

AVERTING DISASTER: ACTION NOW FOR THE SALTON SEA

(REPORT #228, SEPTEMBER 2015)



A LITTLE HOOVER COMMISSION LETTER REPORT
TO THE GOVERNOR AND LEGISLATURE OF CALIFORNIA

Little Hoover Commission

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To Promote Economy and Efficiency

The Little Hoover Commission, formally known as the Milton Marks "Little Hoover" Commission on California State Government Organization and Economy, is an independent state oversight agency.

By statute, the Commission is a bipartisan board composed of five public members appointed by the governor, four public members appointed by the Legislature, two senators and two assemblymembers.

In creating the Commission in 1962, the Legislature declared its purpose:

...to secure assistance for the Governor and itself in promoting economy, efficiency and improved services in the transaction of the public business in the various departments, agencies and instrumentalities of the executive branch of the state government, and in making the operation of all state departments, agencies and instrumentalities, and all expenditures of public funds, more directly responsive to the wishes of the people as expressed by their elected representatives...

The Commission fulfills this charge by listening to the public, consulting with the experts and conferring with the wise. In the course of its investigations, the Commission typically empanels advisory committees, conducts public hearings and visits government operations in action.

Its conclusions are submitted to the Governor and the Legislature for their consideration. Recommendations often take the form of legislation, which the Commission supports through the legislative process.

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State of California

LITTLE HOOVER COMMISSION

September 24, 2015

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The Honorable Edmund G. Brown Jr.
Governor of California

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Vice Chairman

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The Honorable Toni G. Atkins
Speaker of the Assembly
and members of the Assembly

The Honorable Kristin Olsen
Assembly Minority Leader

Chad Mayes
Assemblymember

Don Perata

Sebastian Ridley-Thomas
Assemblymember

Dear Governor and Members of the Legislature:

Richard Roth
Senator

The Salton Sea is shrinking. Currently the state's largest inland body of water, as it dries up, the Sea poses a substantial threat to public health and the environment. Left unaddressed, desert winds will lift dust from thousands of acres of newly-revealed lakebed and blow it into population centers, agricultural areas and world-class resort economies.

David Schwarz

Jonathan Shapiro

Sumi Sousa

Carole D'Elia
Executive Director

This impending crisis is long in the making, a policy paralysis driven by years of government process without implementing a fix. There are clear, understandable and specific mitigation steps that should be taken immediately. The decisions California leaders make in the near future about this remote desert lake will determine whether this dismal scenario will be averted. The Commission urges the Natural Resources Agency to begin implementing shovel-ready projects and the Governor and Legislature to immediately begin planning and funding the next phase of Salton Sea projects while developing a long-term restoration plan.

This little-known lake and its ecosystem are in a downward spiral because of California's decreasing use of Colorado River water, more efficient use by farmers of their own water, and successful negotiation by urban water districts of water from the region. With its receding shoreline and often-impoverished surroundings, the lake has become a scene of grandiose but unfulfilled economic development and restoration visions, home to stakeholders long unable to compromise or cooperate and dependent on government agencies hesitant to accept responsibility for the growing difficulties.

The legal, scientific, economic, social and cultural issues are complicated, but have been fleshed out exhaustively over many years. Temporary fresh water transfers into the lake, agreed to in the 2003 Quantification Settlement Agreement (QSA), keep the current elevation levels from rapidly destabilizing. However, these water transfers end on December 31, 2017. When they do, deterioration of the lake will likely accelerate, raising prospects for blowing dust much like the storms at Owens Lake. The impacts will fall hardest on a region already contending with poor air quality and twice the rate of child asthma hospitalizations than elsewhere in California. Further, the region is home to high concentrations of senior citizens, who are vulnerable to poor air quality. The lake will become inhospitable to fish and then to 400 bird species that depend on this ecosystem with more than 90 percent of California's wetlands having vanished.

When California signed the QSA, it agreed to mitigate the impacts on the Salton Sea caused by the water transfers. The state clarified its intent to restore the sea through

the QSA's implementing legislation. Experts testified it would be tens of billions of dollars cheaper to mitigate the impacts of a shrinking sea up front than to deal with the adverse impacts of inaction.

Fulfilling California's commitment to the Salton Sea is an element of maintaining the terms of the QSA, which provides water security to many Californians. Continued inaction, and the consequent public health and environmental impacts, could undermine political support for the QSA. Further, in the larger picture, California's fulfillment of its commitments is critical to its ability to negotiate future difficult agreements.

Fortunately, there appears to be some momentum toward solutions. Stakeholders have publicly announced that they will accept a smaller lake than existed historically. The Imperial Irrigation District recently released a draft long-term restoration plan, while the Salton Sea Authority is currently working on a similar plan, due May 2016. Funding to build initial projects while the state develops a medium- and longer-term strategy is potentially available through Proposition 1, a water bond enacted by voters in 2014. Governor Brown has convened a Salton Sea Task Force that will develop recommendations related to projects, delivery and governance and has appointed an assistant secretary for Salton Sea policy to lead the work of the task force. The state, meanwhile, has funded and is preparing to break ground on a proof of concept restoration project, and is providing financial assistance to three other projects.

The Commission encourages the newly-appointed assistant secretary for Salton Sea policy to immediately begin working with the task force and stakeholders to expedite construction projects, policy recommendations and funding priorities to meet restoration goals. The Commission advises the Governor and the Legislature to explore new funding opportunities, including an option to transfer mitigation water to the Metropolitan Water District of Southern California in exchange for restoration funding, provided that the state can immediately begin restoration work to compensate. Finally, as stated earlier, the Commission urges the Governor and Legislature to immediately begin planning its next phase of Salton Sea projects while developing its long-term restoration plan. In accordance with its oversight responsibility, the Little Hoover Commission will hold a hearing in April 2016 to learn the progress the state has made in implementing the currently-permitted projects. The Commission also will request a briefing in August 2016 on the next phase of projects as well as the state's medium- and long-term restoration strategy.

California made a promise to restore the Salton Sea. Moreover, the state has an obligation to protect the health and safety of the Californians who live, work and play near the Salton Sea. It is the steward of the wildlife that is dependent on the ecosystem. The state does not have the luxury to ignore this issue indefinitely. It could await inevitable litigation from affected Californians with the potential enormous liabilities. Or the state can be proactive, accept the responsibilities with which it has been entrusted, and turn a potential environmental failure into a success story. Right now the state still has a window of opportunity to make that choice, but that window is steadily closing. To paraphrase the sentiment of so many stakeholders who testified before the Commission: The state knows what needs to be done. It just needs to do it.

The Commission, respectfully submitting these findings and recommendations, urges the Governor and the Legislature to ensure immediate action. The Commission looks forward to working with you toward a successful outcome.

Sincerely,



Loren Kaye
Vice Chairman

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Table of Contents

The Receding Salton Sea.....	1
Searching for a Solution.....	7
Conclusion and Recommendations.....	17
The Commission’s Study Process.....	21
Appendices & Notes.....	23
<i>Appendix A: Public Hearing Witnesses.....</i>	<i>25</i>
<i>Appendix B: Salton Sea Chronology.....</i>	<i>27</i>
<i>Appendix C: California Resources Agency 2007 Preferred Salton Sea Restoration Plan.....</i>	<i>35</i>
<i>Notes.....</i>	<i>41</i>

Table of Sidebars & Charts

Imperial Irrigation District Projections of Exposed Playa	2
Asthma Hospitalizations, Ages 0-17 Years: 2000 – 2013.....	3
The Big Burp.....	5
Fish and Game Code Section 2931.....	9
Salton Sea Advisory Committee Members for the Development of the California Resources Agency Preferred Alternative.....	10
Geothermal Energy.....	11
Dust Control Measures.....	12
An Emerging State Funding Priority.....	13
Financial Assistance Projects.....	14

The Receding Salton Sea

A public health catastrophe looms across Southern California with the impending demise of the Salton Sea. Threats to the annual \$2 billion Imperial Valley farm economy and \$6 billion Greater Palm Springs resort economy are no less dire due to lack of action and urgency by the State of California.¹

The problem is simple: The Salton Sea is shrinking. And this remote saltwater lake located an hour's drive south of Palm Springs will shrink faster beginning in 2018 due to changes in water delivery contracts resulting in diminishing freshwater inflows. Scientists and authorities say that without intervention, thousands of acres of newly-exposed lakebed will trigger dust storms and destroy the habitat of millions of migratory birds on the Pacific Flyway.

Today's Salton Sea is a modern apparition of at least five ancient lakes, forming in a geologic desert trough when a flooding Colorado River broke through diversion canals from 1905 to 1907. At approximately 35 miles long and 15 miles wide, it is California's largest lake, although it is much smaller than its ancestors that formed and evaporated over decades.

Following the flooding of the Salton Sink and creation of the lake, many expected the lake to evaporate again in a basin where summer temperatures routinely reach triple digits. But decades of agricultural runoff laden with salt and fertilizer from Imperial and Riverside counties has flowed into the sea, replenishing the water level. More than a century after its accidental creation, the Salton Sea is approximately 30 feet deep. Being well below sea level with no ability to drain away the salts or dilute them with a significant inflow of freshwater, the sea has steadily become saltier than the Pacific Ocean. Warnings have long abounded that this salinity buildup is intractable and will eventually destroy the lake's ability to sustain wildlife currently depending on it.

The receding lake also has become entangled in the politics of the largest farm-to-urban water transfer in the United States. To reduce California's demands on the Colorado River to its annual allotment of 4.4 million acre-feet (an acre-foot is 325,851 gallons), regional water districts and government agencies signed the 2003 Quantification Settlement Agreement (QSA), which provided for large-scale water transfers from the Imperial Irrigation District (IID) to other regions. Under the agreement,

“What has happened to the sea and what we can see as the future of the sea without significant intervention, the way I look at it, is an environmental travesty. I say that with 33 years in the air pollution business and nearly 18 years as the executive officer of the South Coast District. I don't use that term lightly.” –Dr. Barry

Wallerstein, Executive Officer, South Coast Air Quality Management District. April 28, 2015. Sacramento, CA. Testimony to the Commission.

**Imperial Irrigation District
Projections of Exposed
Playa**

Year	Acres of Exposed Playa
2017	7,184
2020	17,068
2023	29,890
2027	44,232
2030	50,797

Source: Kevin Kelley, General Manager, Imperial Irrigation District. March 18, 2015. Testimony to State Water Resources Control Board. Sacramento, CA.

IID, a public utility that provides water and power in Imperial and Riverside counties, agreed to sell part of its Colorado River allocation to the San Diego Water Authority and the Coachella Valley Water District for up to 75 years. This large-scale reallocation of water meant, however, that less water would flow into the Salton Sea from the Imperial Valley farms that drain their agricultural runoff into the lake, hastening its demise. Understanding the effect that a shrinking lake would have on the Salton Sea ecosystem and the surrounding community, parties to the QSA agreed that IID would deliver 800,000 acre-feet of Colorado River water into the Salton Sea between 2003 and 2017 to mitigate the QSA-related water transfers. The idea was to create a 15-year buffer period while the state developed and implemented a Salton Sea restoration plan. Local entities would pay \$30 million for restoration and the first \$133 million of mitigation costs to meet state and federal environmental requirements. The state would unconditionally cover the rest of the mitigation costs and, per accompanying legislation, restore the lake. The state has begun small “no-regrets” projects, meaning projects that will deliver net benefits no matter what else happens, with local and federal partners, but has selected no comprehensive plan for the long run. About half of the mitigation water has been discharged into the lake, with the other half set to be released by the close of 2017.

The mitigation water supplied by the Imperial Irrigation District only compensates the loss of water from the water transfers agreed to in the 2003 Quantification Settlement Agreement. There is no mitigation for the water that is no longer flowing into the sea due to irrigation efficiencies, non-QSA water transfers and California’s overall lower use of the Colorado River. However, while the sea is currently shrinking, the rate at which it shrinks is expected to increase by several factors once the flow of mitigation water ends after December 2017. The chart above shows IID’s projections for exposed lakebed – called playa – and the rapid increase of exposed playa following the end of the mitigation water.

