lakes, Air Pollution, and Human Health: Evidence from California's Salton Sea," *Science of the Total Environment*, vol. 712 (April 10, 2020). The study's model indicated that each 1-foot drop in lake elevation between 2008 and 2014 was associated with an increase in particulate matter that led to an increase in respiratory mortality rates in surrounding communities of approximately 1-15 people per year and annual health costs of $13.2 million-$147.3 million per year.

[49] E. Lindberg, "As Salton Sea Shrinks, Experts Fear Far-Reaching Health Consequences," *USC News*, August 28, 2019, at https://news.usc.edu/159380/salton-sea-shrinking-asthma-respiratory-health-air-quality/.

[50] California Air Resources Board, *Salton Sea Windblown Dust Levels and Sources*, 2019.

[51] For background on Colorado River allocations, see CRS Report R45546, *Management of the Colorado River: Water Allocations, Drought, and the Federal Role*, by Charles V. Stern and Pervaze A. Sheikh.

[52] Specifically, it directed 200,000 acre-feet per year from IID to the San Diego County Water Authority (SDCWA) and

(i.e., 45 years, with an optional 30-year renewal period) and were widely acknowledged to result in reduced inflows to the Salton Sea.[53] These inflow reductions were to be mitigated by 200,000 acre-feet per year of water transfers from IID to the sea over the next 15 years (i.e., through 2018), with the intent to provide time to study and implement long-term restoration actions. It was acknowledged that after that time, additional mitigation actions would be required to prevent the precipitous decline in the level and water quality of the Salton Sea.

As part of the QSA, the State of California agreed to assume responsibility for Salton Sea restoration costs in excess of $133 million (2003 dollars).[54] State legislation implementing the QSA directed multiple mitigation measures intended to restore the sea, from water transfers to restoration actions. QSA implementing legislation also required the state to identify a Salton Sea restoration plan—and a funding plan to implement the restoration plan—and specified that the California Department of Natural Resources should lead these efforts.[55] (For more information on restoration efforts, see "Restoration and Mitigation Plans," below.)

The Salton Sea and Colorado River Drought Contingency Plans

Ongoing drought conditions in the western United States and the potential for water supply shortages prompted Colorado River Basin states to engage in negotiations with Reclamation, which manages some Colorado River waters and informs the Secretary of the Interior in the Secretary's capacity as lower basin *water master*. These negotiations focused on additional future reductions (i.e., delivery cutbacks beyond the QSA) and other basin-wide actions related to Colorado River water deliveries. After several years of negotiations, on March 19, 2019, Reclamation and the Colorado River Basin states finalized drought contingency plans (DCPs) for the Upper and Lower Colorado River Basins. The DCPs included commitments to curtail water deliveries under some scenarios, including—for the first time—cutbacks to California's deliveries if Lake Mead water levels dropped below a certain elevation. These plans, which required congressional authorization to be implemented, were enacted on April 16, 2019, in the Colorado River Drought Contingency Plan Authorization Act (P.L. 116-114).

To be fully implemented, the DCPs also required additional agreements by state and local entities that would make it possible to realize the plans' state-level commitments. Whereas most states and users approved the DCPs, IID made its approval contingent on the State of California and the federal government committing to funding for the 10-year Phase 1 Plan of the SSMP at a 1:1 federal-to-state funding ratio. IID required that this commitment be in addition to mitigating all future conditions resulting from the DCPs (i.e., additional Lake Meade level declines resulting from reduced Colorado River flows or deliveries). At the time, IID's main financial request of the federal government was for the U.S. Department of Agriculture (USDA) to allocate $200 million in funding from the 2018 farm bill (P.L. 115-334) for Salton Sea restoration. USDA did not commit 2018 farm bill funds and, as a result, IID did not support the final approved legislation.[56]

100,000 acre-feet per year to the Coachella Valley Water District (CVWD) and the Municipal Water District of Southern California.

[53] At the time of the QSA's signing, inflows to the Salton Sea from irrigation drainage were approximately 1.4 MAF per year. Agricultural drainage flows typically make up 90% of inflows to the Salton Sea.

[54] This is the amount the QSA requires the three local water agencies (IID, CVWD, and SDCWA) to pay for restoration.

[55] California Fish and Game Code, §§2931, 2942.

[56] R. E. Kelley, Chairman of the Board of Supervisors, *County of Imperial, Proclamation of Local Emergency for Air Pollution at the Salton Sea*, Imperial County Board of Supervisors, October 22, 2019, at https://imperial.granicus.com/MetaViewer.php?view_id=2&event_id=1744&meta_id=251728.

Restoration and Mitigation Plans

Since the early 1960s, various federal, state, and private entities have developed comprehensive proposals to restore the Salton Sea and mitigate issues associated with its declining lake levels. These plans have common objectives to control salinity, maintain and restore habitat, and stabilize water levels, although the methods for achieving these goals differ. **Table 1** provides a list of four recent plans for restoring the Salton Sea. Several of these plans incorporate elements of prior plans or express consistency with other plans that were under development. For example, the 2007 Reclamation feasibility study incorporated many elements of the prior state and nongovernmental plans, and the 2015 IID plan noted its consistency with the state's phased approach to restoration, which was in early planning stages.

