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March 15, 2017

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VIA HAND DELIVERY

Felicia Marcus
Chair, State Water Resources Control Board
1001 "I" Street, 25th Floor
Sacramento, California 95814

Re: Petition of the Imperial Irrigation District to Modify Revised Order WRO 2002-0013; Motion for an Evidentiary Hearing

Dear Chair Marcus:

Petitioner the Imperial Irrigation District (**IID**) and Intervenors the County of Imperial and the Imperial County Air Pollution Control District (collectively, the **County Agencies**) respectfully request that the State Water Resources Control Board (**State Water Board**) notice an evidentiary hearing on IID's petition to modify the Revised Order WRO 2002-0013 (**Order**) to commence no later than July 17, 2017. The Motion for an Evidentiary Hearing, the Memorandum of Points and Authorities in support of the Motion, and associated exhibits are attached hereto and incorporated herein by reference.

As you know, the Order required IID to deliver mitigation water to the Salton Sea for 15 years to preserve the status quo for the salinity levels of the Sea while the State of California determined whether and how it might implement restoration. The Brown Administration has – to its great credit – correctly determined that restoration of the Salton Sea is the responsibility of the State of California. To be sure, the State of California is seeking the cooperation and assistance of a great many stakeholders in the Imperial and Coachella valleys. IID and the County Agencies pledge to be good partners with the State of California in this important effort, and this Petition is reflective of that cooperative effort.

Not only has the Brown Administration acknowledged the State of California's obligation, it has taken very significant actions toward its resolution. The Brown Administration – also to its great credit – has conducted an evaluation of the issue and determined that it is feasible for the State to restore the Salton Sea. The consensus reached through this evaluation is that a properly funded and executed effort would yield the result proposed by IID and the County Agencies – a smaller but sustainable Salton Sea.

On March 9, 2017, IID met with you and other representatives of the Brown Administration to chart the next steps in our ongoing partnership. We understand that the Administration will shortly release a draft Salton Sea Management Program Phase 1: Ten-Year Plan (**SSMP**) that

will include quantified milestones for the restoration of the Salton Sea, specific projects with specific footprints that will further the restoration effort and estimates of the anticipated costs for this critical effort. While IID is still in the process of reviewing the SSMP and will provide written comments in the near future, we are heartened not only by the quantification of milestones for completion of these tasks, but also by the explicit statements regarding the costs of this effort. The SSMP constitutes substantial progress toward the roadmap for restoration that IID and the County Agencies have been requesting from the State of California for the past year.

While there has been substantial progress toward a roadmap for the Salton Sea, IID and the County Agencies are sure that you agree there is still much work to be done. First, there is the need for continuing funding for the SSMP effort. The current draft of the SSMP identifies an unfunded obligation on the part of the State of California in excess of $300 million over the next decade. We recognize that the Brown Administration has limited time left during its tenure and that it cannot bind its successors' hands. Nonetheless, it is critical to IID and the County Agencies that there be a firm and unequivocal commitment on the part of the State of California to fund the projects that are identified in the SSMP. An explicit commitment must be made now to obtain funds required to "treat" the 28,000 acres of the total playa acreage that will be exposed over the next decade. This written expression of commitment to obtain funds would demonstrate that the State of California accepts its responsibility to protect the people of the Imperial and Coachella valleys and the ecosystem of the Salton Sea from the effects of the recession of the Salton Sea over the next decade. The Brown Administration, by its efforts thus far, has established a firm trajectory toward a smaller but sustainable Salton Sea that will serve the people of California well in the years to come. But that trajectory can only be kept on course with a parallel funding path.

Second, there is an ideal congruence of interest between the renewable energy resources at the Sea and its restoration. As restoration proceeds, all parties participating in restoration must avail themselves of the comparative advantage obtained by utilization of the renewable resources that become available as the elevation of the Salton Sea declines. Utilization of these resources could reduce the exposure of playa that would otherwise be emissive. At the same time, use of these resources would bring well-paying jobs to an impoverished region of the state.

Third, IID and the County Agencies see the opportunity for use of these renewable energy sources (whether the state RPS requirement is 50 percent, 100 percent or something in between) to provide great benefit to the State of California. Because of our sunny and windy conditions, not to mention our unmatched geothermal resources, development of these renewable energy resources would make a major contribution toward California's global leadership in renewable energy. We look forward to working with you and your colleagues at the California Public Utilities Commission and the California Independent System Operator to bring these resources on line during the next decade; accordingly, the draft SSMP should be augmented to include and reference the need for their development as a specific means for reduction in playa exposure.

The passage of time since the granting of the original Order, and the fact that we are in the waning months before the expiration of the 15-year period, require a number of specific findings to be developed immediately. There must be a determination, clear to all parties, that the actions of the State in response to its obligations will be durable for a period that allows for the creation and continuation of a smaller but sustainable Salton Sea. At the same time, even with the great

urgency, there must be a determination that the State of California be provided flexibility to develop projects based on the best available science and on what has been learned from the first projects that are put on the ground. Even the best of intentions, when expressed in writing as well-thought-out plans, require regular oversight and supervision by an agency capable of demanding specific reports, and providing direction when it is needed. The Order contemplated that the State Water Board would have the authority to carry out this supervisory role and indeed reserved the jurisdiction to do so.