Why it Matters to California

Inaction on the shrinking Salton Sea has enormous impact on public health, wildlife, water security and the regional economy:

Air Quality and Public Health

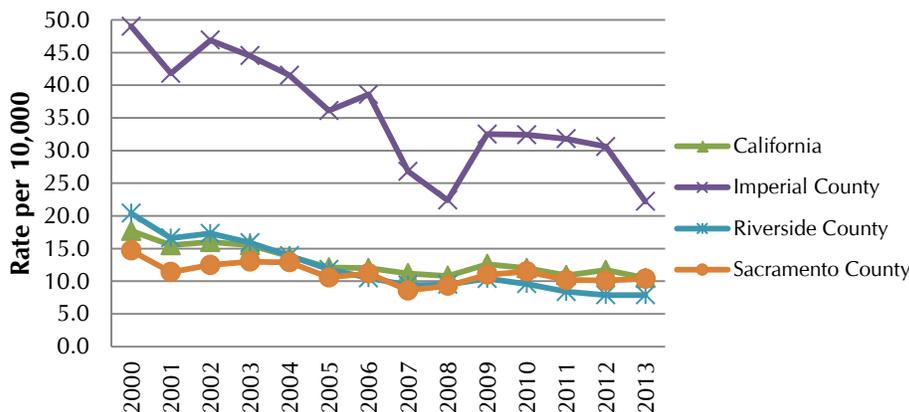
The exposed playa from the shrinking Salton Sea threatens public health through windborne dust. Especially worrisome is particulate matter less than 10 microns in diameter, known as PM₁₀ (approximately one-seventh

the thickness of the average human hair),² because it can evade respiratory defenses and be inhaled into the lungs.³ California Air Resources Board Chairman Mary Nichols testified that exposure to PM₁₀ can increase both the number and severity of asthma attacks, cause or aggravate bronchitis and other lung and cardiovascular diseases and reduce the body’s ability to fight infections. Children, the elderly, active adults and those suffering from asthma or bronchitis are particularly susceptible to the adverse effects of PM₁₀.⁴ Numerous studies have shown positive correlations between higher PM₁₀ exposures and premature death, Dr. Barry Wallerstein, executive officer of the South Coast Air Quality Management District, testified to the Commission.⁵

Also of concern is the question of what toxins the windborne dust will harbor. Imperial County Air Pollution Control Officer Brad Poiriez cited studies finding toxic substances, including arsenic, cadmium, copper, lead, molybdenum, nickel, selenium and zinc, in Salton Sea sediment.⁶

California’s most vulnerable residents will number among the hardest hit by these health hazards. Imperial County has a 25 percent unemployment rate. One in five residents lives in poverty, with nearly one in three children living in poverty.⁷ The air quality in Imperial County and Coachella Valley already is designated nonattainment for the federal 24-hour PM₁₀ standard.⁸ Hospitalization rates for asthma in the region are among the highest in the state, with regional asthma-related emergency room visits more than twice that of California as a whole, Chairman Nichols testified.⁹ The burden of asthma falls harder on the impoverished, testified Dr. Afshan Nuri Baig, chief medical officer of

Asthma Hospitalizations, Ages 0-17 Years: 2000-2013



Source: [As cited on kidsdata.org](http://kidsdata.org), Prepared by California Breathing, Environmental Health Investigations Branch, California Dept. of Public Health using data from the California Office of Statewide Health Planning and Development (OSHPD) Patient Discharge Database, the California Dept. of Finance, and the U.S. Census Bureau (Mar. 2015).



The Yuma subspecies of Ridgway's Rail (formerly known as the Yuma Clapper Rail) is an endangered marsh bird that relies on the Salton Sea ecosystem. Photo credit U.S. Bureau of Reclamation.

Clinicas de Salud del Pueblo, a nonprofit that provides medical and dental services to underserved populations in the Imperial and Coachella Valleys. In general, the prevalence of asthma does not differ greatly by income level, but the rate of asthma-related hospitalization and emergency visits are four times higher for people living in poor areas versus people living in wealthy areas. Lower household incomes and cost barriers to medical care are correlated to less well-controlled asthma.¹⁰

Michael Cohen, a senior researcher with the Pacific Institute, for many years has studied the costs associated with inaction on the Salton Sea. Failure to enact dust control measures, he testified, could result in public health costs from exposed playa emissions increasing from \$360 million in 2014 to \$1.4 billion in 2025 and to about \$2 billion per year after 2035.¹¹

Wildlife

If the status quo continues at the Salton Sea, the lake will not die, biologically speaking, but it will undergo such changes that it will no longer be useful to wildlife, testified Jack Crayon, an environmental scientist with the California Department of Fish and Wildlife.¹² Fish from the Colorado River arrived with the water when the lake was initially formed. With no outlet, the Salton Sea became increasingly saline as the salt-laden agricultural runoff evaporated. During the lake's heyday in the mid-20th century, the California Department of Fish and Game (now Department of Fish and Wildlife) stocked the lake with salt-tolerant fish from the Gulf of Mexico for sport fishing. Tilapia invaded the lake through the irrigation drains and thrived. By the early 2000s, however, the marine sport fish died off as salinity increased beyond ocean water levels.¹³ The remaining fish – predominately hardy tilapia – will die in five to seven years without action at the Salton Sea. Threats include salinity levels that are expected to triple by 2030, declining concentrations of dissolved oxygen and rising incidences of parasites and disease.¹⁴

The loss of the fish will have a devastating effect on the bird population that relies on the Salton Sea ecosystem. A critical stop on the Pacific Flyway, the Salton Sea provides habitat for more than 400 species of birds, approximately two-thirds of all bird species in the United States.¹⁵ It is the area of highest avian abundance and diversity in California and second in the United States.¹⁶ With more than 95 percent of California's wetlands destroyed,¹⁷ migratory birds on the Pacific Flyway have few other options to rest and feed.¹⁸

The receding lake will have other wildlife-related effects. Protected breeding and nesting grounds also will disappear as the lake shrinks,

allowing predators to reach former islands and isolated standing trees, known as snags, that previously were inaccessible by land.¹⁹ The Salton Sea already is home to periodic outbreaks of avian disease. As bird density increases near river entries into the sea due to lack of food elsewhere, transmission of disease could increase, further stressing the avian population.²⁰ The effect on wildlife by taking no action on the Salton Sea would be incalculable, wildlife experts told the Commission.

Water Security for Southern California

The Quantification Settlement Agreement that provides water security for so many urban Southern Californians stipulates that the water transfer agreements become invalid if all parties do not uphold their end of the deal. The State of California agreed to cover all environmental mitigation costs above an initial \$133 million supplied by local partners and, through implementing legislation, to restore the sea.

In November 2014, IID petitioned the State Water Resources Control Board to require the state to implement a Salton Sea solution. “IID ... does not seek to undo the many years of painstaking negotiations that were required to arrive at the delicate compromise the QSA parties struck. But the QSA must be implemented in its entirety - and that includes the restoration of the Salton Sea,” the IID petition stated. “The State has received the benefit of the QSA. It now must live up to its legal commitment to restore the Sea as part of the compromise that brought it that benefit.”²¹ Clearly, the state cannot allow the QSA to be unraveled. There is too much at stake for millions of Southern Californians who could lose long-negotiated sources of water. Further, fulfilling its commitment to the Salton Sea is critical to the state’s ability to be a credible party in future water negotiations.

Economic Effects

The collapse of the lake would have a devastating economic impact on an already economically vulnerable region. As discussed previously, Imperial County has a 25 percent unemployment rate, with a fifth of its population living below the poverty line.²² Valued at more than \$2 billion, agriculture is the county’s driving industry. Ninety percent of its farmland is located within

The Big Burp

“On Sunday September 9, 2012, a strong thunderstorm over the Salton Sea caused [hydrogen sulfide] odors to be released and transported to the northwest, across the Coachella Valley, through the Banning Pass and into the South Coast Air Basin. The odors also crossed through the mountain passes west of the Salton Sea and into the Temecula Valley.”

“The following day, the South Coast Air Quality Management District (SCAQMD) received over 235 complaints of sulfur and rotten egg type odors, some as far west as the San Fernando Valley. ... A Meteorological and modeling analyses confirmed the cause: a high-wind monsoonal front passing through the Salton Sea area.”

“The event served as a cautionary reminder that the Salton Sea, given the right conditions, can affect air quality for a majority of the South Coast, Mojave, and Salton Sea Basins.” –Excerpt from the testimony of Dr. Barry Wallerstein, Executive Officer, South Coast Air Quality Management District. April 28, 2015.



Owens Lake. Following the diversion of its water, the exposed playa of Owens Lake experienced severe dust storms, qualifying it as worst single source of dust pollution until dust mitigation measures were adopted. Photo credit: Brian Russell/Great Basin Unified Air Protection Control District.

the Imperial Valley, the northern edge of which fronts the lake. While the existing research is insufficient to make credible estimates of the impact of the shrinking lake on nearby agriculture, two potential threats loom for agriculture: increased salt dust could decrease crop yields and the micro-climate created by the sea could ebb, leaving neighboring fields without a buffer from the area's temperature extremes.²³

There are other economic effects. The decreasing air quality could lead the region to lose its transportation subsidies by no longer reaching federal air quality thresholds.²⁴ Dust could interfere with U.S. military operations in the area, such as Naval Air Facility El Centro, winter home of the Blue Angels.²⁵

Riverside County, bordering the sea to the north, would face similar economic losses. Agriculture in 2013 was valued at \$616 million in Coachella Valley alone.²⁶ Tourism accounts for one quarter of the jobs in the Coachella Valley. Already, recent declines in visits to the Salton Sea have resulted in \$6 million in annual losses in direct spending.²⁷ It is difficult to imagine the region's outdoor music festivals, such as Coachella and Stagecoach, drawing the crowds they currently do in the face of Owens Lake-style dust storms, nor the desert playgrounds remaining popular tourist destinations with the scent of hydrogen sulfide in the air. A 2015 Greater Palm Springs Convention and Visitors' Bureau study estimated a continually declining Salton Sea would cost the region between 1.7 billion and 8.6 billion dollars over the next five years, with a resulting loss in local and state tax revenue of \$712 million by 2019.²⁸ Pacific Institute researcher Michael Cohen estimated up to \$7 billion in losses to property values if the effects of the receding lake were not remediated.²⁹

Mary Resvaloso, Chairwoman of the Torres Martinez Desert Cahuilla Indians, testified to the profound negative impact the shrinking lake is having on her people. In 1909, the tribal nation was assigned 25,000 acres of land in the area it had historically inhabited. Much of it was under the newly-created Salton Sea. When the promise that the lake would evaporate and they would be able to use the land did not come to fruition, the tribal nation and the government developed land use plans compatible with the lake, which then were thwarted by the fluctuating shoreline. Their primary goal, Chairwoman Resvaloso testified, is to bring tribal members – long scattered about Southern California – back to their land to renew their cultural heritage and sense of identity. To accomplish that, she said, they need jobs. And for jobs, she said, they need a stable lake they can work with for economic development.³⁰

Searching for a Solution

Leaders have long understood the importance of the Salton Sea for regional agriculture and its role in sustaining wildlife. In 1924, President Coolidge set aside lands under the Salton Sea as a permanent drainage reservoir for agricultural and surface water runoff from the Imperial and Coachella valleys. In the midst of the Great Depression, President Hoover established the Salton Sea National Wildlife Refuge, known today as the Sonny Bono Salton Sea National Wildlife Refuge. In California, Governor Goodwin Knight created the Salton Sea State Park the same year Disneyland opened. In 1969, the U.S. Department of Interior and the California Natural Resources Agency (Resources Agency) publicly released their concerns about the Salton Sea's unstable elevation, salinity and mineral nutrients.³¹

Despite these early concerns about the Salton Sea, very little action was taken over the next several decades. The federal government authorized feasibility studies on maintaining the lake's elevation and lowering the salinity.³² In 1988, the State of California authorized a Salton Sea Task Force that was quickly dissolved due to lack of funding.³³ The 1990s brought more movement, including federal appropriations for salinity control studies. Local agencies formed the Salton Sea Authority in 1993 to direct and coordinate water quality improvement, elevation stability and enhance the recreational, economic and other beneficial capacities of the sea. In 2006, the U.S. Geological Survey (USGS) and U.S. Bureau of Reclamation (Reclamation) constructed shallow saline habitat ponds on the southern end of the Salton Sea to evaluate the ecological risk to birds from selenium in a blended water strategy. A detailed chronology, created by Reclamation, of Salton Sea events is located in Appendix B.