Table 1. Salton Sea Restoration Plans

(restoration plans since 2000)

Plan Name (Year)	Lead Entity	Description	Estimated Cost
Salton Sea Authority Plan for Multi-Purpose Project (2006)[a]	Salton Sea Authority	Restoration plan that included the construction of a causeway across the center of the Salton Sea.	Not available
Salton Sea Ecosystem Restoration Program Programmatic Environmental Impact Report (2007)[b]	State of California	Comprehensive restoration plan issued in response to requirements under 2003 Quantification Settlement Agreement.	$8.9 billion (2007 dollars)
Comprehensive Report on Restoration of the Salton Sea (2007)[c]	Bureau of Reclamation	Federal study laying out five alternative restoration plans and a no-action alternative.	$3.5 billion to $14 billion (2006 dollars)
Salton Sea Restoration and Renewable Energy Initiative (2015)[d]	Imperial Irrigation District	Initiative with design concepts for restoration, air quality mitigation, geothermal development, and other renewable energy technologies.	$3.1 billion (2016 dollars)
Salton Sea Management Program (2017)[e]	State of California	Two-phase plan for restoring the Salton Sea by conveying water to the lake, reducing salinity, and covering/restoring approximately 30,000 acres of exposed lake bed.	Phase 1 Plan: $420 million (2017 dollars) Phase 2 Plan: TBA

Source: CRS, based on individual restoration plans (see below).

Notes:

a. TetraTech, *Salton Sea Funding and Feasibility Action Plan*, Salton Sea Authority, May 2016, p. 21, at https://saltonseaauthority.org/wp-content/uploads/2019/11/SSA-Benchmark-7-for-FFAP.pdf.

b. California Department of Water Resources and California Department of Fish and Game, *Salton Sea Ecosystem Restoration Program Final Programmatic Environmental Impact Report*, 2007.

c. U.S. Bureau of Reclamation, *Restoration of the Salton Sea*, December 2007, at https://www.usbr.gov/lc/region/saltnsea/finalreport/index.html.

d. Imperial Irrigation District, *Salton Sea Restoration and Renewable Energy Initiative Framework Document*, July 2015, at https://saltonseanow.com/wp-content/uploads/2015/07/Draft-SSRREI-Framework-Document-July-22-2015.pdf.

e. California Department of Water Resources, California Natural Resources Agency, and California Department of Fish and Wildlife, *Salton Sea Management Program, Phase 1: 10-Year Plan,* March 2017.

As noted, the State of California agreed to assume responsibility for restoring the Salton Sea as part of the QSA. In November 2014, IID submitted a petition to the California State Water Resources Control Board to exercise its authority over the QSA, as adopted in Revised Water Rights Order (WRO) 2002-0013.[57] Among other things, IID argued that WRO 2002-13 approved QSA transfers conditioned upon California's fulfillment of its statutory commitment to restore the Salton Sea. Based on the state's lack of restoration progress to date, IID asked the state water board to enter an order to ensure its success. On November 7, 2017, the state water board responded with a revision to its 2002-0013 order in the form of Order WR 2017-0134, which required annual commitments by the state and a framework for Salton Sea restoration and mitigation efforts.[58] The order acknowledged the SSMP, which had been released since IID filed its petition (see "Salton Sea Management Program" for additional discussion). The order required the State of California, through the California Natural Resources Agency (CNRA), to begin restoring the Salton Sea so that approximately 30,000 acres of exposed playa would be restored through habitat and dust suppression projects by December 31, 2028. The order also called on the CNRA to identify a long-term plan for restoring the sea for an initial 10 years and to develop subsequent 10-year plans to guide projects after the initial 10-year plan was completed.

Salton Sea Management Program

The State of California's current plan for restoring the Salton Sea dates to 2015, when then-Governor Jerry Brown formed the state Salton Sea Task Force and directed it to take actions related to the sea. The task force was to create the SSMP, develop a process to accelerate project implementation and delivery, and meet short- and medium-term goals for dust suppression and habitat projects (**Figure 4**).[59] The SSMP was released in 2017 and is a comprehensive, multiphase restoration plan for the Salton Sea. In 2018, the task force released a 10-year Phase 1 plan (i.e., from 2018 through 2028) for the SSMP.[60]

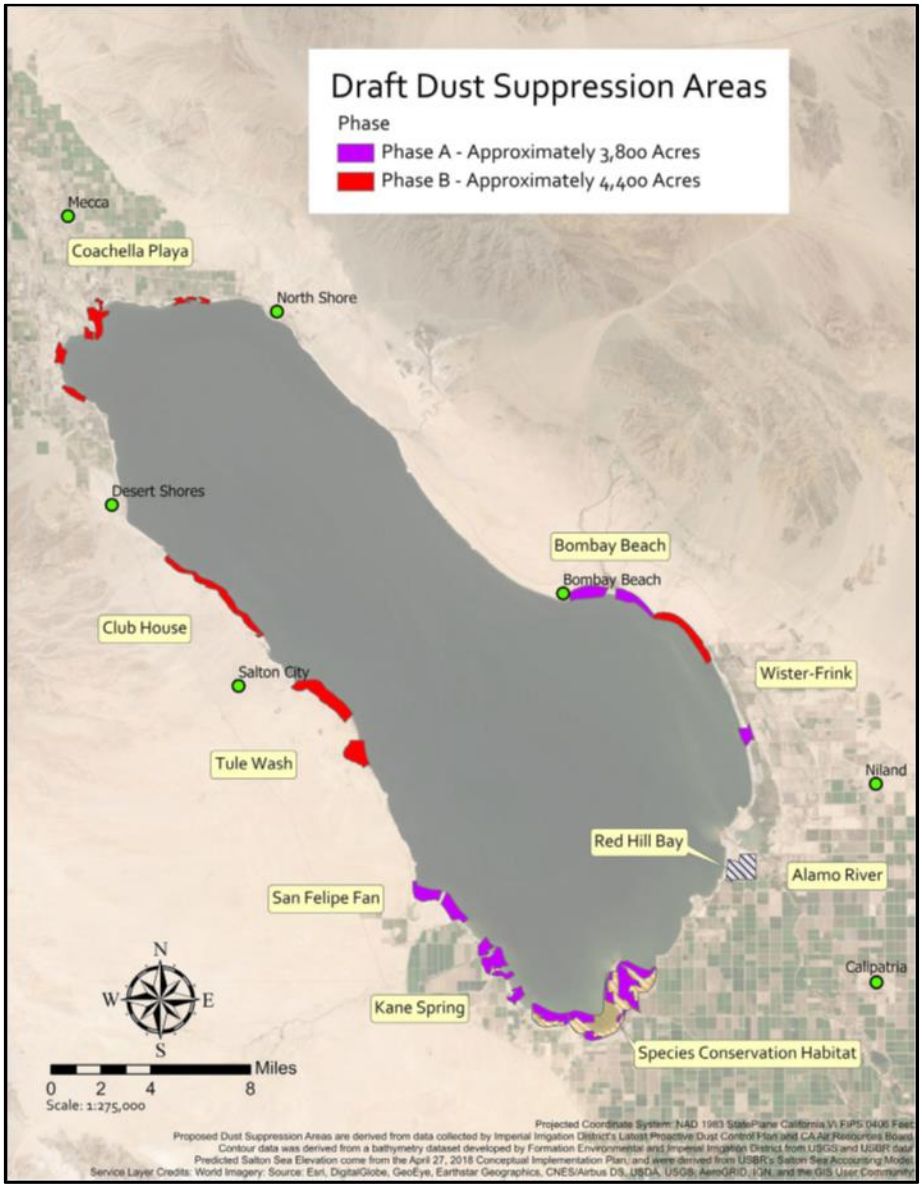
[57] State of California, State Water Resources Control Board, "Petition of Imperial Irrigation District for Modification of Revised Water Rights Order 2002-0013, *Imperial Irrigation District's (IID) and San Diego County Water Authority's (SDCWA) Amended Joint Petition for Approval of a Long-Term Transfer of Conserved Water from IID to SDCWA and to Change the Point of Diversion, Place of Use, and Purpose of Use Under Permit 7643 on Application 7482 of Imperial Irrigation District*," November 18, 2014.