However, until the last months, there was little or no progress over which the State Water Board could exercise its retained authority. We are not suggesting that the State Water Board or the State work in isolation. Rather, there must be a process that involves all relevant stakeholders so that the many constituencies affected by the Salton Sea can have a voice in determining its future. But the time for an informal process has ended. The informal process, thus far, has provided impetus toward restoration, but there is now the need for concrete action. IID and the County Agencies are grateful for all of the efforts made by the State over the past 18 months. However, they are convinced that that the best way – indeed the only way – to continue that progress is for the State Water Board to revisit the Order.

All of those who participated in the past must be invited to come back before the State Water Board, to hear and understand from the State of California that a smaller but sustainable Sea is possible. They can then be invited to present their respective cases as to what California should do to achieve this goal. At the conclusion of that process, the State Water Board, after hearing all of the presentations, can issue an order that will provide the parties with certainty and that will be durable for the life of the SSMP. Accordingly, we have filed the Motion attached hereto requesting that the State Water Board order such an evidentiary hearing.

At the same time, IID and the County Agencies fully recognize that there may be other methods to accomplish our goals, as described above, including but not limited to legislation. The intent of our Motion is not to preclude such other avenues, but to operate in parallel with those other discussions and to complement the State Water Board process with other processes that can address any limitations associated with it. We believe that, in the end, we will need to use all of the tools in the toolbox to reach a resolution that respects all interests but that moves the dial firmly toward a smaller but sustainable Salton Sea.

In conclusion, IID and the County Agencies wish again to thank you and your colleagues in the Brown Administration for recognizing the critical needs of the Salton Sea and the need for the State of California to take immediate action – before the mitigation water obligation expires at the end of 2017 – to ensure a smooth transition into the restoration effort contemplated in the draft SSMP. We look forward to partnering with the State of California in this important work.

Very truly yours,

Kevin E. Kelley

Kevin E. Kelley
General Manager

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STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the matter of:

IMPERIAL IRRIGATION DISTRICT'S (IID) AND SAN DIEGO COUNTY WATER AUTHORITY'S (SDCWA) AMENDED JOINT PETITION FOR APPROVAL OF A LONG-TERM TRANSFER OF CONSERVED WATER FROM IID TO SDCWA AND TO CHANGE THE POINT OF DIVERSION, PLACE OF USE, AND PURPOSE OF USE

Under Permit 7643 on Application 7482 of Imperial Irrigation District

(counsel listed on next page)

MOTION OF PETITIONER IMPERIAL IRRIGATION DISTRICT AND INTERVENORS COUNTY OF IMPERIAL AND IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT FOR THE STATE WATER RESOURCES CONTROL BOARD TO CONDUCT AN EVIDENTIARY HEARING TO COMMENCE NO LATER THAN JULY 17, 2017 FOR MODIFICATION OF REVISED WATER RIGHTS ORDER 2002-0013

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MOTION TO HOLD AN EVIDENTIARY HEARING TO COMMENCE NO LATER THAN JULY 17, 2017 FOR MODIFICATION OF REVISED WATER RIGHTS ORDER 2002-0013

Petitioner Imperial Irrigation District (**IID**) and Intervenors County of Imperial (**County**) and Imperial County Air Pollution Control District (**Air District**) (collectively **County Agencies**) hereby respectfully request that the State Water Resources Control Board (the **State Water Board**) hold an evidentiary hearing commencing no later than July 17, 2017 to consider modification of the Revised Order WRO 2002-0013 (the **Order**) and to issue a decision no later than December 15, 2017, as specified further below.

By issuance of the Order, the State Water Board conditionally approved the long-term transfer of conserved water from IID's water service area under the Quantification Settlement Agreement (the **QSA**) by approving a petition to change the point of diversion, place of use, and purpose of use under IID's Permit No. 7643 (Application No. 7482); and in doing so, the State Water Board recognized the need for sufficient time to study the feasibility of restoration of the Salton Sea and develop a restoration plan for the Sea. (Order, pp. 3, 47 and 87.) As a result, the Order imposed Condition Five for the implementation of the Salton Sea Habitat Conservation Strategy for 15 years, which in effect was the delivery of up to 800,000 acre-feet of mitigation water to the Salton Sea "to replace water that [would] no longer flow to the Sea as a result of the [QSA conserved water] transfer." (Order, pp. 24 and 86.)

Now in the final year of the 15-year period given to the preparation for restoration of the Salton Sea, IID and the County Agencies respectfully request the State Water Board hold an evidentiary hearing to exercise its duty and the continuing authority it expressly reserved in Condition Seven of the Order to modify Condition Five to address the next steps to be taken regarding restoration of the Sea "in light of the results of the study on the feasibility of restoration" that took place during the last 15 years. (Order, p. 87.) IID and the County Agencies specifically request the State Water Board to modify Condition Five by adding the following paragraphs:

> The State Water Board finds that, after 15 years of delivering up to 800,000 acre-feet of mitigation water to the Salton Sea under the Salton Sea Habitat Conservation Strategy and after several studies regarding the feasibility of restoration of the Sea, the State of California has a legal and enforceable duty to restore the Salton Sea, that restoration of a smaller but sustainable Sea is feasible and that restoration must be completed forthwith in order to avoid catastrophic consequences to the State of California as a whole and

specifically to the health of the residents of the Imperial and Coachella valleys and to the multiple wildlife habitats that exist at the Sea and serve the Pacific Flyway.