Start Small, Learn, Adapt and Scale Up: The Bureau of Reclamation's 2007 Suggestion

In September 2007, Reclamation released its assessment of potential actions for Salton Sea restoration, as required by the federal 2004 Water Supply Reliability and Environmental Improvement Act. Sifting through hundreds of ideas for viable plans, Reclamation ultimately evaluated five restoration alternatives, ranging from \$3.5 billion to \$14 billion with annual operations and maintenance costs ranging from \$119 million to \$235 million.³⁴ After a detailed analysis of the costs and risks associated

with each alternative, Reclamation concluded that it could not recommend any of the alternatives, writing:

“All five alternatives considered in this report entail extreme costs; and there are substantial uncertainties and risks associated with engineering, physical, and biological elements of the alternatives... a more detailed evaluation would not resolve the hydrologic and biologic uncertainties. Therefore, Reclamation does not have a basis for recommending implementation for any of the action alternatives considered in this report.”³⁵

Despite not recommending one of the alternatives, they did suggest an adaptive management study of saline habitat complexes that could feasibly replace historic wildlife use of the sea.³⁶ The idea would be to develop, study and monitor sections of habitat in a phased approach, updating engineering designs and wildlife management criteria based on lessons learned from the previous phase.³⁷ “Development of adaptive and flexible strategies would reduce risks and uncertainties associated with operating larger complexes,” Reclamation wrote.³⁸ The first phase of the proposed project could be based on the lessons learned from the shallow habitat pilot project. (This pilot program had been established the year before and was ultimately assessed to be a viable wetland restoration alternative.)³⁹ Implementation of the proposed project was estimated to cost \$150 million initially, increasing to \$3.4 billion as the project scaled up from 2,000 to 60,000 acres. Similarly, annual operations and maintenance costs were estimated to begin at \$600,000 and to increase to \$3.5 million as the project scaled up.⁴⁰

The start small and scale up approach proposed by Reclamation was a stark contrast to the restoration plan released by the California Natural Resources Agency in May 2007. This agency plan assessed different alternatives and combined elements from several to create an \$8.9 billion preferred alternative, a plan so “bloated, expensive and unreasonable,” as one witness described it, that when it was released, stakeholders worried it would become a barrier to restoration.⁴¹ Their fears quickly proved to be justified.

The Process to Develop the California Natural Resources Agency’s Preferred Alternative

When the Quantification Settlement Agreement (QSA) was signed in 2003, related bills, SB 317 (Kuehl, 2003) and SB 1214 (Kuehl, 2004), required the Resources Agency to conduct a study to find the preferred alternative to restore the Salton Sea. Codified into Fish and Game Code Sections 2081.7 and 2931, the legislation also required the study to

include “at least one most cost-effective, technically feasible alternative.”⁴² The advisory committee convened by the Resources Agency (members are listed in the sidebar on page 10) considered eight alternatives plus a no-action alternative.

The most cost-effective, technically feasible alternative was determined to be Alternative 2, a 75,000-acre saline habitat complex with brine recirculation and air quality management measures. It was estimated to cost \$3.3 billion and require \$107 million annually for operations and maintenance.⁴³ It was not, however, selected as the preferred alternative because there were concerns that it did not meet one of the legislative criteria for restoration. The Resources Agency wrote in its Final Programmatic Environmental Impact Report:

“Although Alternative 2 would provide diversity of fish and wildlife similar to those that currently exist at the Salton Sea, Alternative 2 may not fully meet the legislative objective “historic levels and diversity of fish and wildlife” because it does not contain a marine waterbody as has historically existed at the Salton Sea.”⁴⁴

The most cost-effective, technically feasible alternative that definitely met the objective of “historic levels” was determined to be Alternative 5, which included a 62,000-acre marine sea in the northern part of the lake, 45,000 acres of saline habitat complex in the southern part and air quality management measures.⁴⁵ It was estimated to cost \$4.5 billion with \$134 million annually in operations and maintenance.⁴⁶

Alternative 5 was not selected as the preferred alternative either. In addition to the legislative criteria for a preferred alternative, the 32-member Salton Sea Advisory Committee and members of the public added additional criteria for what would be necessary in the preferred alternative. These included saline habitat complexes along the northern shore, a marine sea along recreational areas and the southern shore and areas for geothermal development, among others.⁴⁷

Fish and Game Code Section 2931

- (a) It is the intent of the Legislature that the State of California undertake the restoration of the Salton Sea ecosystem and the permanent protection of the wildlife dependent on that ecosystem.
- (b) This restoration shall be based on the preferred alternative developed as a result of the restoration study and alternative selection process described in Section 2081.7 and using the funds made available in accordance with that section to be deposited in the Salton Sea Restoration Fund and other funds made available by the Legislature and the federal government.
- (c) The preferred alternative shall provide the maximum feasible attainment of the following objectives:
 - (1). Restoration of long-term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Salton Sea.
 - (2). Elimination of air quality impacts from the restoration projects.
 - (3). Protection of water quality.
- (d) For the purpose of the restoration plan, the Salton Sea ecosystem shall include, but is not limited to, the Salton Sea, the agricultural lands surrounding the Salton Sea, and the tributaries and drains within the Imperial and Coachella Valleys that deliver water to the Salton Sea.

**Salton Sea Advisory
Committee Members for
the Development of the
California Natural
Resources Agency
Preferred Alternative,
2004 - 2007**

Federal Members

- Bureau of Indian Affairs
- Bureau of Reclamation
- Environmental Protection Agency
- Fish and Wildlife Service
- Geological Survey

Tribal Governments

- Cabazon Band of Mission Indians
- Torres Martinez Desert Cahuilla Indians

State Bodies

- California Air Resources Board
- Colorado River Basin Regional Water Quality Control Board
- State Water Resources Control Board

Regional and Local Agencies

- Coachella Valley Association of Governments
- Coachella Valley Water District
- County of Imperial
- County of Riverside
- Imperial County Air Pollution Control District
- Imperial Irrigation District
- Imperial Valley Association of Governments
- Metropolitan Water District of Southern California
- San Diego County Water Authority
- South Coast Air Quality Management District

Nongovernmental Organizations

- Audubon California
- CalEnergy Operating Corporation
- California Farm Bureau Federation
- California Waterfowl Association
- Citizens Congressional Task Force on the New River
- Defenders of Wildlife
- Imperial County Farm Bureau
- Pacific Institute
- Planning and Conservation League
- Riverside County Farm Bureau
- Sierra Club
- United Anglers of Southern California

Dead on Arrival: A \$9 Billion Distraction

The preferred alternative, attached to this report along with descriptions of its features in Appendix C, was not one of the plans studied during the review process. Instead, it was a combination of features from several different plans.⁴⁸ It included saline habitat complexes on both ends of the lake, a marine sea bordering roughly two-thirds of the shoreline, air quality management facilities, a brine sink for discharge of salts, conveyance facilities, sedimentation/distribution facilities, early start habitat and an exclusion area for geothermal development.⁴⁹ The report presenting the preferred alternative hailed itself as the first Salton Sea restoration plan in 20 years of studying solutions that a majority of stakeholders could accept.⁵⁰ It also came with an \$8.9 billion price tag, an estimated \$142 million for annual operations and maintenance costs and no way to pay for it.

The plan identified only \$67 million in funds available for restoration. This included \$20 million in the Salton Sea Restoration Fund created by SB 277 (Ducheny, 2003) and \$47 million in 2006 Proposition 84 bond money. To fill the \$8.83 billion deficit, not including operations and maintenance, the report suggested creating a Salton Sea Infrastructure Finance District. The Salton Sea Authority, through legislation in 1999, had received authority to create a special district to collect tax increment revenue to fund restoration projects. The report also suggested that revenue for restoration could be raised through unspecified federal funding sources, user fees and other local agency funds, including bonds and public-private partnerships.⁵¹

The report was as sparse on governance details as it was on paying for the preferred alternative, stating, "There are federal, local and state interests involved in Salton Sea restoration," and that a consortium would be needed for effective implementation.⁵² It noted that many different agencies at different levels of government had responsibilities for actions that occur at the Salton Sea, and that any governing body established should be open to the public.⁵³ The financial obstacles and vagueness about implementation and governance make it easy, in hindsight, to see why some stakeholders considered the \$8.9 billion plan dead on arrival.⁵⁴ The start of the Great Recession six months after the release of the final Programmatic Environmental Impact Report was the final nail in the coffin.

A key factor that drove the escalation of the preferred alternative's infrastructure complexity and cost was the desire of the Salton Sea Authority and local interests to return the Salton Sea to the star-studded resort destination it was in its heyday.⁵⁵ These solutions, Kimberly Delfino, California Program Director for Defenders of Wildlife testified, focused on "freshening" up the lake's water to return it to more of a marine environment for fish. They also focused on stabilizing the shoreline for development along its shores and building dams or other large infrastructure to create a recreational lake for fishing and other water sports.⁵⁶

The California in which the Salton Sea existed in the 1940s, 1950s and 1960s is not the California in which it exists today. A 1968 promotional video enticing city dwellers to buy property in the "Salton Riviera" advertises an abundance of water. Water for home use. Water for agriculture. "And naturally," the narrator enthuses, "water for golf courses."⁵⁷ The glory days of the Salton Sea were fed by bounteous agricultural runoff in an era when no one seriously questioned California's overuse of the Colorado River, before large portions of Imperial Valley's water were redirected to urban users and when less-efficient irrigation practices were used than exist today.

Refusal to acknowledge the changing conditions around the Salton Sea hampered development of a more affordable, realistic plan. If the Salton Sea's elevation could not be maintained through agricultural drainage as it had historically, many reasoned, it could be maintained through other sources of water. Proposals to import water from the Sea of Cortés and the Pacific Ocean abounded. Reclamation studied the Sea of Cortés option in the early 2000s and concluded it had low feasibility, partly due to costs estimated to run between \$15 billion and \$38 billion, Ms. Delfino testified. The Resources Agency examined the idea and abandoned it for being too costly. The Salton Sea Authority considered it and reported it too impractical.⁵⁸ And yet, the idea persists. Individuals and groups continue to offer their ideas – and request taxpayer-funded grants to refine their proposals – on recreating the Salton Riviera of a bygone era.

Geothermal Energy

The Salton Sea contains abundant geothermal energy potential. There are 10 geothermal power plants near the lake that, combined, generate more than 300 megawatts of energy, enough to instantaneously power more than 200,000 homes. Estimates of potential for geothermal production at the Salton Sea range between 1,750 and 3,400 megawatts. Geothermal energy represents a way to cover exposed playa while potentially creating revenue for additional mitigation projects or economic development.

Geothermal energy production at the Salton Sea faces some challenges, however. Initial start-up costs can be high. A transmission line needs to be built to export the energy to areas of demand, at a cost estimated between \$2 million and \$4 million per mile for 150 miles. Additionally, geothermal energy is more expensive than other types of energy currently available, such as natural gas, so utilities do not have an incentive to purchase this resource.

Efforts are underway to overcome these challenges and develop the Salton Sea's geothermal energy potential. The Salton Sea Authority is working with the National Renewable Energy Lab to study the feasibility of renewable energy development at the Salton Sea. Imperial County and the Imperial Irrigation District released a draft Salton Sea Restoration and Renewable Energy Initiative framework document in July 2015, in which the development of geothermal energy figures prominently.

Sources: Dudek for Imperial Irrigation District and County of Imperial. July 2015. "Draft Salton Sea Restoration and Renewable Energy Initiative Framework." Also, Tetra Tech for Salton Sea Authority. June 2015. "Salton Sea Funding and Feasibility Action Plan: Benchmark 3: Evaluation of Alternatives with Respect to Existing Conditions." Also, Kimberly Delfino, California Program Director, Defenders of Wildlife. June 25, 2015. Written testimony to the Commission. Also, Benjamin Matek and Karl Gawell, Geothermal Energy Association. February 2014. "Report on the State of Geothermal Energy in California." Also, California Independent System Operator. "California ISO Glossary." Accessed June 5, 2015.

After the Preferred Alternative

While some stakeholders seemed to want too much for the Salton Sea, state government seemed to want nothing to do with it at all. The Quantification Settlement Agreement, signed after the recall election of Governor Gray Davis but before Governor Arnold Schwarzenegger was inaugurated, put California on the hook for a blank check for the Salton Sea by an administration that would never be held accountable for it. The result was inaction.