[58] State of California, State Water Resources Control Board, Order WR 2017-1034, *In the Matter of Imperial Irrigation District Regarding State Water Board Revised Order WRO 2002-0013*.

[59] The short-term goal was 9,000-12,000 acres of dust suppression and habitat projects, and the medium-term goal was 18,000 to 25,000 acres of projects.

[60] 2017 SSMP.

Figure 4. Proposed Areas to Implement Dust Suppression



Source: California Natural Resources Agency, *2020 Annual Report on the Salton Sea Management Program,* February 2020, p. 31, at http://saltonsea.ca.gov/wp-content/uploads/2020/02/2020-Annual-Report_2-21-20-v3.pdf.

Notes: Phase A project areas began construction in 2020. Phase B project areas are being planned in 2020 and are to be implemented in 2021.

Phase 1 of the SSMP includes projects and activities that aim to convey water to the Salton Sea, reduce salinity, and cover or restore approximately 30,000 acres of exposed playa. Proposed construction projects to treat exposed playa under the SSMP would increase the areas treated under the plan from 500 acres in 2018 to 4,200 acres in 2028.[61] Other projects in Phase 1 include

- air quality and habitat projects, as well as the water "backbone" infrastructure associated with these projects;

[61] 2017 SSMP, p. 8.

- the Phase I Species Conservation Habitat Project, which is expected to suppress toxic dust by creating approximately 3,770 acres of habitat for waterfowl on the southern edge of the Salton Sea;
- the Red Hill Bay Restoration Project (a joint effort by FWS and IID), which aims to create 530 acres of wetland habitat; and
- the Torres Martinez Wetland Project, an effort of the Torres Martinez Desert Cahuilla Indians to build shallow wetlands along the northern edge of the Salton Sea.

DOI entered into several memoranda of understanding (MOUs) with California as DOI developed and undertook work on the SSMP, most recently in the form of an MOU executed in August 2016.[62] Among other things, DOI, through Reclamation, agreed to designate officials to serve on the Salton Sea Working Group; coordinate federal spending with state spending; recognize the state's SSMP restoration and mitigation project goals; and agree to pursue federal appropriations, budgets, and funding opportunities to support certain SSMP activities.[63] In addition to Reclamation, other federal engagement on the SSMP includes FWS efforts to implement the Red Hill Bay Restoration Project; an agreement with the U.S. Army Corps of Engineers (USACE) to facilitate funding and permitting under the National Environmental Policy Act (NEPA) to implement restoration authorities in the Salton Sea; and efforts by USDA's Natural Resources Conservation Service (NRCS) to support the SSMP's objectives through a Regional Conservation Partnership Project.

As of 2018, the total estimated cost for Phase 1 of the SSMP was $420.0 million (2017 dollars).[64] Available funding anticipated for the plan includes funding from California state water bonds passed in 2014 (Proposition 1) and 2018 (Proposition 68), plus other appropriated funding sources. As of 2020, state appropriated funds totaled $356.8 million, with the majority of these funds yet to be spent.[65]

Status of SSMP Implementation

In 2020, the state completed the first SSMP project, the 112-acre Bruchard Road Dust Suppression Project. The Species Conservation Habitat Project—a major component of the SSMP—is expected to begin in 2020 and to be completed by the end of 2023.[66] In July 2020, the state developed a Dust Suppression Action Plan to prioritize 8,200 acres of dust suppression projects at various emissive lake-bed locations, including up to 3,800 acres of surface roughening projects to be completed in 2020.[67] California also is continuing the programmatic environmental planning process that is to allow for NEPA compliance and federal permitting of the 30,000 acres

[62] "Memorandum of Understanding by and Between the United States Department of the Interior and the State of California Natural Resources Agency Regarding the Cooperation of Activities to Manage the Salton Sea," August 31, 2016, at https://www.doi.gov/sites/doi.gov/files/uploads/ca-doi_2106_ss_mou_signed_1.pdf. Hereinafter, 2016 MOU. This memorandum reportedly was amended in January 2017.