The California Natural Resources Agency is hereby ordered to submit a final Salton Sea Management Program 10-year restoration roadmap to the State Water Board no later than October 1, 2017 that will include the following:

a. Acreage performance standards for each calendar year from 2018 through 2025, inclusive and a corresponding schedule;
b. Proposed permit streamlining actions for performance of the plan;
c. An adaptive management plan for implementation;
d. Identification of funds and actions to obtain additional funding for implementation of the plan;
e. A 5-year consultation process to initiate the planning and management of restoration activities for the next 10 years; and
f. A statement affirming the State's obligation to restore the Salton Sea with specific oversight actions by the State Water Board to ensure implementation of the plan.

The California Natural Resources Agency shall enter into an agreement with the Permittee and the County of Imperial to implement all actions identified in the Salton Sea Management Program 10-year restoration roadmap, implementation of which shall be overseen by the State Water Resources Control Board as set forth in the Governor's Salton Sea Agency Actions Plan. The State Water Resources Control Board and the Superior Court of Imperial County shall have concurrent jurisdiction for any actions to enforce said agreement.

IID and the County Agencies respectfully request that the State Water Board calendar this matter for a preliminary status conference at the conclusion of its regular meeting on April 4, 2017, so that the State Water Board may hear from interested parties whether they support this Motion. This Motion is made based upon the following, all of which are incorporated herein by reference as if set forth in full: (i) the Petition filed with the State Water Board by IID on November 18, 2014 (the **Petition**); (ii) an email from counsel for the State Water Board to counsel for IID dated April 24, 2015 (the **SWRCB counsel email**, copy attached hereto as Exhibit A); (iii) the Governor's Salton Sea Task Force Agency Actions Plan dated October 2015 (the **Agency Actions Plan**, copy attached hereto as Exhibit B); (iv) the Memorandum of Understanding By and Between the United States Department of the Interior and the California Natural Resources Agency Regarding the Coordination of Activities to Manage the Salton Sea dated August 31, 2016, and the Addendum thereto dated January 18, 2017 (collectively the **MOU**, copy attached hereto as Exhibit C); (v) the Points and Authorities attached hereto; and (vi) the State Water Board's records for the Order and pertaining to the Petition. Concurrently

with the filing of this Motion with the State Water Board, IID is serving this Motion on all parties to the proceedings that resulted in the Order, as well as all stakeholders that have received notice of the State Water Board's workshops regarding the Salton Sea over the past two years.

The urgency and priority of this request is due to the ongoing and escalating transfer of conserved water from the IID water service area and the completion of the mitigation water deliveries to the Salton Sea by the end of December 2017, if not sooner. In the event that the State Water Board fails to take timely action, irreparable damage will occur shortly thereafter to the public health within the Imperial and Coachella valleys and to the wildlife habitat at the Sea as the result of the QSA conserved water transfers, as described more fully in the Points and Authorities.

Further, as a result of the completion of the deliveries of mitigation water to the Salton Sea by the end of this year as required by the Order and the need for an approved plan for the future of the Sea as a prerequisite for the federal Drought Contingency Plan (**DCP**) for the Colorado River system, and in order to allow for the completion of a roadmap for the future of the Salton Sea by December 31, 2017, the State Water Board must determine, not later than April 18, 2017, whether it will schedule and hold an evidentiary hearing no later than July 17, 2017, as requested by this Motion. An evidentiary hearing is the appropriate proceeding for the State Water Board to consider modification of Condition Five of the Order pursuant to California Water Code sections 1735, *et seq.*, Title 23 of the California Code of Regulations sections 648, *et seq.*, and as anticipated in the Order itself, which is more fully set forth in the Points and Authorities attached hereto.

IID and the County Agencies view the State Water Board as critical to the process of restoration of the Salton Sea. An evidentiary hearing is an essential step in that process because it was the State Water Board's Order that required the State to evaluate the feasibility of restoration of the Sea. Were the State Water Board to refuse to schedule and/or conduct a timely evidentiary hearing, this would mean that there would not be an administrative forum in which the matter could be presented. Without this forum, absent seeking relief in other fora, there will be no relief at all for the Sea. Given the need for immediate action to protect the public health of the Imperial and Coachella valleys and the wildlife habitat of the Sea and its role in the Pacific Flyway, if the State Water Board fails to schedule and/or conduct a timely evidentiary hearing

IID and the County Agencies will have no other option but to make use of all remedies afforded under the QSA, the law and by the courts to protect the Salton Sea.

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the matter of:

IMPERIAL IRRIGATION DISTRICT'S (IID) AND SAN DIEGO COUNTY WATER AUTHORITY'S (SDCWA) AMENDED JOINT PETITION FOR APPROVAL OF A LONG-TERM TRANSFER OF CONSERVED WATER FROM IID TO SDCWA AND TO CHANGE THE POINT OF DIVERSION, PLACE OF USE, AND PURPOSE OF USE

Under Permit 7643 on Application 7482 of Imperial Irrigation District

(counsel listed on next page)

MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF MOTION OF PETITIONER IMPERIAL IRRIGATION DISTRICT AND INTERVENORS COUNTY OF IMPERIAL AND IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT FOR THE STATE WATER RESOURCES CONTROL BOARD TO CONDUCT AN EVIDENTIARY HEARING TO COMMENCE NO LATER THAN JULY 17, 2017 FOR MODIFICATION OF REVISED WATER RIGHTS ORDER 2002-0013

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MEMORANDUM OF POINTS AND AUTHORITIES IN SUPPORT OF MOTION TO HOLD AN EVIDENTIARY HEARING

Petitioner Imperial Irrigation District (**IID**) and Intervenors County of Imperial and Imperial County Air Pollution Control District (collectively **County Agencies**) hereby submit this Memorandum of Points and Authorities in Support of the Motion for an Evidentiary Hearing.