Following the release of the Resources Agency's preferred alternative, State Senator Denise Ducheny spent more than two years working with stakeholders to create a governance structure that could implement a restoration plan.⁵⁹ In 2010, the Legislature passed and Governor Schwarzenegger signed Senator Ducheny's bill, SB 51, which created a Salton Sea Restoration Council within the California Natural Resources Agency. The legislation called on the 16-member council to oversee restoration activity, evaluate plans and recommend a solution by 2013. Facing staffing and financial challenges in the midst of the recession, the Department of Fish and Wildlife never staffed the council. Two years later, reorganization legislation proposed by Governor Jerry Brown and enacted by the Legislature eliminated the council before it had ever met. Subsequently, responsibility for Salton Sea restoration was transferred to the regional Salton Sea Authority with oversight from the Resources Agency.⁶⁰

Dust Control Measures

Not all air quality projects are high tech and costly. The Imperial Irrigation District shared with the Commission a spectrum of techniques that potentially could be used to control dust. In addition to larger projects, such as habitat restoration, reclamation of agricultural land and energy generation, these measures can include:

- **Surface Stabilizers.** These are usually applied topically and control dust by changing the physical properties of the soil surface. Surface stabilizers can take the form of water, mulch and fiber mixtures and salt and brines, among many others.
- **Vegetated Swales.** These are vegetated, earthen channels constructed by raising pairs of parallel berms, resulting in reduced wind velocity at the soil surface and suppression of sand and dust emissions. Swales capture and trap sand beneath the plant canopy.
- **Plant Community Enhancement.** As the sea recedes, existing plant communities can be expanded onto newly exposed playa.
- **Moat and Row.** This consists of earthen berms flanked on both sides by ditches. It captures moving soil particles and the berms shelter downwind playa, reducing wind velocity at the soil's surface.
- **Water-Efficient Vegetation.** Vegetation can be seeded or planted on raised beds and controls dust by stabilizing and suppressing soil and sand movement between the vegetation canopy.
- **Tillage.** This involves roughening the land surface, which then is less susceptible to erosion due to the boundary layer of moving air being lifted further above the land surface and the capture of mobile sand within the furrows created by the roughened surface. Tillage is a low-cost technique relative to other options.

Source: Bruce Wilcox, Manager, Environmental and Salton Sea Programs, Imperial Irrigation District and Jessica Lovecchio, Environmental Specialist, Imperial Irrigation District. July 21, 2015. Communication with Commission staff.

In the meantime, the Metropolitan Water District of Southern California (MWD) tried to bring the state's attention to a legal provision that would allow it to purchase water it needed and create an alternative source of restoration funding. In the early 2000s, MWD Colorado River Resources Manager Bill Hasencamp testified, California was interested in potential new sources of funding. Legislation, subsequently codified into Fish and Game Code 2081.7(c), allowed for three types of water sales to MWD that would fund Salton Sea restoration. Two of those options are currently not applicable.⁶¹ A third option, however, would allow the Imperial Irrigation District to transfer the fresh water originally intended for Salton Sea mitigation to the Department of Water Resources (DWR), which would then sell the water to MWD. Since the diversion of the mitigation water would speed up the lake's deterioration, the proceeds from the sale would be used for Salton Sea restoration.⁶² As of June 2015, two and a half years before the mitigation water ceases, approximately half – 390,000 acre feet out of a total 800,000 acre feet – of the scheduled mitigation water could still be transferred to MWD, generating, Mr. Hasencamp testified, more than \$120 million.⁶³

Though there remains a small window of opportunity for the state to take advantage of this legal provision to procure some Salton Sea funding, the period in which it would have been most beneficial has passed. A state official testified to the Commission that the water sale option only would have worked if they were able to immediately implement projects to compensate for the decrease of water flowing into the lake.⁶⁴ While his assessment is correct, the history of inaction once again bred more inaction.

A Turnaround

After so many years of inaction, there are signs that the state is beginning to prioritize the Salton Sea. It has granted money for small, no-regrets restoration activities. This includes the Species Conservation Habitat (SCH) program and three financial assistance projects. The combined cost is about \$30 million, most from 2006 Proposition 84 bond funds. An underlying goal of each project is to provide air quality

An Emerging State Funding Priority

The state has spent approximately \$13 million in bond funds on the Salton Sea since FY 2010. These funds have gone to the design of the Species Conservation Habitat project, studies of Salton Sea fish and wildlife, environmental document review and contract development and oversight. These funds also are being used as grants to pay for restoration projects as part of the Financial Assistance Project. Additionally, the California Natural Resources Agency has awarded \$2 million of non-bond funds to the Salton Sea Authority so it could contract for the Salton Sea Funding and Feasibility Action Plan, a restoration study occurring from 2014 to 2016 focused on promoting the environment, wildlife protection and economic development within fiscal realities.

Sources: California State Auditor. November 2013. "Salton Sea Restoration Fund." Report 2013-101. Pages 33-34. Also, Keali'i Bright, Deputy Secretary for Legislative Affairs, California Natural Resources Agency. July 30, 2015. Communication with Commission staff.

Financial Assistance Projects

The financial assistance projects under the umbrella of the SCH program include the following programs. By covering exposed playa, each of these projects also will protect air quality:

Torres Martinez Tribe Wetlands / Geotube Tribal Project. This project encompasses two phases, the first to build 70 acres of wetlands to protect habitat and the second to test the use of Geotubes to build in the wetted parts of the lake, which could be used to facilitate development of geothermal capability. With approximately \$1.1 million in state funding, the project should begin construction by the end of 2015 and is scheduled for completion in the second quarter of 2016.

Salton Sea Water Habitat Project. This pilot project uses low-pressure geothermal energy in solar ponds to reclaim hyper-saline water and create sustainable habitat for fish. The project, with \$693,000 in state funding, is currently in the permitting phase and is expected to be completed in the second quarter of 2017.

Red Hill Bay Project. This pilot project will create saline shallow bird habitat by mixing relatively fresh Alamo River water with Salton Sea water. The state is providing about \$1.2 million for the project, which is expected to be completed in the second quarter of 2016.

Sources: Keali'i Bright, Deputy Secretary for Legislation, California Natural Resources Agency. June 25, 2015. Written testimony to the Commission. Also, Vivien Maisonneuve, Senior Environmental Scientist, California Department of Water Resources. March 18, 2015. Sacramento, CA. Presentation to the State Water Resources Control Board.

assistance to the region. The SCH is a partnership of state, local and federal agencies to create a series of aquatic habitat cells near the New River at the south end of the lake and manage them for ecological benefits along the receding shoreline. This project is considered a proof of concept, meaning that the partners plan to learn from this pilot in order to implement larger-scale restoration efforts in the future. While the project has been permitted for 3,700 acres, current funding exists to develop just 640 acres. Groundbreaking is expected to begin near the end of 2015, with construction estimated to last approximately one year.⁶⁵

There are other encouraging signs. Proposition 1, enacted by voters in 2014, includes \$475 million to be used for state water obligations, which include the Salton Sea. Governor Brown highlighted Salton Sea restoration in his revised FY 2015-16 budget, pledging to begin construction of already-developed short-term plans and, working with stakeholders, devise achievable medium- and long-term plans for restoration.⁶⁶ Simultaneously, Governor Brown has created a Salton Sea Task Force comprising lead staff from the Resources Agency, Department of Fish and Wildlife, Department of Water Resources, Energy Commission, CalEPA, California Air Resources Board and the State Water Resources Control Board to meet with stakeholders and develop recommendations related to projects, delivery and governance.⁶⁷ In September 2015, he appointed an assistant secretary for Salton Sea policy within the Resources Agency to lead the work of the task force.

Perhaps most importantly, for the first time since the signing of the Quantification Settlement Agreement, the major players appear to be reaching a consensus on the future of the Salton Sea and are cooperating with one another. Parties are closing ranks around the idea of implementing incremental proof-of-concept projects, much like the approach Reclamation suggested in 2007. For the first time, the local entities agree that the lake will be smaller than it was historically and have publicly announced they will live with that.⁶⁸ The Salton Sea Authority has engaged consulting firm Tetra Tech to study long-term solutions within the context of today's realities in both water availability and finances.⁶⁹ A final report is due in May 2016. In February 2015, IID and Imperial County resolved their long-standing legal battles and a

month later, appeared before the State Water Resources Control Board to urge action on the Salton Sea. At the federal level, in 2014 the Department of the Interior signed an MOU with the Salton Sea Authority to facilitate collaboration and exchange of technical and scientific information regarding the resources of the Salton Sea.⁷⁰ The federal government has indicated a willingness to partner with the state, but the state must take the lead. The State of California is starting to put savvy Salton Sea experts who know how to create movement in key positions. It has hired a staff member with extensive Salton Sea experience from U.S. Senator Barbara Boxer's office to be the Resources Agency's assistant secretary for federal water policy. Additionally, the state has hired an experienced staff member from the Salton Sea Authority and IID to be the Resources Agency's assistant secretary for Salton Sea Policy.

Forward Momentum Not Guaranteed

There appears to be growing forward momentum on the Salton Sea, but it is fragile. The Proposition 1 funding is not guaranteed for the Salton Sea; it is only one of several projects competing for the \$475 million. The Salton Sea Task Force has no timeline or deliverables. Creating a task force does not automatically guarantee success: one need only look at the 2007-era Salton Sea Advisory Committee, listed in the box on page 10, to see that good intentions without effective leadership supported by a responsive administration to direct the process, focus stakeholders and be held accountable for results can produce ineffectual outcomes. Local agencies have influential stakeholders who are opposed to any solution short of a return to the Salton Sea's glory days. Federal funding is often directed to other projects with established project plans, benchmarks and measureable outcomes. The federal MOU with the Salton Sea Authority indicates its interest in the Salton Sea, but federal priorities may change when the administration does. Senator Boxer will leave Congress in January 2017 and the lake will lose one of its staunchest champions at the federal level. The Salton Sea currently is at a crossroads. It is up to California's policymakers to lead the state down a path of action.

Conclusion and Recommendations

A running theme throughout the Commission’s study process suggested that if the Salton Sea were in the San Francisco Bay, the problem would have been solved long ago. Sitting in an isolated, poverty-ridden part of the state, with few friends politically, the Salton Sea remains out of sight and out of mind for many policymakers.

One thing is clear: The state must take immediate action on the Salton Sea. The threats to Californians’ health, the wildlife that depends on the ecosystem and to Southern California’s water security are real and significant.

The State Urgently Needs a Dedicated Leader for Salton Sea Restoration

After years of inaction, infighting and lawsuits, there finally appears to be forward momentum on Salton Sea restoration. Parties are finally accepting the idea of a smaller lake and incremental solutions. Long-term restoration plans finally are being studied within the context of feasibility and affordability.

It is an encouraging sign that the Governor has convened a task force to meet with stakeholders and advise him on short-, medium- and long-term recommendations for projects, delivery and governance. Additionally, the Commission commends the Governor for his September 2, 2015, appointment of an assistant secretary for Salton Sea policy to lead the work of the task force and manage expedited construction of projects that protect wildlife and air quality at the Salton Sea. The state has long needed a strong decision-maker who will be accountable for the Salton Sea and who will channel communication and cooperation back from the Governor’s office to the local stakeholders, as well as build and strengthen relationships with the federal government, tribal nations, local agencies and nearby residents.

Disparate interests and desires have proved to be one of the greatest impediments to a long-term restoration plan. Planning officials who have tried to make everyone happy ultimately have satisfied no one. Interests and desires inevitably will collide again, despite newfound cooperation and agreement. To prevent roadblocks from stopping progress as in the

“Everyone knows what needs to get done. They need to write it down, meet with the Governor, get the recommendations out. The saline habitat project has been permitted. \$30 million has been appropriated. They need to start moving the dirt now... Make the recommendations and hire someone with the responsibility to do it and make them do it.”

–Kimberly Delfino, California Program Director, Defenders of Wildlife. June 25, 2015. Sacramento, CA. Testimony to the Commission.

past, the assistant secretary for Salton Sea policy should build stakeholder consensus within realistic constraints in a timely manner when possible, and swiftly develop policy recommendations to aid the Governor in making difficult decisions when consensus cannot be reached.

The assistant secretary for Salton Sea policy also should identify funding opportunities for Salton Sea restoration. This includes organizing to apply for Proposition 1 funding, working with federal officials to pursue federal funding opportunities and exploring private sector opportunities and other funding possibilities.

One funding option the state should use is the option to transfer mitigation water to the Department of Water Resources, which would sell the water to the Metropolitan Water District of Southern California for Salton Sea restoration funds. This should only be done, however, if restoration projects can be immediately implemented to compensate for the loss of mitigation water flowing into the lake. There is more revenue available through this option than any other source currently available, except for an unknown amount of funding that potentially could be awarded to the Salton Sea Restoration Fund through Proposition 1. The state must act immediately if it is to take advantage of this option.

Finally, the deterioration of the sea will escalate rapidly once the mitigation water ceases at the close of 2017, or sooner if the state exercises its option to sell the water to the Metropolitan Water District of Southern California. The assistant secretary for Salton Sea policy should work with the administration and the Legislature, as well as local and federal officials, to determine where bureaucratic red tape could be cut to expedite the permitting and implementation of restoration projects.