[63] 2016 MOU, p. 5.

[64] State of California Department of Water Resources, California Natural Resources Agency, and California Department of Fish and Wildlife, *Salton Sea Management Program*, August 2018.

[65] *2020 Salton Sea Management Program Annual Report*, p. 14.

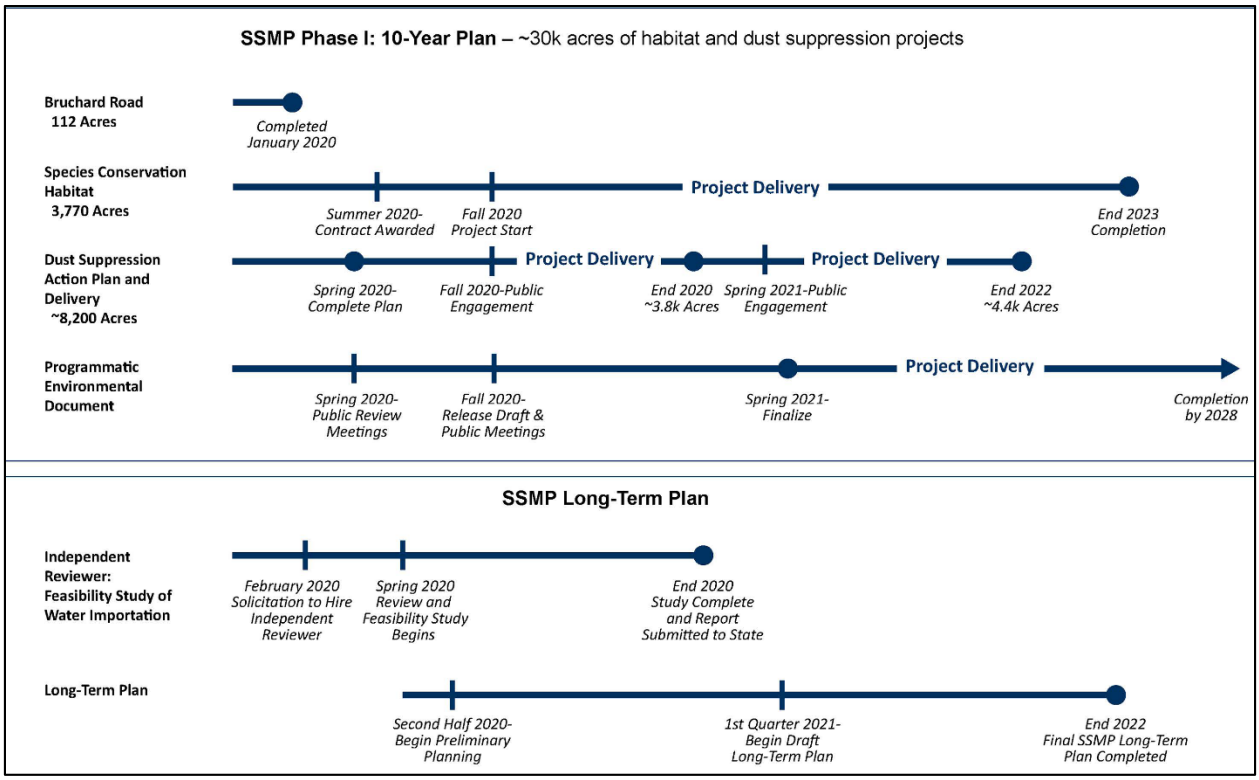
[66] *2020 Salton Sea Management Program Annual Report*, pp. 6, 23.

[67] *2020 Salton Sea Management Program Annual Report*, p. 6. Gavin Newsom, Governor of California, *California State Budget 2020-2021: Summary*, State of California, June 26, 2020, p. 93, at http://www.ebudget.ca.gov/budget/2020-21EN/#/BudgetSummary.

in the Phase I plan. In addition, the state is working on the long-term (i.e., post-2028) plan for restoration. **Figure 5** shows the status of the SSMP's various projects and processes.

The State of California included $47 million in its FY2020 budget to address issues in and around the Salton Sea. A portion of those funds (approximately $28 million) is to be used for restoration activities in the New River, which feeds into the sea. Another portion (approximately $19 million) is to be for the North Lake Pilot Project, which aims to construct a deepwater recreational area in the northern portion of the Salton Sea.[68]

Figure 5. Salton Sea Management Program (SSMP) Project Delivery Timeline



Source: California Natural Resources Agency, *2020 Annual Report on the Salton Sea Management Program*, February 2020.

Federal, State, and Local Roles in Restoration

The State of California is leading restoration activities in the Salton Sea, along with the Salton Sea Authority, IID, and the Torres-Martinez Band of Desert Cahuilla Indians. Federal actions directed toward restoring the Salton Sea are not following any comprehensive plan. Restoration efforts by federal agencies are largely in the form of pilot projects; monitoring; and individual agency plans, proposals, or authorities. **Table 2** presents a summary of federal, state, and local entities and their activities to restore the Salton Sea.

[68] Gavin Newsom, Governor of California, *California State Budget 2020-2021: Summary*, State of California, June 26, 2020, p. 93, at http://www.ebudget.ca.gov/budget/2020-21EN/#/BudgetSummary.