I. INTRODUCTION.

1. *Revised Order WRO 2002-0013*

On October 28, 2002, the State Water Resources Control Board (the **State Water Board**) issued Revised Order WRO 2002-0013 (the **Order**) [1] conditionally approving the long-term transfer of conserved water from the Imperial Irrigation District (**IID**) under the Quantification Settlement Agreement (the **QSA**) by approving a petition to change the point of diversion, place of use, and purpose of use under IID's Permit No. 7643 (Application No. 7482). The Order approves, under the QSA, the annual transfer for a term of up to 75 years of conserved water up to 200,000 acre-feet (**AF**) to San Diego County Water Authority (**SDCWA**) and up to 100,000 AF to Coachella Valley Water District (**CVWD**), or Metropolitan Water District of Southern California (**MWD**) under certain circumstances.

The Order was approved on the condition, among others, that salinity levels at the Salton Sea would be maintained for a period of 15 years through the Salton Sea Habitat Conservation Strategy (**SSCHS**), which called for providing replacement water to the Sea to mitigate the impact of reduced agricultural return flows caused by the conserved water transfer. (Order, pp. 3, 41-47, 86.) This condition has in effect resulted in the delivery of up to 800,000 AF of mitigation water to the Salton Sea to be completed by the end of 2017. The burden to create the mitigation water has been placed on the agricultural community of the Imperial County because, as the Order points out, the only possible source for this water has been through water conserved by fallowing land within IID's service area. (Order, p. 44.) However, the 15 years was chosen to serve a specific purpose. The Order expressly states that "[t]his requirement mitigates project impacts to the Salton Sea for a long enough period to provide time to study the feasibility of long-term restoration actions and begin implementation of any feasible restoration projects." (Order, p. 3; see also pp. 44, 47 and 87.) The State Water Board found the Order and this

[1] Order WRO 2002-0013 was amended with "certain clarifying amendments" by Order WRO 2002-0016 on December 20, 2002. (Order WRO 2002-0016, p. 3.) Both orders can be located at http://www.waterboards.ca.gov/waterrights/water_issues/programs/salton_sea/.

specific requirement "achieves a reasonable balance between the State's interest in protecting the fish and wildlife that depend on the Salton Sea, the State's interest in protecting the economy of Imperial County, and the State's interest in the implementation of this transfer to meet California's water supply needs." (Order, p. 3.)

2. *IID's Petition to Modify the Order.*

On November 18, 2014, IID filed a petition (the **Petition**) with the State Water Board seeking modification of the Order to add or modify an existing condition to require the State of California to fulfill its obligation to restore the Salton Sea. The Petition identifies IID's obligation to be completed by the end of 2017, by Condition Five of the Order, to deliver "replacement water" to the Salton Sea under the SSCHS to mitigate the impacts to biological resources of the Sea, specifically fish and bird habitat, resulting from the conserved water transfers under the QSA. (Petition, pp. 10-12 and 14-17.) The Petition details the need for immediate action by the State Water Board to forestall the public health and environmental catastrophe that will occur from fugitive dust emissions arising from the exposed playa at the Salton Sea as a consequence of the conserved water transfers, effects that the State Water Board recognized and acknowledged in the Order. (Petition, pp. 9-12 and 44-48; Order, pp. 36-37 and 71.) Most importantly, the Petition sets out how restoration of the Salton Sea was an indispensable component of the QSA, as it was specifically premised upon the legislation requiring the restoration of the Sea to remain in full force and effect without material modification. (Petition, pp. 14-20 and 36-44.) Consequently, the Petition requested that the State Water Board take immediate action to convene all interested stakeholders in a collaborative and cooperative process for identifying and implementing a realistic, feasible restoration plan for the Salton Sea and a mechanism for funding it. (Petition, pp. 48-50.)

3. *State Actions Taken in Last 2 Years in Response to the Petition.*

On March 18, 2015, the State Water Board conducted a public workshop to receive information and public input regarding whether the Board should take further actions to address the future of the Salton Sea. This initial workshop had an overwhelming stakeholder turnout and a resounding message that the State Water Board must take further actions to address the future of the Salton Sea. In response and shortly thereafter, in 2015 Governor Jerry Brown appointed a Salton Sea Task Force composed of top members of his Administration and appointed a new Assistant Secretary of Salton Sea Policy for the California Natural Resources Agency (**CNRA**).

The governor then issued the Salton Sea Task Force Agency Actions Plan (**Agency Actions Plan**), which outlines particular actions to be taken by a handful of state agencies with regard to the Salton Sea under the Salton Sea Management Program (**Salton Sea Program**). The Agency Actions Plan specifically calls for accelerated planning and permitting and "immediate implementation" of projects critical for the protection of regional air quality and natural resources at the Sea specifically "staged to address the expected progression of playa exposure" under the oversight of the State Water Board and the California Air Resources Control Board. While IID and the County Agencies were encouraged by this call for action, the process embarked upon by the CNRA since then has primarily involved public presentations that largely rehash proposals and activities made or undertaken by other agencies, most notably IID.