Get Shovels in the Ground, Now

Since 2013, the state has had 640 acres of available habitat already permitted and funded. It should begin construction on those projects immediately. Additionally, it should be planning and developing funding for second-phase projects. The Little Hoover Commission will hold a follow-up hearing in April 2016 to learn about the progress the state has made in these activities. Specifically, the Commission will be interested in learning about:

- Progress on the Species Habitat Complex;
- Progress on the Financial Assistance Projects;

- Funding options for next steps on Salton Sea restoration, including bond money; federal, state and local partnerships; the Metropolitan Water District option as well as other possibilities.

As state and local officials, scientists, researchers and other stakeholders acknowledged in Commission hearings, medium- and long-term planning must occur while the state is implementing near-term solutions. The Salton Sea Authority has contracted with Tetra Tech on a study about a long-term plan, with the final report due by May 16, 2016. The Little Hoover Commission requests that the Resources Agency share its medium- and long-term strategy for the Salton Sea in an August 2016 briefing. These strategies should include measureable benchmarks and outcomes and require regular reporting on restoration progress.

Be Proactive, Not Reactive

Stories of terminal salt lakes often do not end well. California has an opportunity with the Salton Sea to achieve a profound environmental win. So often the state is criticized for being reactive instead of proactive. Here, although the state is arriving late to the game, it still has a chance to positively influence the outcome. California can still turn the Salton Sea into a success story if it acts immediately and decisively, if it prioritizes its most important goals instead of trying to make the lake all things to all people. But it has to act now. California owes swift action to the vulnerable residents of the Imperial and Coachella valleys. It owes swift action to the wildlife it is supposed to protect. It owes swift action to the millions of people whose water security may otherwise be negatively affected. And it owes swift action to the taxpayers statewide who would pay so much more to clean up the mess of a neglected Salton Sea than they would to prevent the problems in the first place. The Salton Sea can either become a disaster or the model for overcoming environmental challenges. The Little Hoover Commission urges the Governor and the Legislature to choose a winning outcome.

Recommendations

Recommendation 1: As the state authority accountable for Salton Sea restoration, the newly-appointed assistant secretary for Salton Sea policy should immediately begin leading the Salton Sea Task Force, coordinating with stakeholders at all levels inside and outside of government, advising the Governor on policy recommendations, leading efforts to develop funding opportunities for Salton Sea restoration and working with officials to cut red tape to expedite restoration projects.

Recommendation 2: Assuming that the state can implement restoration projects to compensate, the Administration should exercise its option for the Imperial Irrigation District to transfer Salton Sea mitigation water to the Department of Water Resources for sale to the Metropolitan Water District of Southern California in order to provide initial funding for a portion of Salton Sea restoration.

Recommendation 3: The state should begin construction on the restoration projects that are already permitted and funded. It should begin planning and developing funding for a second phase of projects consistent with its goals for the Salton Sea. Both of these should include measurable benchmarks and outcomes. Additionally, the California Natural Resources Agency, in conjunction with other stakeholders, should develop a medium- and long-term restoration plan with measurable benchmarks, outcomes and regular reporting on restoration progress.

- The Legislature should work with the California Natural Resources Agency in developing a funding plan for short-, medium- and long-term restoration solutions.***
- The Little Hoover Commission will hold a hearing in April 2016 to learn the progress the state has made in implementing currently-permitted projects.***
- The Little Hoover Commission will request a briefing by state officials in August 2016 about the next phase of projects as well as the state's medium- and long-term strategies for the Salton Sea.***

The Commission's Study Process

The Little Hoover Commission began its Salton Sea study in April 2015. The findings and recommendations in this report are based on the oral and written testimony presented in two public hearings and a site visit, as well as staff research, public comments and interviews with experts and stakeholders from federal, state and local government, academia, the nonprofit and private sector and the communities surrounding the Salton Sea.

The Commission began its study by visiting the Salton Sea on April 27, 2015. This visit served as an introduction to the Salton Sea and the environmental, economic and social problems surrounding the shrinking lake. Officials and subject matter experts from more than 15 local, state and federal agencies, academia and stakeholder groups accompanied the Commissioners, as well as staff members from Congressional and Assemblymember offices and members of the media. Commissioners visited a Cal Energy geothermal facility, the Coachella Valley Canal, Mountain View Estates, North Shore Yacht Club, Red Hill Bay, the Salton Sea State Recreation Area and managed wetlands within the Salton Sea ecosystem.

The Commission held its first hearing on the topic in Palm Desert on April 28, 2015. This hearing focused on the local perspective, with witnesses representing Riverside and Imperial counties, the Torres Martinez Desert Cahuilla Indians, local water and irrigation agencies, public health and the environment. Witness testimony described the underlying water and political issues and highlighted potential environmental and public health impacts. The hearing also revealed frustration with perceived state inaction on the Salton Sea. The Commission also learned about regional hopes for the sea's future and economic development visions.

The Commission's second hearing on the topic, in Sacramento on June 25, 2015, considered the larger state and global perspective on the problems surrounding the receding Salton Sea. Witnesses described significant issues and complications of managing the environmental and health challenges and explained why progress has been slow on the Salton Sea. Commissioners also heard about lessons learned from similar environmental challenges in California, including Owens and Mono lakes.

Throughout this study, the Commission has benefited enormously from the expertise of scientists, researchers, public health experts, administrators, officials from every level of government, community organizers, journalists, entrepreneurs, local residents and concerned citizens. All gave generously of their time and assistance, providing great value to the Commission. The findings and recommendations, however, are the Commission's own.

Appendices & Notes

- ✓ ***Public Hearing Witnesses***
- ✓ ***Salton Sea Chronology***
- ✓ ***2007 Preferred Alternative***
- ✓ ***Notes***

Appendix A

Public Hearing Witnesses

The lists below reflect the titles and positions of witnesses at the time of the hearings in 2015.

***Public Hearing on the Salton Sea: The Local Perspective
April 28, 2015
Palm Desert, California***

Afshan Nuri Baig, Chief Medical Officer,
Clinicas de Salud del Pueblo

Kevin Kelley, General Manager, Imperial
Irrigation District

John Benoit, Supervisor, Riverside County

Peter Nelson, Director, Coachella Valley Water
District

Ralph Cordova, County Executive Officer,
Imperial County

Bradley Poiriez, Air Pollution Control Officer,
Imperial County Air Pollution Control District

Jack Crayon, Environmental Scientist,
California Department of Fish and Wildlife

Mary Resvaloso, Tribal Chairwoman, Torres
Martinez Desert Cahuilla Indians

Robert Hargreaves, General Counsel for the
Salton Sea Authority, Best Best & Krieger LLP

Barry Wallerstein, Executive Officer, South
Coast Air Quality Management District

Bradley Herrema, Special Counsel for the San
Diego County Water Authority, Brownstein
Hyatt Farber Shreck

***Public Hearing on the Salton Sea: The State and Nongovernmental Perspective
June 25, 2015
Sacramento, California***

Timothy Bradley, Director, Salton Sea
Initiative, University of California, Irvine

Kimberly Delfino, California Program Director,
Defenders of Wildlife

Keali'i Bright, Deputy Secretary for Legislation,
California Natural Resources Agency

William Hasencamp, Manager, Colorado River
Resources, Metropolitan Water District of
Southern California

Michael Cohen, Senior Research Associate, The
Pacific Institute

Mary Nichols, Chairman, California Air
Resources Board

Appendix B

Salton Sea Chronology

Created by the U.S. Bureau of Reclamation from the California Natural Resources Salton Sea Restoration Project. This is a living document; please contact the U.S. Bureau of Reclamation Lower Colorado Region Resources Management Office for the most recent version.

Year	Events
10,000 BC <i>(Approx)</i>	First recorded human habitation in the Salton Basin.
700 AD <i>(Flood!)</i>	Lake Cahuilla is formed in the Salton Basin when the Colorado River silts up its outlet to the Gulf of California and swings northward. Lake Cahuilla is subject to multiple wet and dry cycles over intervening years.
1500 <i>(Flood!)</i>	Large inflow of the Colorado River water fills Lake Cahuilla to create a waterbody 6 times the size of the current Salton Sea. (The calcareous water line remains visible on the northwest mountains in the present day).
1840-1891	Multiple flood events from the Colorado River are recorded in the Salton Basin forming ephemeral lakes up to 100,000 acres.
1876	Executive Order of May 15, 1876, establishes the Torres Martinez Desert Cahuilla Indian Reservation with a grant of 640 acres (Torres Martinez Compact, 2003).
1891	Executive Order of December 19, 1891, pursuant to the Mission Indian Relief Act of 1891, expands the Torres Martinez Desert Cahuilla Indian Reservation approximately 12,000 acres on the northern side of the Salton Basin.
1892	New Liverpool Salt Company mines salt from a salt marsh centered west of the railroad station named "Salton".
1901	California Development Company is contracted by a private entity to build a canal (the Alamo Canal) to deliver water by gravity flow from the Colorado River to irrigate the Imperial Valley.
1904	Silt blocks the Alamo Canal, preventing it from supplying water to the Imperial Valley.
1905 <i>(Flood!)</i>	Temporary diversion of the Colorado River to replace water from the blocked Alamo Canal is breached by a series of floods. Colorado River changes course into the Salton Basin.
1906	The present day Salton Sea is created in the Salton Basin after a series of exceptional winter floods. Prior to the flooding, the Salton Sea surface elevation is estimated at 240 feet below sea level (Carpelan, 1958).
1907	Southern Pacific Railroad repairs the breach and the Colorado River ceases to flow into the Salton Sea. The United States Geological Survey (USGS) records the Salton Sea surface elevation at 197 feet below sea level.
1909	An additional 12,000 acres of land, 9,000 of which were submerged under the Salton Sea, are



During the 1905-1906 Colorado River Flood, a southern Pacific passenger train crosses the Salton Sea on a trestle at a point 5 miles east of Salton Station. Bureau of Reclamation photo 1905.

- added to the Torres Martinez Reservation under an Executive Order issued pursuant to a 1907 amendment to the Mission Indian Relief Act of 1891.
- 1911 Imperial Valley residents vote to establish the Imperial Irrigation District (IID) to acquire properties of the bankrupt California Development Company and its Mexican subsidiary.
- 1917 Seining of Striped mullet (*Mugil cephalus*) becomes profitable industry at Salton Sea during World War I.
- 1918 The Coachella Valley Water District (CVWD) is formed to conserve water and deliver irrigation water. Later CVWD expanded to include domestic (drinking) water, collect and recycle wastewater, provide regional storm water protection, replenish the groundwater basin and promote water conservation.
- 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. (All lands subject to the two Public Water Reserve Orders were revoked in their entirety by Public Land Order 6105 on March 5, 1982. Reclamation subsequently withdrew 79,576 acres from the public domain under the Salton Sea for project and agricultural discharge purposes.)
- 1928 Boulder Canyon Project Act of 1928 (P.L. 70-642), authorizes the construction of the Boulder Dam and All American Canal (expected to control the Colorado River and stop future flooding events). The Act limits California's diversion of Colorado River water to 4.4 million acre-feet (MAF).
- 1929 End of observed populations of carp (*Cyprinus carpio*), and bonytail chub (*Gila elegans*), in the Salton Sea; razorback sucker (*Xyrauchen texanus*) remain common. Mullet becoming scarce (although limited restocking continues until April 1951) (Walker, 1961).
- 1929 Striped bass (*Roccus saxatilis*) first deliberate stocking, but did not survive.
- 1930 Pile worms (*Neanthes succinea*) introduced as fish food. Longjaw mudsuckers (*Gillichthys mirabilis*) fish stocked, but did not survive.
- 1930 Salton Sea National Wildlife Refuge (35,000 acres) designated pursuant to Executive Order 5498. (Renamed the Sonny Bono Salton Sea National Wildlife Refuge by the Salton Sea Reclamation Act of 1998 [P.L. 105-372].)
- 1934 Construction of the 90 mile All-American Canal commences, as a reliable water delivery system to the Imperial Valley.
- 1937 The Seven Party Agreement divides the 4.4 MAF among the California water agencies.
- 1938 Construction of the 122-mile Coachella Canal, off-shoot of the All-American Canal, commences.
- 1941-45 Commercial fishermen use Salton Sea to supply mullet to coastal fish markets after German submarines make ocean fishing hazardous during WWII.
- 1942 Construction of the All-American Canal completed; the Bureau of Reclamation (Reclamation) owns the canal, which IID operates and maintains to supply water to the Imperial Valley.
- 1944-45 B-29s from the U.S. Army's 393rd Heavy Bombardment Squadron, commanded by Lt. Col. Paul Tibbets, make highly secret practice flights from Wendover Air Base in Utah to drop dummies of a new bomb into the Salton Sea. On August 6, 1945, Tibbets and his crew, in the *Enola Gay*, drop the first Atomic Bomb over Hiroshima, Japan.
- 1949 Construction of the Coachella Canal is complete. CVWD operates and maintains the canal which provides irrigation water to the Coachella Valley and drinking to urban southern CA.
- 1950 The California Department of Fish and Game introduced Corvina (*Cynoscion xanthalmus*) along with several other species of ocean game and baitfish, which continues through 1956, after which only tilapia, originally a freshwater fish, manages to adapt to increased salinity levels and survive into the 21st century.