Table 2. Role of Selected Federal, State, and Local Agencies in Salton Sea Restoration

Entity	Role in Restoring the Salton Sea
Federal Agencies	
Bureau of Reclamation	Implements the Salton Sea Research Project and other restoration activities. In addition to general Reclamation authorities under the Reclamation Act of 1902, several laws form the basis for Reclamation's Salton Sea Research Project. P.L. 102-575 directed the Secretary of the Interior (via Reclamation) to conduct research on projects to control salinity levels, provide habitat for endangered species, enhance fisheries, and protect recreational values in the Salton Sea. Authorized to conduct feasibility studies on restoration options for the Salton Sea (transmitted in January 2000) and to authorize river reclamation and restoration activities on the New and Alamo Rivers (tributaries that flow into the sea). P.L. 108-361 directed the Secretary of the Interior, in coordination with the State of California, to complete a feasibility study on a preferred alternative for Salton Sea restoration (transmitted in 2007).
U.S. Fish and Wildlife Service	Administers the Salton Sea National Wildlife Refuge in the southern edge of the Sea. Implementing the Red Hill Bay Restoration Project adjacent to the Salton Sea Wildlife Refuge under the authority of the National Wildlife Refuge System Administration Act (16 U.S.C. § 668dd); the project aims to restore wetland habitat for migratory birds and waterfowl and to suppress dust.
U.S. Geological Survey	Conducts scientific studies in and around the Salton Sea related to restoration and energy development. Some of these activities are under the Ecosystems Research Program and the National Water Quality Assessment Program.
U.S. Army Corps of Engineers	Authorized to conduct ecosystem restoration in the Salton Sea through §3032 of P.L. 110-114, as amended. This provision authorizes a program to implement project-specific restoration plans and projects consistent with studies to increase the success of full-scale restoration projects in the sea.
U.S. Department of Agriculture, Natural Resources Conservation Service	Partnered with the Salton Sea Authority in a Regional Conservation Partnership to provide technical and financial assistance to farmers in the Imperial Irrigation District (IID), which is within the Salton Basin. The project aims to improve water quality, reduce poor air quality, improve soils and drought resistance, and conserve species habitat of the sea.
State Agencies	
California Natural Resources Agency	Lead state agency overseeing and guiding Salton Sea activities. Coordinates and negotiates with other local, state, and federal agencies.
California Department of Water Resources	Implements most of the state's restoration projects at the Salton Sea, including engineering and design, contracting, construction, and operations and maintenance.
State Water Resources Control Board	Responsible for protecting water quality, water flows for aquatic life, and water rights, including permits for Quantification Settlement Agreement (QSA) water transfers and mitigation water, and for requiring the state to construct specified projects at the Salton Sea.
California Department of Fish and Game	Designs Salton Sea habitat projects and conducts monitoring. Issues regulatory permits for restoration projects and administers the Salton Sea Restoration Fund.
Tribal	
Torres-Martinez Band of Desert Cahuilla Indians	Largest private landowner of property around the Salton 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 the sea.

Entity	Role in Restoring the Salton Sea
Local/Regional Entities	
Quantitative Settlement Agreement Joint Powers Authority (QSA-JPA)	Includes the IID, Coachella Valley Water District, San Diego County Water Authority, and state Department of Fish and Wildlife. Administers funding for implementing mitigation activities required by QSA permits.
Coachella Valley Water District (CVWD)	Party to the QSA that helps to fund mitigation projects required by QSA permits and serves as legal counsel for the QSA-JPA. Responsible for water deliveries for irrigation and domestic uses in the Coachella Valley near the Salton Sea.
San Diego County Water Authority (SDWA)	As a party to the QSA, funds a portion of the mitigation projects required by QSA permits and handles administration and finance for the QSA-JPA.
Imperial Irrigation District	As a party to the QSA, transfers up to 300,000 acre-feet per year of its water to CVWD and SDWA. Helps to fund the mitigation projects required by 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.
Federal-State Collaboration	
Salton Sea Authority	Joint powers authority authorized to restore the Salton Sea in consultation and cooperation with the federal government and the State of California.

Source: Adapted from Rachel Ellers, *The Salton Sea: A Status Update*, California Legislative Analyst's Office, August 29, 2018, at https://lao.ca.gov/Publications/Report/3879.

Notes: A *joint powers authority* in California is an entity that allows two or more public agencies to jointly exercise common powers. These entities are formed by the California state government and are not considered federal entities overseen by Congress.

Role of Congress

California has largely spearheaded restoration of the Salton Sea. Congress has enacted multiple bills to guide federal activities and to provide authorities for federal involvement in the sea's restoration; however, there is no comprehensive law or authority for federal agencies to holistically address the Salton Sea ecosystem through either a federal initiative or a joint state-federal initiative.

Since 1992, the following bills have been enacted to address Salton Sea restoration:

- The Reclamation Projects Authorization and Adjustment Act (Title XI, §1101 of P.L. 102-575) established that restoration of the Salton Sea was of national interest and directed the Secretary of the Interior to conduct research on projects to control salinity levels, provide habitat for endangered species, enhance fisheries, and protect recreational values in the sea.
- The Salton Sea Recovery Act of 1998 (P.L. 105-372) expanded restoration activities in the sea. The act authorized the Secretary of the Interior to conduct feasibility studies of various options for restoring the Salton Sea and studies of wildlife and species' responses to the sea's hydrology and toxicology. The act also authorized river reclamation activities for the New and Alamo Rivers (tributaries that flow into the Salton Sea) and provided authority to aid in several restoration projects administered through the state-funded Salton Sea Authority.
- Section 3032 of the Water Resources Development Act of 2007 (P.L. 110-114), as amended by Section 1181 of the Water Infrastructure Improvements for the

Nation Act (P.L. 114-322) authorized a program for project-specific Salton Sea restoration plans and projects consistent with previously published studies to increase the success of full-scale restoration projects.[69]

- The resolution on Salton Sea and Tributaries, Riverside, Imperial, and San Diego Counties, California, by the Senate Environment and Public Works Committee on April 28, 2016 (Senate Hearing 114-323) authorized USACE to review the Chief of Engineers' reports contained in the preliminary examination report on flood control for all streams in San Diego and Imperial Counties, CA, flowing into the Salton Sea, dated July 15, 1943, and other pertinent reports to determine the advisability of federal participation in providing improvements for flood risk management, ecosystem restoration, and other water- and land-related resources for the Salton Sea and its vicinity. The examination was to focus on restoration and protection of the environment and on improvements to public health and safety for the Salton Sea and tributaries in Riverside, Imperial, and San Diego Counties, CA.