Also in 2015, Assembly Bill 1095 was adopted directing the CNRA to identify "shovel-ready" restoration projects at the Salton Sea to be submitted in a report to the Legislature in March 2016. The report, unfortunately, simply catalogued pre-existing IID and State efforts, such as the previously identified Species Conservation Habitat and Red Hill Bay projects, the Torres-Martinez Wetlands, and IID's Backbone Infrastructure project. As the non-governmental organizations pointed out during the State Waters Board's April 2016 workshop and again at the August 2016 workshop, even these projects touted by the CNRA as part of the Salton Sea Program are far too limited to address anticipated transfer impacts, and instead of moving forward even with these small projects, the State seems committed only to restudying, re-engineering and representing the existing plans and designs, rather than making concrete on-the-ground progress. In 2016 the Legislature appropriated approximately $80 million for the Salton Sea to be expended for the "shovel-ready" restoration projects submitted to the Legislature. While this appropriation was encouraging, the list of projects falls far short of addressing the 25,000 acres of fish and wildlife habitat and air quality projects directed by the Agency Actions Plan and the $80 million has already been identified and presented by the CNRA as insufficient to fully fund the limited list of shovel-ready projects in the report.

After the March 2015 workshop and based in part on the governor's actions, the State Water Board deferred processing and ruling on the Petition. Rather, it held a number of workshops to inform the public of the CNRA's progress toward the development of a restoration plan under the Salton Sea Program. At each workshop, with increasingly more urgency as time passed, the State Water Board requested that the responsible state agencies provide a report that

would detail a feasible plan to restore the Salton Sea. Although concerned with the possibility of losing additional valuable time by the State's development of the Salton Sea Program and the process it embarked upon to get stakeholder involvement in its actions, IID and the County Agencies were active participants in these workshops, offering extensive services and assistance to the State as it moved forward with its program. This participation was made possible by an email from counsel for the State Water Board to counsel for IID dated April 24, 2015 (the **SWRCB counsel email**) confirming that the Petition could resume being processed at any time and be considered at an evidentiary hearing before the State Water Board. Nevertheless, at each workshop, it was clear that the State's progress under its Salton Sea Program toward a feasible restoration plan was not sufficient given the cessation of the mitigation water deliveries in 2017.

At the final State Water Board workshop, on November 15, 2016, IID and the County Agencies made clear to the State Water Board that the abstract planning and countless meetings conducted by the State had consumed two years of irreplaceable time during which a 10-year roadmap for restoration of the Sea could – and should – have been adopted and implementation commenced. Most recently and shortly after that workshop, on December 9, 2016, the CNRA submitted to IID and the County Agencies a draft plan, titled Salton Sea Management Program, Phase I: Ten-Year Plan (the **SSMP**), which is intended to serve as a 10-year roadmap for restoration of the Sea. The CNRA has embarked upon revisions to the SSMP, but a date for release of a final plan has not yet been provided by the CNRA.

II. THE STATE WATER BOARD HAS THE AUTHORITY AND DUTY TO HOLD AN EVIDENTIARY HEARING TO CONSIDER THE PETITION.

As established in the Petition, the State Water Board has the clear and unquestionable authority and duty to impose new or modified conditions in the Order approving the QSA conserved water transfers and in order to carry out this authority and duty it must hold an evidentiary hearing regarding the Petition. The Legislature has vested the State Water Board with "plenary power and duties of management and oversight of valuable water resources." (*U.S. v. State Water Resources Control Bd.* (1986) 182 Cal.App.3d 82, 148; *see also Light v. State Water Resources Control Bd.* (2014) 226 Cal.App.4th 1463, 1485.) This includes all "powers … that may be necessary or convenient for the exercise of its duties authorized by law." (*Light, supra,* at p. 1482, quoting Water Code §186(a).) (Petition, pp. 30-31.)

The Water Code provides the plenary and undeniable authority to the State Water Board to revisit the Order to add or modify the conditions. (Petition, pp. 30-33; Water Code §§1701, *et seq.*) The State Water Board's authority over its orders is one of "continuing authority" and not a one-time power, regardless of whether or not the State Water Board has expressly reserved that authority within its order. (*U.S. v. State Water Resources Control Bd., supra,* p. 129, 152; *see also Environmental Defense Fund, Inc. v. East Bay Mun. Util. Dist.* (1980) 26 Cal.3d 183, 190; *cf. Nat'l Audubon Soc'y v. Superior Ct.* (1983) 33 Cal.3d 419, 446-447.) (Petition, pp. 32-33.) Nevertheless, the State Water Board expressly reserved its continuing authority in the Order, repeatedly noting the need to do so to protect the Salton Sea. (Order, pp. 46 fn. 11, 47, 47 fn. 12, 53, 59 fn. 18, 60, 66, 74, 77, 87 condition 7.)

An evidentiary hearing is the proceeding identified by the Water Code in which the State Water Board has the authority to conditionally approve the long-term conserved water transfers under the QSA and to revisit the conditions of that approval specified in the Order to protect fish, wildlife and other beneficial uses that may be affected by that long-term conserved water transfer.[2] Specifically, Water Code section 1736 states that the State Water Board may only approve a long-term conserved water transfer after "*providing notice and opportunity for a hearing*" and "*where the [long-term transfer] would not result in substantial injury to any legal user of water and would not unreasonably affect fish, wildlife, or other instream beneficial uses.*" (Water Code §1736, emphasis added, and Title 23 C.C.R. §§648, *et seq.*; *see also U.S. v. State Water Resources Control Bd., supra,* p. 103; Petition, p. 31-33.) The statutory duty placed on the State Water Board includes the "broad authority to control and condition water use," which "includes protection of the environment." (*Light, supra,*p. 1485.) (Petition, p. 30.)