- 1951 Single introduction of Sargo (*Anisotremus davidsoni*) resulted in a very productive fishery until 1958, presumably because of increasing salinity levels.
- 1955 Salton Sea State Park is dedicated; at the time, the largest state park in California. The park consists of 120,682 acres, of which 1,855 acres are leased from Reclamation. (Renamed the Salton Sea State Recreation Area in 1965.)
- 1960 North Shore Beach and Yacht Club Estates opened on north side of Sea, becoming a premier recreation site.
- 1965 California State Water Resources Control Board paper predicts that if nothing is done, the Salton Sea will become too salty and die.
- 1967 Yuma Clapper Rail (*Rallus longirostris yumanensis*) is listed as an endangered species in the U.S. Its range includes the Salton Sea.
- 1968 USGS records the Salton Sea surface elevation at 233 feet below sea level.
- 1968 The California legislature adopted a statute declaring the primary use of the Salton Sea for the collection of agricultural drainage water, seepage, and other flows (Assembly Bill 461, 1968; Statutes 1968, Chapter 392).
- 1969 Department of the Interior (DOI) and various Federal and state agencies complete a reconnaissance study of water quality concerns in the Salton Sea.
- 1970 Brown Pelican (*Pelecanus occidentalis*) is listed as an endangered species. Its range includes the Salton Sea.
- 1971 Salton Sea Project Act of 1971 (P.L. 92-76) authorizes DOI and other Federal and state agencies to conduct a feasibility investigation to provide alternatives for lowering the salinity and maintaining water levels in the Salton Sea.
- 1974 Salinity of the Salton Sea found to be approximately 38 parts per thousand (ppt) based on water quality sampling during the feasibility investigation.
- 1976/1977 Along with rising agricultural discharge levels and above average rainfall for the next 7 years, Tropical storms Kathleen and Doreen flood Bombay Beach and Salton City, destroying the recreation/leisure infrastructure.
- 1985 Reclamation records the salinity of the Salton Sea at approximately 40 ppt.
- 1986 Desert pupfish (*Cyprinodon macularius*) is listed as a federally endangered species in its entire range, which includes the Salton Sea.
- 1992 Title XI of the Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575) authorizes, and Congress appropriates, \$10 million for Reclamation salinity control studies.
- 1992 Estimated 150,000 eared grebes die at the Salton Sea; mortality cause was not determined.
- 1993 The Salton Sea Authority is formed under the provision of Articles I and II, Chapter 5, Division 7, Title 1 of the government code of the State of California, "for the purpose of directing and coordinating activities relating to improvement of water quality and stabilization of water elevations and to enhance recreational and economic development potential of the Salton Sea and other beneficial uses, recognizing the importance of the Salton Sea for the continuation of the dynamic agriculture economy of Imperial and Riverside Counties." This Joint Powers Authority membership consists of Imperial and Riverside Counties, IID, CVWD, and the Torres Martinez Indian Tribe.



Yuma Clapper Rail. Bureau of Reclamation photo 1989.

- 1995 USGS records the salinity of the Salton Sea at approximately 45 ppt.
- 1996 Type C avian botulism outbreak causes large-scale mortalities of white and brown pelicans. This die-off focuses national attention on the Salton Sea. An estimated 15 to 20 percent of western population of white pelicans and more than 1,000 endangered brown pelicans die at the Sea.
- 1996 Secretary of the Interior Bruce Babbitt informs California that it can no longer use more than 4.4 MAF per year. Compliance is required by 2015.
- 1997 Reclamation and the Salton Sea Authority provide a report to Congress which provides an evaluation of alternatives to address salinity and elevation concerns at the Salton Sea.
- 1997 A workshop is held in October 1997 in Palm Springs, CA which becomes the genesis for future scientific endeavors at the Sea. Workshop participants include U.S. Fish & Wildlife Service, California Department of Fish & Game, Reclamation, and USGS.
- 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 stabilize salinity and surface elevation, as well as maintain fish and wildlife populations and enhance the potential for recreation and economic development.
- 1998 The Salton Sea Reclamation Act of 1998 (P.L. 105-372) authorizes and establishes the Salton Sea Research Management Committee and Salton Sea Science Subcommittee to conduct research into environmental issues impacting Salton Sea. Dr. Milt Friend was appointed as executive director.
- 1998 In August, 7.6 million tilapia and croakers die from oxygen being depleted due to algae bloom in Salton Sea. Scientific studies determined that the Sea may still have the most productive fishery in the world despite the massive fish die-off.
- 1998 Salton Sea Authority awarded \$4.875 million EPA grant to conduct scientific investigations described in P.L. 105-372. Restoring and Sustaining the Salton Sea: Supporting Science and Environmental Data Collection and Analysis 1998-2003. Project scientific oversight conducted by Science Subcommittee and USGS Salton Sea Science Office (formed in 2000, see below).
- 1999 Reclamation begins quarterly water quality monitoring at the Salton Sea (ongoing) <http://www.usbr.gov/lc/region/programs/saltonsea.html>
- 1999 The 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 Sea.
- 2000 At the request of the DOI Deputy Secretary, the USGS Salton Sea Science Office is established to provide "continuity of the science effort, effectiveness of the science undertaken in support of the restoration project and efficiency of operations in serving management needs..."(Salton Sea Science Subcommittee, 2000).
- 2000 Reclamation and the Salton Sea Authority conduct a study at the old Salton Sea Navy Test Base to test the use of solar ponds and enhanced evaporation system technology to reduce salinity, as well as understand issues related to disposing of salt deposits produced from salt concentrating technologies.
- 2000 The Secretary of the Interior submits to Congress a Reclamation-produced Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and Strategic Science Plan for restoring the Salton Sea.
- 2000 Title VI of the Torres Martinez Settlement Act (P.L. 106-568) provides compensation to the



Aerial view of the Salton Sea Test Base, located at the Salton Sea in southern California. Bureau of Reclamation photo 2005.

Torres Martinez Desert Cahuilla Indians for reservation land submerged by increased irrigation and other drainage.

- 2001 The Imperial County Farm Bureau Voluntary Total Maximum Daily Load Compliance Program commence to reduce the amount of silt and mineral runoff (salts) entering the New and Alamo Rivers which discharge into the Salton Sea. The program proves to be very successful.
- 2002 California legislature passes SB 317 authorizing the QSA.
- 2003 California State legislature passes the Salton Sea Restoration Act (SB 277) that states, “the intent of the Legislature that the State of California undertake the restoration of the Salton Sea ecosystem and the permanent protection of the wildlife dependent on that ecosystem.”
- 2003 Reclamation submits a Salton Sea Study Status Report, which evaluates alternatives from the 2000 Draft EIS/EIR for the full or partial restoration of the Salton Sea. Report predicts that if California is to reduce its use of Colorado River water to less than 4.4 MAF, then flows to the Salton Sea will be reduced to 800,00 AF per year.
- 2003 The Quantification Settlement Agreement (QSA) is executed to quantify IID, CVWD, and Metropolitan Water District’s share of California’s 4.4 million acre-feet of Colorado River water.
- 2004 The Water Supply Reliability and Environmental Improvement Act of 2004 (P.L. 108-361) requires the Secretary of the Interior, in coordination with the State of California and the Salton Sea Authority, to complete a feasibility study on a preferred alternative for Salton Sea restoration.
- 2004 California legislature passes SB 1214 requiring Salton Sea Restoration Study.
- 2006 USGS and Reclamation construct Shallow Saline Habitat Ponds (SHPs) on the southern end of the Salton Sea to evaluate the ecological risk to birds from selenium of a blended water strategy in created saline habitat ponds.
- 2006 Pacific Institute publishes *Hazard: The Future of the Salton Sea with No Restoration Project* released May 1, 2006 (Pacific Institute, 2006).
- 2007 The Water Resources Development Act of 2007 (P.L. 110-114) authorizes \$30 million for Salton Sea Restoration (money was not appropriated).
- 2007 In fulfillment of Water Supply and Reliability and Environmental Improvement Act of 2004, Reclamation releases a summary report titled *Restoration of Salton Sea*.
- 2007 State of California finalizes Programmatic Environmental Impact Report on Salton Sea Restoration.
- 2009 Brown Pelican (*Pelecanus occidentalis*) is removed from the list of threatened and endangered species. Its range includes the Salton Sea.
- 2009 IID completes Phase 1 (365 acres) of managed marsh complexes in Niland, CA (QSA mitigation).
- 2010 USGS and Reclamation SHPs at the southern end of the Salton Sea are decommissioned. USGS publishes “*An Ecological Risk Assessment*” documenting that SHPs are a viable alternative for restoration of wetlands at the Salton Sea (Case III, H.L. et al. 2013).
- 2010 California legislature passes SB 51 creating the Salton Sea Restoration Council however; it formally dissolves in 2012.
- 2011 The U.S. Army Corps of Engineers (USACOE) and the State of California release the Draft EIR/EIS for the Salton Sea Species Conservation Habitat Project (SCH).



Aerial view of the Shallow Habitat Project, located at the Salton Sea in southern California. Bureau of Reclamation photo 2005.

- 2012 State of California's Financial Assistance Program awards \$1,194,154.00 to FWS to fund a portion of the Red Hill Bay Project (south end of the Salton Sea within the Sonny Bono Salton Sea National Wildlife Refuge), which will create 420 acres of shallow saline habitat for migratory birds; \$692,819.00 to IID/Sephton to fund a portion of the Salton Sea Water Habitat Pilot Project on the south end of the Salton Sea; and \$1,113,027.00 to Torres Martinez Tribe/SSA to fund a portion of the Tribe's wetlands rehabilitation project, on the north end of the Salton Sea.
- 2013 The USACOE and the State of California release the Final EIR/EIS for the SCH. The preferred alternative permits 3,770 acres of shallow saline ponds at the mouth of the New River. (A Record of Decision has not been issued as of August 2015.)
- 2013 The University of California, Irvine (UCI), commences The Salton Sea Initiative (Initiative). The purpose of the Initiative is to harness the research, teaching, and service resources of the UCI campus to help address the multiple sustainability challenges faced by the Salton Sea region.
- 2014 IID completes Phase 2 (approximately 396 acres) of managed marsh complexes in Niland, CA.
- 2014 DOI and SSA enter into a Memorandum of Understanding on February 27, 2014, to facilitate collaboration and exchange of technical and scientific information regarding the resources of the Salton Sea.
- 2014 Genetics analyses prove that the endangered bird formerly known as Yuma Clapper Rail (*Rallus longirostris yumanensis*) is a subspecies of the newly designated Ridgway's Rail (*Rallus obsoletus yumanensis*), also classified as endangered.
- 2014 USGS convenes meetings for stakeholders, scientists, and managers to review all the Salton Sea science conducted to date to assess knowledge gaps, and make recommendations for immediate and near future science and monitoring needs, including anticipated funding requirements for Salton Sea management decisions.
- 2014 Pacific Institute publishes *Hazard's Toll: The Costs of Inaction at the Salton Sea* released on September 3, 2014 (Pacific Institute, 2014).
- 2014 The SSA and the Water Research Institute at Palm Desert Campus of Cal State San Bernardino establishes a Salton Sea Repository (includes materials of interest to the history and development of the region including the Coachella Valley and the Lower Colorado Watershed). <http://wripdc.csusb.edu>
- 2015 The California State Water Resources Control Board convenes a workshop on March 18, 2015, in Sacramento California regarding the status of the Salton Sea and revised Water Rights Order 2002-0013, in response to a petition from IID in November 2014.
- 2015 The Little Hoover Commission (LHC) holds a Public Hearing on April 28, 2015, at the University of California Riverside Palm Desert Campus, to review the State of California's Salton Sea environmental mitigation and restoration governance strategy. (LHC conducts a subsequent public hearing on June 25, 2015, in Sacramento, CA.)
- 2015 The IID Salton Sea Restoration and Renewable Energy Initiative (SSRREI) kick-off meeting is held on January 16, 2015 in Imperial, CA. The initiative is intended to be a collaborative Salton Sea incremental restoration approach designed to minimize the environmental and air quality impacts, while using revenue generated by renewable energy projects to fund larger scale environmental mitigation and restoration efforts at the Sea.
- 2015 Reclamation records the salinity of the Salton Sea during the quarterly May sampling at approximately 57 ppt.