Recent appropriations legislation has provided funding for restoration activities, in particular to Reclamation.[70] From FY2016 to FY2020, Congress appropriated $10 million to Reclamation specifically for Salton Sea restoration. (Most of this funding was in addition to the President's annual budget requests.)[71] Congress has not appropriated funds to USACE, although USACE has the authority to conduct restoration in the Salton Sea if funding were provided.[72]

In the last five fiscal years, Congress has appropriated funds to FWS and the NRCS for restoration activities in the Salton Sea. FWS is leading the Red Hill Bay Restoration Project, which aims to restore 530 acres of wetland habitat for sensitive species. The project is a joint effort by FWS and IID. Federal assistance for the Red Hill Bay Restoration Project is from funding allocated to the Sonny Bono Salton Sea Wildlife Refuge. According to FWS, the project has received approximately $1.0 million and is not yet finished.[73] NRCS partnered with the Salton Sea Authority in a Regional Conservation Partnership to provide technical and financial assistance to farmers in the IID, which is within the Salton Basin. The project aims to improve water quality, reduce poor air quality, improve soils and drought resistance, and conserve species habitat of the sea.[74] USDA provided $7.5 million and leveraged $50.6 million from partner-provided funding for the project, which runs from 2016 to 2020.

Issues for Congress

Congress might consider several issues related to Salton Sea restoration. For example, Congress may be interested in the overall level and type of federal involvement in this restoration, the

[69] U.S. Army Corps of Engineers (USACE), "Salton Sea Restoration Pilot Projects, CA," February 2020, at https://www.spl.usace.army.mil/Portals/17/docs/congressional/Fact_Sheets/PPMD/SaltonSeaRestorationProjectsFactSheet.pdf?ver=2020-04-27-195654-350.

[70] Reclamation typically is funded in annual Energy and Water Development and Related Agencies appropriations bills.

[71] Work plans describing the distribution of "additional funds" are available at https://www.usbr.gov/budget/.

[72] Personal communication with USACE, August 20, 2020.

[73] Personal communication with the U.S. Fish and Wildlife Service, August 28, 2020.

[74] Natural Resources Conservation Service, *Salton Sea Water Quality, Air Quality and Agricultural Wetlands*, August 24, 2020, at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/programs/farmbill/rcpp/?cid=nrcseprd1304025.

extent of collaboration with the State of California, and any potential federal efforts to mitigate the health effects of airborne toxins due to exposed playa.

Level of Federal Involvement in Restoration

Recent federal involvement in restoring the Salton Sea is largely limited to selected efforts to complement the SSMP, including restoration activities on federal lands such as the Sonny Bono Salton Sea Wildlife Refuge. Some policymakers contend that federal resources for restoring the Salton Sea should increase due to significant federal ownership of land in and around the sea.[75] Others support greater federal involvement in restoration because they believe the federal government has a responsibility to help restore the ecosystem for fish and wildlife and reduce the threat of airborne pollutants.[76] In contrast, some policymakers contend the Salton Sea is artificially maintained through runoff and the federal government should use its limited resources for other priorities, such as fighting forest fires.[77] These policymakers and other stakeholders also contend the State of California should bear the primary responsibility for restoring the Salton Sea, per its commitment under the QSA.[78]

Congress has appropriated steady funding for restoring the Salton Sea in recent years. Some in Congress proposed increased federal involvement in restoration of the sea in report language in the form of newly authorized restoration projects and studies; however, most of these requests have not been enacted.[79] In bill language in the 116th Congress, H.R. 7575 would direct USACE to carry out a study to evaluate the feasibility of constructing a perimeter lake in the sea to restore habitat and reduce exposed playa.[80]

Other proposals also might require an increased federal role. For example, the IID-proposed plan to use a portion of revenues from geothermal energy and mineral recovery projects to fund Salton Sea restoration and to reduce dust emissions from the sea likely would involve increased federal support.[81] The plan would involve a collaboration between the IID, the federal government, and other stakeholders. It is unclear what new authorities, if any, this plan would require.

Collaboration with the State of California

Some collaboration has occurred between the federal government and the state to restore the Salton Sea. In 2016, DOI signed an MOU with the State of California and other nonfederal entities to participate in efforts to restore 25,000 acres of dry lake bed and to implement the SSMP.[82] The MOU also included commitments to coordinate on implementing projects that aim to improve air and water quality, fish and wildlife habitat, water security, existing obligations

[75] Testimony of Wade Crowfoot.

[76] Statement of Hon. Jared Huffman.

[77] Statement of Hon. Tom McClintock.

[78] Statement of Hon. Tom McClintock.

[79] In its FY2021 Energy and Water Development Appropriations report (H.Rept. 116-449, accompanying H.R. 7613), the House Appropriations Committee encouraged USACE to be an active participant in restoration, including efforts to implement the California Natural Resources Agency's SSMP.

[80] Section 203 of H.R. 7575. The perimeter lake approach to restoration consists of creating water bodies and habitat along portions of the perimeter of the Salton Sea to reduce playa exposure and improve habitat for fish and wildlife.

[81] IID, *Unlocking the Salton Sea's Renewable Energy Potential*, May 12, 2016, at https://www.iid.com/home/showdocument?id=8599 and Congressional Hearing, *Restore Salton Sea*, 2020.