The affirmative duty to hold an evidentiary hearing regarding the QSA conserved water transfers and to condition any such approval to protect the environment was originally recognized by the State Water Board in 2001 and 2002 when it issued a notice on December 20,

[2] IID and the County Agencies recognize that there is one alternative hearing option to an evidentiary hearing, which is an informal hearing that is identified in the State Water Board regulations under Title 23 of the California Code of Regulations, section 648.7. However, section 648.7 lists the factors to be considered to determine whether a matter will be heard in an informal hearing, which include the number and nature of written comments, the number of interested persons wishing to present oral comments at the hearing, the complexity and significance of the issues involved and the need to create a record. The application of these factors to this situation overwhelmingly supports the need for an evidentiary hearing and makes clear that an informal hearing would be wholly inadequate. IID and the County Agencies would object to an informal hearing as allowed by this regulation to resolve this complex and significant issue affecting the Imperial and Coachella valleys and the stability of the water supply for California.

2001 and a revised notice on February 5, 2002 and held an evidentiary hearing in two phases over 15 days between April 22, 2002 and July 16, 2002, the result of which was the conditional approval of the QSA conserved water transfers pursuant to the Order, including the conditions specifically protecting the Salton Sea and the Imperial and Coachella valleys. (Order, pp. 9-11, 84-92.) As a result of the previous evidentiary hearing and considering the circumstances set forth in the Petition affecting the Salton Sea, an evidentiary hearing to consider modification of the conditions of the Order is the only appropriate proceeding to be conducted by the State Water Board.

III. AN EVIDENTIARY HEARING MUST BE HELD BY THE STATE WATER BOARD TO SATISFY THE CONDITIONS OF THE ORDER.

As the State Water Board is well aware, the Order approved the QSA conserved water transfers based upon the first and foremost premise that 15 years of mitigation water delivered to the Salton Sea would hold the line against degradation while restoration was studied, a plan was developed and implementation of that plan commenced. (Order, pp. 3, 44, 47, 66,71, 86-87.) As the Order points out, in 2002, the impacts of the QSA conserved water transfers on the Salton Sea "generated the most concern in [that] proceeding." (Order, p. 2.) For that reason, the Order approved the QSA conserved water transfers with the conditions that IID would deliver mitigation water under the Salton Sea Habitat Conservation Strategy (**SSHCS**) for 15 years and the State Water Board would consider modifying this condition "in light of the results of the study on the feasibility of restoration…" (Order, pp. 86-87, conditions 5 and 7.) That 15-year period will expire this year, and while restoration has been studied at length, there is still no concrete final plan for restoration.

The SSHCS and the 15-year period of mitigation water being delivered to the Salton Sea were to neutralize the effects of the transfer on fish and wildlife connected to salinity levels of the Sea. (Order, p. 3, "[W]e conclude that salinity levels at the Salton Sea that would have existed in the absence of the transfer should be maintained for a period of 15 years."; *see also* Order, p. 46, "… by this order we require IID to maintain baseline salinity levels, as outlined under the SSHCS for 15 years following the effective date of the QSA.") The State Water Board relied specifically on SB 482 as a further basis for imposing the condition to preserve the status quo at the Salton Sea for 15 years. (Order, p. 46, "[I]mplementation of the QSA, during the first 15 years that the agreement is in effect (1) will not result in a material increase in projected

salinity levels at the Salton Sea and (2) will not foreclose alternatives for reclamation of the Salton Sea.")

As set out in the Order, "[t]his requirement mitigates project impacts to the Salton Sea for a long enough period to provide time to study the feasibility of long-term restoration actions and begin implementation of any feasible restoration projects." (Order, p. 3.) Moreover, this condition of determining the feasibility of restoration over a 15-year period was specifically designed to allow the State Water Board to set a specific decision point in the future, rather than being forced to prejudge the feasibility of restoration on the date the Order was issued. (Order, p. 3, "At the same time, it avoids prejudging those restoration-planning efforts".)

The State Water Board succinctly explained the value of imposing this condition in the Order as achieving "a reasonable balance between the State's interest in protecting the fish and wildlife that depend on the Salton Sea, the State's interest in protecting the economy of Imperial County and the State's interest in the implementation of the transfer to meet California's water supply needs." (Order, p. 3; *see also* p. 46, "SB 482 achieves a reasonable balance between the importance of mitigating project impacts to the Sea long enough to study the feasibility of long-term restoration, the economic impacts of fallowing, and the importance of the transfer to California's water supply needs.")

With respect to the "balance" that the State Water Board had anticipated, the State of California has received the benefits of the QSA conserved water transfers that: a) protected the water supplies of Southern California by bringing California into compliance with its obligation to reduce California's annual use of Colorado River water to 4.4 million AF, and b) protected the Bay-Delta region from additional water exports to the Southern California coast that would have had devastating effects on that already heavily impacted environmental area. The State Water Board found at the time of issuance of the Order, protecting the Bay Delta and reducing California's annual Colorado River water use to 4.4 million AF justified the environmental consequences to the Salton Sea and the Imperial and Coachella valleys. The State Water Board reasoned that,

> If the proposed transfer is not implemented because the cost of mitigation is too high, the consequences to the State's water supply and to the San Francisco Bay/Sacramento San Joaquin River Delta (Bay-Delta) could be severe. In view of these competing considerations, we conclude that IID should be required to maintain baseline salinity levels, as specified by the SSHCS, for 15 years. (Order, p. 44.)