View of the Salton Sea. Bureau of Reclamation photo 2005.

2015 IID releases the draft SSRREI framework documents on July 28, 2015.
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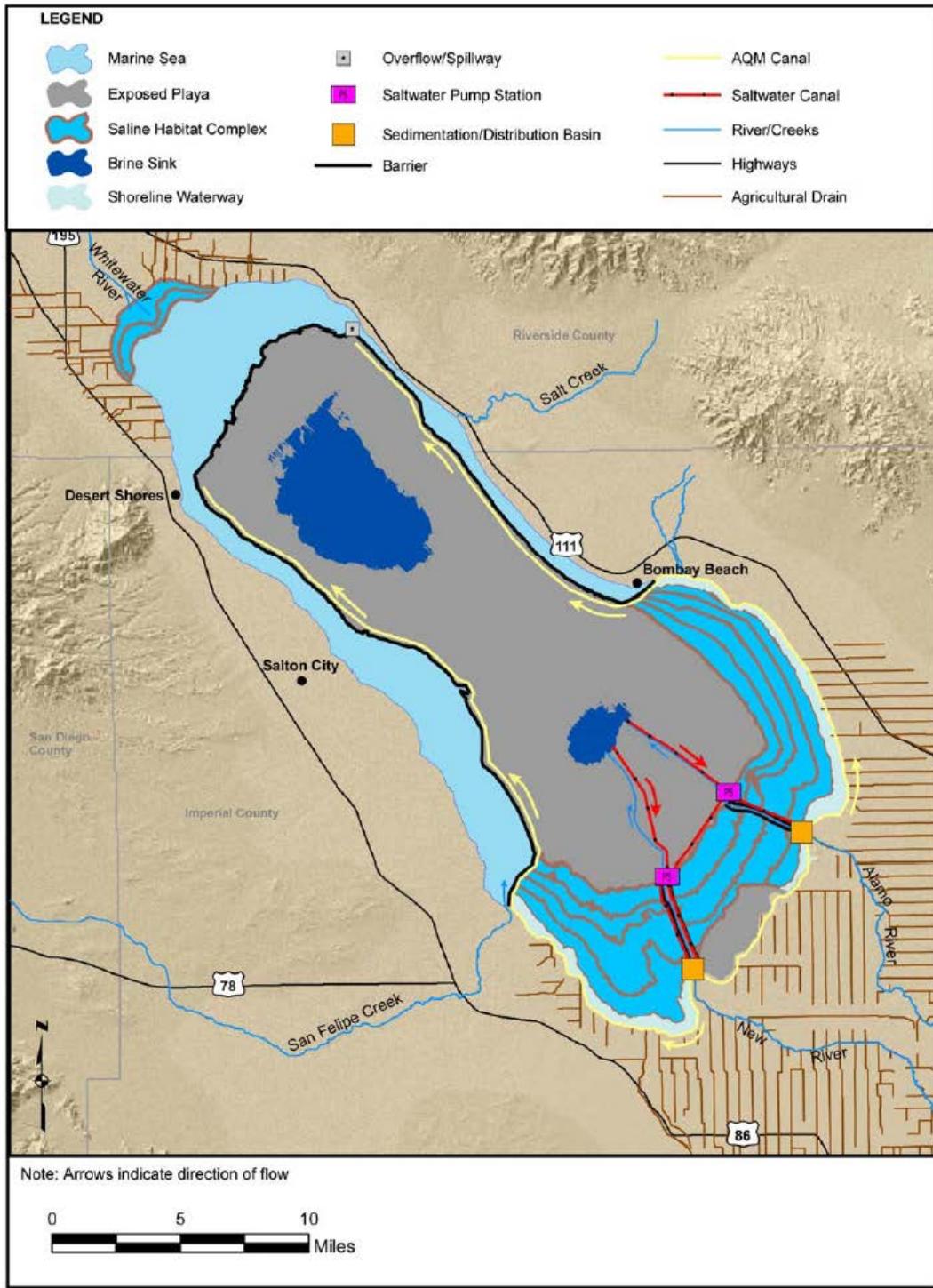
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Appendix C

California Natural Resources Agency 2007 Preferred Salton Sea Restoration Plan Alternative



Description of Components

Saline Habitat Complex. The Saline Habitat Complex is intended to provide a diversity of habitats to support food web organisms (e.g., invertebrates and fish), that will provide an avian forage base similar to that which developed at the Salton Sea. Berms, islands, peninsulas, and snags would contribute to use by a variety of shorebirds and wading birds. Excavated areas up to 15 feet in depth would be incorporated to increase habitat diversity and provide shelter for fish and invertebrates.

Salinity within the Saline Habitat Complex could range from near 20,000 mg/L to 200,000 mg/L. Maintaining most of the Saline Habitat Complex with saline water (greater than 20,000 mg/L) would reduce vegetation growth, selenium ecorisk, and vector populations. The water supply would be from the New, Alamo, and Whitewater rivers plus water recycled from the Brine Sink or upgradient Saline Habitat Complex cells to achieve a minimum salinity of 20,000 mg/L.

The first rows of the southern Saline Habitat Complex that will extend from the shoreline (at -230 feet msl) to the first Berm (at -236 feet msl) would not be divided into ponds. This area would serve as a mixing zone for the inflows and saline water and would be maintained at a salinity of 20,000 to 30,000 mg/L. Berms would be used in the remaining rows of the Saline Habitat Complex to provide multiple 1,000-acre cells.

Berms would be constructed of suitable earthfill materials excavated from the Sea Bed with 3:1 side slopes. A 20-foot wide gravel road on top of each Berm would allow access for maintenance. Rock slope protection would be placed on the water side of the Berm. Water depths would be less than 6 feet (2 meters). Berms could not be constructed until the Brine Sink (residual Salton Sea) recedes to an elevation below the Berm location.

The design of the individual cells within the Saline Habitat Complex would be flexible and could be modified to respond to environmental changes or the results of performance monitoring. The characteristics that would vary among cells likely would include salinity, overall water depth of the cell, presence or absence of islands and deep pools, number and arrangement of roosting and nesting structures, amount of shoreline, presence or absence of hard substrates, and bottom slope. The ratio of water to land, salinity, and arrangement of the cells would be developed in project-level analyses.

Immediately following construction, saline water from the Brine Sink would be conveyed through temporary pumping facilities into the first row of Saline Habitat Complex cells. The saline water would be mixed with the drain flows to provide salinity of at least 20,000 mg/L. After this initial mixing, salinity in each cell would be managed by controlling inflows and outflows, and evapo-concentrating the water in each cell to create cells with salinities ranging from 20,000 to 200,000 mg/L. During operations of the Saline Habitat Complex, water quality monitoring would need to be conducted to determine if constituents of concern accumulated to concentrations that would cause adverse impacts to fish and wildlife that used these areas.

Early Start Habitat. The Preferred Alternative would include up to 2,000 acres of shallow saline habitat for use by birds after the Salton Sea salinity becomes too high to sustain some species of fish. This habitat would be created prior to construction of full-scale habitat components, and is referred to as Early Start Habitat. Early Start Habitat was assumed to be located at elevations between -228 and -232 feet msl and could either be a permanent or temporary feature to be eliminated or assimilated as other components are constructed.

For the purposes of the Preferred Alternative, it was assumed that the Early Start Habitat area would be located along the southern shoreline because the flat slope of the Sea Bed would

provide a large area for shallow water cells. The area is currently used by many birds. Most agricultural drains in this area are pumped into the Salton Sea and could provide a stable source of inflows into the Early Start Habitat. Saline water from the Salton Sea would be pumped into the cells to be mixed with freshwater from the drains to provide salinity between 20,000 and 60,000 mg/L.

The area would be divided into cells with Berms excavated from on-site materials. Average water depths within each cell would be less than four feet, although deep holes located away from the Berms may extend to 15-foot depths. Specific design and testing criteria would be developed in a project-level analysis.

Marine Sea. A Marine Sea would be formed through the construction of a Barrier. The Marine Sea would eventually stabilize at a surface water elevation of -230 feet msl with a salinity between 30,000 mg/L and 40,000 mg/L. Salinity in the Marine Sea would be managed through regulation of inflows and discharges. Air Quality Management Canals, Sedimentation/Distribution Basins, and Early Start Habitat would be constructed between the -228 and -230 foot msl contours and would avoid conflicts with existing land uses along the shoreline.

Inflows to the Marine Sea would include direct flows from the Whitewater River, Coachella Valley drains, Salt Creek, San Felipe Creek, and local drainages. Flows from the New and Alamo rivers would be blended in a large Air Quality Management Canal and diverted into the Saline Habitat Complex and the southeastern and southwestern portions of Marine Sea. The portion of the Air Quality Management Canal located between the Sedimentation/Distribution Basins and Marine Sea would be located along the shoreline of the Saline Habitat Complex and would be siphoned under major drainages and agricultural drains to ensure that existing drainages are not impacted and that connectivity is provided for desert pupfish between the drains and the Shoreline Waterway. Air Quality Management Canals would continue on the interior side of the Barrier where the Marine Sea is located. Flows from the Marine Sea would be spilled to the Brine Sink to maintain salinity and elevation control.

The water depth would be less than 12 meters (39 feet) to reduce the potential for hydrogen sulfide generation and potential fish kills, due to long-term temperature stratification. The Preferred Alternative assumes implementation of the proposed TMDLs for nutrients and selenium, and therefore, additional water treatment for inflows would not be required. However, there is insufficient information to determine the role that nutrients contained in sediments will have in continued production of hydrogen sulfide in the Marine Sea. Therefore, the Preferred Alternative is based upon a conservative approach that maintains water depth to less than 12 meters (39 feet). During project-level analyses, additional data should be collected and the maximum water depth should be re-evaluated prior to final design.

The Barrier would be constructed of rock with a seepage barrier on the upstream face. The Barrier would be up to 47 feet above the existing Sea Bed and up to a half-mile wide at the base. The final slope of the Barrier would be 10:1 on the Marine Sea side and 15:1 on the down gradient side. The structure would require compliance with DWR, Division of Safety of Dams regulations. For the purposes of the PEIR, it was assumed that the Barrier would be constructed using barges. Therefore, the Barrier would need to be constructed before the Brine Sink (residual Salton Sea) recedes. Rock used to form the Barrier could be delivered to the barges by a railroad trestle or at a harbor that could be used for Marine Sea access after construction. However, use of barges would result in extensive vehicle emissions, as described in the Draft PEIR. It may be more advantageous to construct a trestle that would be extended with construction of the barrier and could accommodate alternative fuel trucks to deliver rock to the barrier construction site. This could lead to lower air quality emissions and allow construction even if the Brine Sink water recedes. During project-level analyses, specific

construction methods need to be evaluated to provide a cost-effective construction approach and to reduce construction impacts.

Sedimentation/Distribution Basins. Inflows from the New and Alamo rivers would be captured in two 200-acre Sedimentation/Distribution Basins to divert desilted river water into one of several Air Quality Management Canals or bypass flows into the Brine Sink through extension of the New and Alamo river channels. The unlined Sedimentation/Distribution Basins would be excavated along the shoreline and would be located from -228 to -230 feet msl. Water depths would be about 6 feet. Sediment collected in the basins would be periodically dredged and flushed into the Brine Sink through river extensions.

Air Quality Management. Prior to design of Air Quality Management facilities, monitoring and testing activities would be conducted to identify the potential for and rate of dust emissions, determine chemical characteristics of the playa, analyze response of salt crusts and sediments to humidity and wind. If potential for significant dust emissions occur, several actions could be implemented to reduce air quality problems. It is anticipated a combination of actions would be used because the playa characteristics may vary throughout the Sea Bed. For the purposes of the PEIR and the Preferred Alternative, the following assumptions were used to define Air Quality Management components:

- 30 percent of the total exposed playa would be non-emissive and require no actions;
- 20 percent of the exposed playa would use management options that do not require freshwater supplies, such as brine stabilization, sand fences, or chemical stabilizers; and
- 50 percent of the exposed playa would use water efficient vegetation that is irrigated with a portion of the inflows to the Salton Sea.

The conservative approach for control of dust emissions would use Air Quality Management Canals to convey water from the Sedimentation/Distribution Basins to a series of 2-square mile units on the exposed playa. Each 2-square mile unit would include water filtration and chemical treatment units to prevent clogging and scale in the irrigation system, pumps, and buried distribution and drip irrigation pipes. The drip irrigators would be buried to reduce potential for selenium toxicity to wildlife from ponded water. Facilities would be included in each unit to pump brine from the Brine Sink to the treatment unit to increase the salinity of the water to 10,000 mg/L, if needed. Drains would be constructed under the irrigated area and drainage water would be conveyed to the Brine Sink. Construction of the irrigation system would require excavations up to 8 feet deep for trenches throughout the exposed playa. Salt bush, or similar vegetation, would be planted every 5 feet apart in rows that would be separated by 10 feet.