[82] 2016 MOU.

with American Indian communities, and resource management decisions. This MOU was preceded by an MOU between DOI and the Salton Sea Authority in 2014 for collaboration on scientific and technical information related to the sea.[83]

Some argue that the federal government should increase collaboration with the State of California to implement the SSMP. Among other things, this collaboration might involve additional commitments related to the SSMP and a clearer indication of what direction the federal government plans to take in regard to future implementation.[84]

Congress might consider options in other restoration initiatives to increase collaboration between the federal government and the state. One option may be to authorize an intergovernmental task force to streamline coordinated restoration efforts among federal and state agencies and to organize federal efforts to restore the Salton Sea; similar task forces and advisory bodies exist for restoration initiatives in the Chesapeake Bay, Great Lakes, Everglades, and Lake Tahoe. Some policymakers might resist this option because of lower levels of federal investment in restoration relative to state levels, arguing there might not be enough activities to justify a task force or a federal-state group. Other stakeholders might support directing federal agencies to collaborate with the state in restoration activities. For example, in report language to accompany proposed FY2021 appropriations legislation, the House Committee on Appropriations directs USACE and Reclamation to partner with federal, state, and local agencies to support Salton Sea restoration and implement the SSMP.[85] This report language would also direct the USACE to focus on specific projects that take a multi-agency approach to improving habitat and water quality and increasing public health benefits.[86]

Potential Effects of Airborne Pollution from the Salton Sea

Some stakeholders are concerned about the effects on human health of airborne pollution from exposed playa. These stakeholders might look to Congress to address the issue. Reclamation noted that approximately 8.75 square miles of Reclamation lands under the Salton Sea could be exposed to the air in the next 10 years as the sea recedes, which might lead to significant air quality mitigation costs under the Clean Air Act (42 U.S.C. 7401 et seq.).[87] In its FY2021 budget justification, Reclamation compared the sort of mitigation efforts that may be required in the Salton Sea to existing efforts under the Great Basin Unified Air Pollution Control District's Owens Lake Air Quality Mitigation Program.[88] This program is conducting compliance actions under the Clean Air Act and reports that air quality mitigation for exposed lake beds costs

[83] Department of the Interior (DOI), "Department of the Interior and Salton Sea Authority Sign Joint Memorandum of Understanding," press release, March 4, 2014, at https://www.doi.gov/news/pressreleases/department-of-the-interior-and-salton-sea-authority-sign-joint-memorandum-of-understanding.

[84] For example, see testimony of Joaquin Esquivel, Chair, California State Water Resources Control Board, in U.S. Congress, House Committee on Natural Resources, Subcommittee on Water, Oceans, and Wildlife, *Efforts to Restore the Salton Sea*, 116th Cong., 2nd sess., September 24, 2020.

[85] House Appropriations Committee, Report on FY2021 Energy and Water Development Appropriations, H.Rept. 116-449, accompanying H.R. 7613.

[86] House Appropriations Committee, Report on FY2021 Energy and Water Appropriations, H.Rept. 116-449, accompanying H.R. 7613.

[87] DOI, Bureau of Reclamation, *Budget Justification and Performance Information FY2021, Bureau of Reclamation*, 2020, at https://www.usbr.gov/budget/2021/FY_2021_Budget_Justifications.pdf. Hereinafter, Reclamation, *2021 Budget Justification*.

[88] For more information on the Great Basin Unified Air Pollution Control District's Owens Lake Air Quality Mitigation Program, see https://www.gbuapcd.org/.

approximately $38.0 million per square mile (averaged over all types of mitigation), with annual maintenance costs of approximately $500,000 per square mile.[89]

Concluding Remarks

In the future, Congress may be asked by various stakeholders to make additional commitments to Salton Sea restoration, potentially in the form of additional appropriations to one or more federal agencies to supplement or match state expenditures on the SSMP or specific directives related to federal restoration efforts. Some prior commitments, such as those in DOI's 2016 MOU with the State of California, may not be fully realized without additional funding and authorities from Congress. However, the extent to which this is the case remains unclear.

Congress may be interested in several questions related to Salton Sea restoration and the effects of Salton Sea ecosystem degradation on environmental contaminants and human health. These questions may include the following:

- What are the effects of exposed playa on air quality and, consequently, on human health in the region? What is the federal responsibility for mitigating these effects?
- How do decisions related to water supply and deliveries in the Colorado River Basin affect the health of the Salton Sea ecosystem?
- What is the preferred federal role in implementing the SSMP? Does the project require additional funding, authorities, or other congressional direction?
- What are the cost, content, and duration of long-term restoration plans currently under way in the SSMP? How will these plans restore the Salton Sea ecosystem, mitigate the effects of exposed playa, and conserve species?

[89] "Lower Colorado Basin" in Reclamation, *2021 Budget Justification*, 2020, p. 41.