The State Water Board also recognized the negative socio-economic impacts that fallowing land could have on Imperial County. (Order, p. 44-45.) However, the State Water Board reasoned that limiting the delivery of the mitigation water to the Salton Sea for the 15-year period and the continuing authority reserved to revisit conditions at the end of the 15 years provided that balance to the socio-economic interests of the region. (Order, pp. 2, 44-45, 59-60, 73-77.)

While the condition for implementation of the SSHCS for 15 years achieved the balancing of many interests, the State Water Board also had the foresight to recognize that these mitigation measures could not continue indefinitely into the future and that it would have to take up the issue of restoration of the Salton Sea again after it was studied. (Order, p. 3, "[This Order] also recognizes that it would be unreasonable to have these mitigation requirements remain in effect if restoration planning either ultimately produces a plan that will restore the Salton Sea without requiring continued mitigation by the parties to the transfer or reveals that restoration is infeasible.") While the State Water Board acknowledged the uncertainty of future mitigation requirements, it was unequivocal in asserting its commitment to revisit the issue in 15 years. (Order, p. 47, "With the mitigation requirements imposed by this order, the transfer will not have an adverse impact on the water quality of the Salton Sea, and the degradation will not occur for at least 15 years. It is uncertain what the future of the Sea will be after 15 years. Restoration efforts may continue to maintain the water quality of the Salton Sea, or it may be determined that maintaining the existing beneficial uses is impossible. As explained in section 5.1.5, it is appropriate to apply water quality standards as part of a more comprehensive review, and not just to this transfer in isolation. Because we are reserving continuing authority, we need not speculate at this time on how or under what circumstances the SWRCB should address degradation that may occur 15 years from now.")

The studies regarding feasibility of restoration of the Salton Sea were to be completed by the end of the 15-year period and the State Water Board was to reevaluate the conditions in light of those studies and any identified feasible restoration measures that could begin to be implemented during that period. (Order, p. 47; *see also* p. 2, "The feasibility of restoring the Salton Sea is the subject of an ongoing study by the Secretary of Interior and the Salton Sea Authority."; p. 44, "Fifteen years will allow the Secretary of Interior, Salton Sea Authority,

Secretary of Resources, and the Governor of California sufficient time to study the feasibility of restoration of the Salton Sea and begin implementation of any identified feasible restoration measures.") In fact, the State Water Board specifically in Condition Seven anticipated substantial work to be done to study the feasibility of restoration from the United States Bureau of Reclamation in addition to the efforts of the Resources Agency, the Salton Sea Authority and the governor relying on the eloquent language of SB 482 (Order, p. 87, "The [State Water Board] reserves continuing authority to consider whether it would be appropriate to add, delete, or modify the mitigation measures required by Conditions 5 and 6, above, in light of the results of the study on the feasibility of restoration to be prepared by the Secretary of Interior, in cooperation with the Resources Agency, the Salton Sea Authority, and the Governor of California, in accordance with the Salton Sea Reclamation Act of 1998 and Senate Bill 482.")

The Order and specifically Condition Five for the delivery of the mitigation water to the Salton Sea under the SSHCS for 15 years make no sense without the State Water Board's reevaluation of the conditions at an evidentiary hearing. (Order, p. 86.) The effect of the SSHCS for 15 years has been the delivery of up to 800,000 AF to the Salton Sea. The Order expressly states that "[n]othing in this order requires the petitioners to proceed with the transfer, or in the absence of the transfer to satisfy any of the *conditions or mitigations described in this order.*" (Order, p. 3, emphasis added.) Even so, IID dutifully complied with the mitigation measures prescribed by the conditions in the Order and waited patiently for 13 years to receive the benefits of the restoration-planning efforts anticipated by the Order. As the 15-year period comes to an end, there is no additional time that can be allowed or any more water that can be expended without the future of the Salton Sea being vetted by the State Water Board. It is now time for an evidentiary hearing to be held for the reevaluation of the conditions, as was anticipated throughout the entire Order and, after a full evidentiary hearing under the continuing jurisdiction it retained specifically for that purpose, the State Water Board must modify the Order as needed to ensure restoration of the Salton Sea by the State of California.

IV. RESTORATION OF A SMALLER BUT SUSTAINABLE SALTON SEA IS FEASIBLE AND THE STATE IS OBLIGATED TO RESTORE IT.

The State Water Board approved the QSA conserved water transfers based on the assumption – quite reasonably – that the State of California would be able during the SSHCS 15-year period to determine whether restoration of the Salton Sea was feasible and, if so, to develop

and begin implementing a plan to restore the Sea. (Order, pp. 3, 44.) After 15 years of studying restoration of the Salton Sea, one thing has become clear – restoration of a smaller but sustainable Sea is feasible.