Brine Sink. The Brine Sink would provide the repository necessary to store excess salts, water discharged from the Saline Habitat Complex, Marine Sea, and Air Quality Management areas, and excess inflows. Flood flows from the New and Alamo rivers would be flow directly into the Brine Sink through extensions of the river channels. High flows from San Felipe and Salt creeks and Whitewater River (via a submerged pipeline) would flow into the Marine Sea and overflow through a spillway into the Brine Sink. The elevation would fluctuate seasonally based upon the patterns of these tributary flows.

During project-level analyses, partitioning of the Brine Sink could be considered to provide another area with salinities of less than 200,000 mg/L that could support invertebrates and provide additional habitat on the Sea Bed.

Desert Pupfish Connectivity. Desert pupfish connectivity would be provided in four separate areas. The shoreline waterways (first rows of the southern Saline Habitat Complex) would provide connectivity for the Imperial Valley drains between Bombay Beach and to Alamo River and between New River and an area located to the south of San Felipe Creek.

The first row of the northern Saline Habitat Complex would provide connectivity for a portion of the drains in Riverside County. The Marine Sea would provide connectivity for the remaining drains in Riverside County and San Felipe and Salt creeks.

Area for Geothermal Development. Imperial County has one of the larger known geothermal resource areas in the world, including lands near the southern shoreline of the Salton Sea. Several geothermal generation facilities have been constructed on the upland side of the shoreline. Field investigations have indicated that additional generation facilities could be successfully constructed in currently inundated areas of the Sea Bed after the water recedes.

One of the areas that may include significant geothermal resources is located between the New and Alamo rivers along the southern shoreline. A portion of this area is located within the Sonny Bono Salton Sea National Wildlife Refuge, and most of the area is used extensively by many species of birds. Placement of Saline Habitat Complex and geothermal development in this area could require very specific mitigation measures to avoid conflicts with geothermal facilities, including power transmission lines and other facilities.

Geothermal development will be extremely important in California and other southwestern states as part of a mosaic of energy sources to meet increasing energy demands. Therefore, the Preferred Alternative includes an area between the New and Alamo rivers without Saline Habitat Complex to reduce potential conflicts between geothermal development and habitat criteria. The geothermal development area would avoid the Sonny Bono Salton Sea National Wildlife Refuge lands and areas with pupfish connectivity in the drains. The Preferred Alternative includes Air Quality Management actions for the geothermal development area; however, specific Air Quality Management methods may be different for the industrial land uses.

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http://waterboards.ca.gov/waterrights/water_issues/programs/salton_sea/docs/comment_s031115/ryan_kelley_031115.pdf. Accessed March 18, 2015.
25. Cordova Jr. See endnote 8.
26. John Benoit, Supervisor, Riverside County. April 28, 2015. Written Testimony to the Commission.
27. Benoit. See endnote 26.
28. Benoit. See endnote 26.
29. Cohen. See endnote 14. Page v.
30. Mary Resvaloso, Chairwoman, Torres Martinez Desert Cahuilla Indians. April 28, 2015. Written testimony to the Commission.
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32. U.S. Bureau of Reclamation. 2015. "A Salton Sea Chronology: Prehistory to 2015." See Appendix B.
33. U.S. Bureau of Reclamation. See endnote 32.
34. U.S. Bureau of Reclamation. September 2007. "Restoration of the Salton Sea: Summary Report." Page xvi.
35. U.S. Bureau of Reclamation. See endnote 34. Page 9-4.
36. U.S. Bureau of Reclamation. See endnote 34. Page 9-5.
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38. U.S. Bureau of Reclamation. See endnote 34. Page 9-5.
39. H.L. Case III, U.S. Geological Survey; Jerry Boles, California Department of Water Resources; Arturo Delgado, California Department of Fish and Wildlife; Thang Nguyen, California Department of Water Resources; Doug Osugi, California Department of Water Resources; Douglas A. Barnum, U.S. Geological Survey; Drew Decker, U.S. Geological Survey; Steven Steinberg, Southern California Coastal Water Research Project; Sheila

Steinberg, Brandman University; Charles Keene, California Department of Water Resources; Kristine White, California Department of Fish and Wildlife; Tom Lupo, California Department of Fish and Wildlife; Sheldeon Gen, San Francisco State University; and Ken A. Baerenklau, University of California, Riverside. 2013. "Salton Sea Ecosystem Monitoring and Assessment Plan." U.S. Geological Survey Open-File Report 2013-1133. Also, U.S. Bureau of Reclamation. See endnote 32.

40. U.S. Bureau of Reclamation. See endnote 34. Pages 9-5 to 9-7.
41. Cohen. See endnote 2. Also, Delfino. See endnote 15.
42. California Resources Agency. June 2007. "Salton Sea Ecosystem Restoration Program: Volume 1: Final Programmatic Environmental Impact Report." Pages 3-9 to 3-10.
43. California Resources Agency. See endnote 42. Pages 3-9 to 3-10. Also, California State Auditor. November 2013. "Salton Sea Restoration Fund: The State Has Not Fully Funded a Restoration Plan and the State's Future Mitigation Costs are Uncertain." Report 2013-101. Page 21.
44. California Resources Agency. See endnote 42. Pages 3-9 to 3-10.
45. California Resources Agency. See endnote 42. Pages 3-9 to 3-10. Also, California Resources Agency. May 2007. "Salton Sea Ecosystem Restoration Program: Preferred Alternative Report and Funding Plan." Page 9.
46. California State Auditor. See endnote 43. Page 21.
47. California Resources Agency. See endnote 42. Page 3-10.
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49. California Resources Agency. See endnote 42. Page 3-10.
50. California Resources Agency. See endnote 45. Page ES-1.
51. California Resources Agency. See endnote 45.
52. California Resources Agency. See endnote 45. Page ES-7.
53. California Resources Agency. See endnote 45. Page ES-7.
54. Kimberly Delfino, California Program Director, Defenders of Wildlife. May 11, 2015. Sacramento, CA. Meeting with Commission Staff.
55. Delfino. See endnote 15.
56. Delfino. See endnote 15.
57. "Miracle in the Desert." https://www.youtube.com/watch?v=M_eylXfK4.
58. Delfino. See endnote 15.
59. Cohen. See endnote 2.

60. AB 71 (Manuel Pérez). Chapter 402, Statutes of 2013.
61. One option would allow for the sale of excess Colorado River water to MWD, however, there has not been excess Colorado River water. The other option would allow the Imperial Irrigation District to voluntarily conserve water, which it would then transfer to the Department of Water Resources, which would then sell the water to MWD, putting the proceeds toward Salton Sea restoration. IID has not indicated an interest in pursuing this option.
62. Bill Hasencamp, Manager, Colorado River Resources, Metropolitan Water District of California. June 25, 2015. Written testimony to the Commission.
63. Hasencamp. See endnote 62.
64. Keali'i Bright, Deputy Secretary for Legislation, California Natural Resources Agency. June 25, 2015. Sacramento, CA. Testimony to the Commission.
65. Keali'i Bright, Deputy Secretary for Legislation, California Natural Resources Agency. July 28, 2015. Phone call with Commission staff.
66. Edmund G. Brown Jr, Governor, California. May 2015. "Summary: Governor's Revised Budget 2015-2016: Natural Resources." Page 76. <http://www.ebudget.ca.gov/2015-16/pdf/Revised/BudgetSummary/NaturalResources.pdf>. Accessed May 20, 2015.
67. Keali'i Bright, Deputy Legislative Secretary, California Natural Resources Agency. June 25, 2015. Written testimony to the Commission.
68. Kevin Kelley, General Manager, Imperial Irrigation District. March 18, 2015. Sacramento, CA. Testimony to the State Water Resources Control Board.
69. Roger Shintaku, General Manager, Salton Sea Authority. April 28, 2015. Written testimony to the Commission.
70. U.S. Bureau of Reclamation. See endnote 32.

Little Hoover Commission Members

CHAIRMAN PEDRO NAVA (*D-Santa Barbara*) Appointed to the Commission by Speaker of the Assembly John Pérez in April 2013. Advisor to telecommunications industry on environmental and regulatory issues and to nonprofit organizations. Former state Assemblymember. Former civil litigator, deputy district attorney and member of the state Coastal Commission. Elected chair of the Commission in March 2014.

VICE CHAIRMAN LOREN KAYE (*R-Sacramento*) Appointed to the Commission in March 2006 and reappointed in December 2010 by Governor Arnold Schwarzenegger. President of the California Foundation for Commerce and Education. Former partner at KP Public Affairs. Served in senior policy positions for Governors Pete Wilson and George Deukmejian, including cabinet secretary to the Governor and undersecretary for the California Trade and Commerce Agency.

DAVID BEIER (*D-San Francisco*) Appointed to the Commission by Governor Edmund G. Brown Jr. in June 2014. Managing director of Bay City Capital. Former senior officer of Genetech and Amgen. Former counsel to the U.S. House of Representatives Committee on the Judiciary. Serves on the board of directors for the Constitution Project.

SENATOR ANTHONY CANNELLA (*R-Ceres*) Appointed to the Commission by the Senate Rules Committee in January 2014. Elected in November 2010 and re-elected in 2014 to the 12th Senate District. Represents Merced and San Benito counties and a portion of Fresno, Madera, Monterey and Stanislaus counties.

JACK FLANIGAN (*R-Granite Bay*) Appointed to the Commission by Governor Edmund G. Brown Jr. in April 2012. A member of the Flanigan Law Firm. Co-founded California Strategies, a public affairs consulting firm, in 1997.

ASSEMBLYMEMBER CHAD MAYES (*R-Yucca Valley*) Appointed to the Commission by Speaker of the Assembly Toni Atkins in September 2015. Elected in November 2014 to the 42nd Assembly District. Represents Beaumont, Hemet, La Quinta, Palm Desert, Palm Springs, San Jacinto, Twentynine Palms, Yucaipa, Yucca Valley and surrounding areas.

DON PERATA (*D-Orinda*) Appointed to the Commission in February 2014 and reappointed in January 2015 by the Senate Rules Committee. Political consultant. Former president pro tempore of the state Senate, from 2004 to 2008. Former Assemblymember, Alameda County supervisor and high school teacher.

ASSEMBLYMEMBER SEBASTIAN RIDLEY-THOMAS (*D-Los Angeles*) Appointed to the Commission by Speaker of the Assembly Toni Atkins in January 2015. Elected in December 2013 to represent the 54th Assembly District. Represents Century City, Culver City, Westwood, Mar Vista, Palms, Baldwin Hills, Windsor Hills, Ladera Heights, View Park, Crenshaw, Leimert Park, Mid City, and West Los Angeles.

SENATOR RICHARD ROTH (*D-Riverside*) Appointed to the Commission by the Senate Rules Committee in February 2013. Elected in November 2012 to the 31st Senate District. Represents Corona, Coronita, Eastvale, El Cerrito, Highgrove, Home Gardens, Jurupa Valley, March Air Reserve Base, Mead Valley, Moreno Valley, Norco, Perris and Riverside.

DAVID A. SCHWARZ (*R-Beverly Hills*) Appointed to the Commission in October 2007 and reappointed in December 2010 by Governor Arnold Schwarzenegger. Partner in the Los Angeles office of Irell & Manella LLP and a member of the firm's litigation workgroup. Former U.S. delegate to the United Nations Human Rights Commission.

JONATHAN SHAPIRO (*D-Beverly Hills*) Appointed to the Commission in April 2010 and reappointed in January 2014 by the Senate Rules Committee. Writer and producer for FX, HBO and Warner Brothers. Of counsel to Kirkland & Ellis. Former chief of staff to Lt. Governor Cruz Bustamante, counsel for the law firm of O'Melveny & Myers, federal prosecutor for the U.S. Department of Justice Criminal Division in Washington, D.C., and the Central District of California.

SUMI SOUSA (*D-San Francisco*) Appointed to the Commission by Speaker of the Assembly John Pérez in April 2013. Officer of policy development for San Francisco Health Plan. Former advisor to Speaker Pérez. Former executive director of the California Health Facilities Financing Authority.

“Democracy itself is a process of change, and satisfaction and complacency are enemies of good government.”

*Governor Edmund G. “Pat” Brown,
addressing the inaugural meeting of the Little Hoover Commission,
April 24, 1962, Sacramento, California*