Appendix. Chronology of Events in the Salton Sea

Chronology of Selected Historical Events Related to the Salton Sea

Year	Historical Event
10,000 BC	Native Americans first occupy the Salton Basin.
AD 700	Lake Cahuilla is formed in the Salton Basin and proceeds to dry out and fill up four times.
1500 (approx.)	Large inflow of water fills the Salton Basin from the Gulf of California. It is 26 times the size of the Salton Sea.
1600	Salton Basin dries out.
1840–1870	Flooding from the Colorado River is recorded in the Salton Basin.
1876	U.S. government establishes the Torres-Martinez Desert Cahuilla Indian Reservation with a grant of 640 acres.
1891	20,000 acres of land on the northern side of the Salton Basin provided to the Torres-Martinez Band of Desert Cahuilla Indians.
1901	Imperial Canal brings water from the Colorado River to the Imperial Valley.
1905	The Salton Sea is created in the basin by a levee break in the Colorado River.
1909	The U.S. government reserves in trust nearly 10,000 acres of land under the Salton Sea for the benefit of the Torres-Martinez Indians.
1924	President Calvin Coolidge issues Public Water Reserve Orders 90 (issued in 1924) and 114 (issued in 1928) setting aside lands under the Salton Sea as a permanent drainage reservoir for agricultural and surface water runoff from the Imperial and Coachella Valleys.
1928	Boulder Canyon Project Act (P.L. 70-642) authorizes the construction of the Boulder Dam and the All American Canal (expected to control the Colorado River and stop flooding).
1930	Salton Sea Wildlife Refuge established. It covers an area of 35,000 acres. Due to flooding and a rise in sea level since 1930, only 2,000 acres remain uncovered by salty water. The refuge was renamed to Sonny Bono Salton Sea National Wildlife Refuge in 1998.
1967	The yuma clapper rail is listed as an endangered species in the United States. Its range includes the Salton Sea.
1969	A federal-state reconnaissance investigation studies water quality problems in the Salton Sea. Based on this study, a feasibility study of management plans was authorized in 1972.
1970	The brown pelican is listed as an endangered species. Its range includes the Salton Sea. (In 1985, the species was delisted in the East, but it is still being monitored.)
1974	Federal-state feasibility study, which provided alternatives for lowering the salinity and maintaining water levels in the Salton Sea, is completed.
1986	The desert pupfish is listed as a federally endangered species in its entire range, which includes the Salton Sea.
1992	150,000 eared grebes die, garnering national attention for the Salton Sea. Cause of their deaths is unknown.
	Title XI of the Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575) authorizes Bureau of Reclamation (Reclamation) to conduct research on methods to control salinity levels, provide habitat to endangered species, enhance fisheries, and protect recreational values of the Salton Sea. A total of $10 million is authorized for this effort.
1993	The Salton Sea Authority is formed among Riverside and Imperial Counties and the Coachella Valley Water and Imperial Irrigation Districts. The goal is to coordinate activities that relate to improving water quality, stabilizing water levels, and enhancing economic and recreational activities in and around the Salton Sea.

Year	Historical Event
1998	The Salton Sea Reclamation Act of 1998 (P.L. 105-372) authorizes the Secretary of the Interior to complete studies of management options to allow the use of the Salton Sea to continue and to stabilize salinity and surface elevation, as well as to maintain fish and wildlife populations and enhance the potential for recreation and economic development.
1999	Water Resources Development Act of 1999 (P.L. 106-53) authorizes the Secretary of the Army to provide technical assistance to federal, state, and local agencies to implement restoration measures in the Salton Sea and to determine a plan in which the U.S. Army Corps of Engineers could assist others in restoring the sea.
2000	The Department of the Interior (DOI) submits a draft environmental impact statement/environmental impact report and a strategic science plan for restoring the Salton Sea. DOI establishes the U. S. Geological Survey (USGS) Salton Sea Science Office to provide continuity of the science effort, effectiveness of science undertaken in support of the restoration project, and efficiency of operations in serving management needs. (In FY2016, the office was closed and its function was consolidated with the DOI Region 8 USGS Regional Office in Sacramento.) Title VI of the Torres-Martinez Settlement Act (P.L. 106-568) provides compensation to the Torres-Martinez Desert Cahuila Indians for their submerged land. A total of $14 million was authorized, $10 million from the federal government and $4 million from water districts.
2003	Reclamation submits the *Salton Sea Study Status Report*, which contains various proposals for the full or partial restoration of the sea.
2004	Water Supply, Reliability, and Environmental Improvement Act (P.L. 108-361) requires the Secretary of the Interior to complete a feasibility study on a preferred alternative for Salton Sea restoration.
2006	Reclamation and the USGS construct shallow habitat pools on the southern end of the Salton Sea.
2007	Water Resources Development Act of 2007 (P.L. 110-114) authorizes $30 million for Salton Sea restoration pilot projects. Reclamation and DOI release *Restoration of the Salton Sea.*
2013	USACE, in conjunction with state agencies, releases final environmental impact report/environmental impact statement for the Salton Sea Species Conservation Project.
2015	Salton Sea Restoration and Renewable Energy Initiative proposed by Imperial Irrigation District. Described design concepts for restoration, air quality mitigation, geothermal development, and other renewable energy technologies.
2016	DOI signs a memorandum of understanding with the State of California agreeing to participate in Salton Sea restoration efforts.
2016	Senate resolution on Salton Sea and Tributaries, Riverside, Imperial, and San Diego Counties, California, by the Senate Environment and Public Works Committee, authorizes USACE to review the Chief of Engineers' reports on flood control for all streams in the San Diego and Imperial Counties, CA, flowing into the Salton Sea, along with other pertinent reports, to determine the advisability of federal participation in providing improvements for flood risk management, ecosystem restoration, and other water- and land-related resources for the Salton Sea and its vicinity. USACE is authorized to conduct ecosystem restoration in the Salton Sea through §3032 of P.L. 110-114, as amended. USACE is authorized to implement project-specific restoration plans and projects consistent with previously published studies to restore the Salton Sea.
2017	State of California releases the Salton Sea Management Program (SSMP), a comprehensive, multiphase restoration plan for the Salton Sea.

2019	Colorado River Drought Contingency Plan Authorization Act (P.L. 116-114) passes. Reclamation and the Colorado River Basin states finalize drought contingency plans (DCPs) for the Upper and Lower Colorado River Basins. The DCPs include commitments to curtail water deliveries under some scenarios, including, for the first time, cutbacks to California's deliveries if Lake Mead water levels drop below a certain elevation.

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