As recognized in the Order, as the QSA conserved water transfers continue and up to 300,000 AF of conserved water is annually transferred outside of the IID water service area, the Salton Sea will be shrinking. (Order, p. 71.) IID and the County Agencies prepared a draft framework analysis in July 2015, which identified feasible restoration efforts that could be implemented as the elevation of the Salton Sea recedes in anticipation of a smaller but sustainable Sea. (*Draft Executive White Paper, Framework for a Smaller But Sustainable Salton Sea* and *Framework Document,* July 2015 http://www.iid.com/home/showdocument?id=10121 and http://www.iid.com/home/showdocument?id=10123.)

The feasibility of a smaller but sustainable Salton Sea has been recognized by the State of California as well. The CNRA has repeatedly conceded during State Water Board workshops and its own public outreach presentations that restoration of a smaller but sustainable Sea is feasible. In fact, the framework analysis and the IID Backbone Infrastructure Project coming out of that analysis has been incorporated into the SSMP developed by CNRA and is a foundational piece of restoring a smaller but sustainable Sea. Additionally, the Agency Actions Plan specifically states that "[t]he implementation of sustainable habitat and air quality management and mitigation at the Salton Sea through a Salton Sea Management Program is critical for the protection of regional air quality, natural resources at the sea, and the management of a stable Colorado River Supply for California." By this statement, it is clear that the governor recognizes the feasibility of a smaller but sustainable Salton Sea. The Agency Actions Plan then establishes the feasibility of restoration of the Salton Sea further by setting clear and specific short-term and medium-term restoration goals of creating up to 25,000 acres of habitat and dust suppression projects. Further, the governor directed the State Water Board in the Agency Actions Plan to "regularly monitor and assess progress on the implementation of the Salton Sea Management Program." There could be no other purpose for directing the State Water Board "to monitor and assess progress on the implementation" of restoration than to ensure that restoration would actually take place. The governor's directive must have intended that the State Water Board would take whatever actions needed to ensure that CNRA was meeting its obligations, including the enforcement of its own Order.

The Order reasonably relied on the foundational premise that, if restoration were found to be feasible, the State of California would undertake that restoration. Not only did State officials directly assure IID in 2002 and 2003 that it would restore the Salton Sea – as Director Kuhn detailed in the initial State Water Board workshop regarding the Sea in March 2015 – but as more fully set forth in the Petition, the State of California also enacted the "QSA Legislation" (a package of three bills, SB 277, SB 317 and SB 654) in which the California Legislature agreed to assume the costs of Salton Sea restoration and QSA mitigation, except for the first $133 million (in 2003 dollars) in mitigation costs to be borne by IID, SDCWA and Coachella Valley Water District. (Petition, p. 18.) Specifically, in SB 277, the "Salton Sea Restoration Act," the Legislature declared it to be "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." (Fish & Game Code §2931(a).) (Petition, p. 18.) The sponsors of SB 277 explained that it entailed "a commitment on the part of the State to restore the Salton Sea," and that SB 277 "states that it is the responsibility of the State of California to restore the Salton Sea." (Petition, p. 18.)

The State's obligation to restore the Salton Sea was made manifest in 2013 when the Legislature and Administration renewed their commitment to Salton Sea restoration with the passage of AB 71, which reaffirmed that it remains "the intent of the Legislature" to "[p]ermanently protect fish and wildlife that are dependent on the Salton Sea ecosystem," "[r]estore the long-term stable aquatic and shoreline habitat for fish and wildlife that depend on the Salton Sea," and "[m]aintain the Salton Sea as a vital link along the Pacific Flyway." (Fish and Game Code §2940(e).) AB 71 also provided that the CNRA would lead the State's Salton Sea restoration efforts." (Fish and Game Code §2941.) The 2014 California Water Action Plan, as updated in 2016, directly calls on the State Water Board to oversee CNRA leadership in the development and implementation of a comprehensive and accelerated response to the air quality and ecological needs at the Sea.

The culmination of all of these efforts occurred when, in August 2016, the CNRA signed the Memorandum of Understanding By and Between the United States Department of the Interior and the California Natural Resources Agency Regarding the Coordination of Activities to Manage the Salton Sea (the **federal MOU**). The federal MOU notes that "[u]nder the QSA, the State of California agreed to assume responsibility for environmental mitigation requirements

in excess of $133 million (in 2003 dollars), the amount that the QSA requires three local water agencies to pay for this purpose." (Federal MOU, p. 2.) The federal MOU also affirms that in the Agency Actions Plan "the State recognizes that immediate implementation of sustainable habitat and air quality management and mitigation at the Sea through a Salton Sea Management Program is critical for the protection of regional air quality, natural resources at the [S]ea...." (Federal MOU, p. 3.) Significantly, the federal MOU links the need for restoration of the Sea to the obligation of California to work with other Colorado River basin states in a manner that ensures "the management of a stable [Colorado] River water supply for California." (Federal MOU, p. 3.)

The federal MOU tracks exactly the position of IID and the County Agencies. It concludes that it is necessary that there be "clear and achievable milestones with State-directed plans to achieve them" and "the State's role as lead on Sea management." (Federal MOU, p. 4.) Finally, the federal MOU found that achieving the State's goal of providing 25,000 acres of wildlife habitat, air and water quality projects and other projects is critical. (Federal MOU, p. 4.) In January 2017, the State of California strengthened its commitment to restoring the Salton Sea when the CNRA entered into an Addendum to the August 31, 2016, Memorandum of Understanding By and Between The United States Department of the Interior and The State of California Natural Resources Agency Regarding The Coordination of Activities to Manage the Salton Sea (the **Addendum**). The Addendum states that "the Parties wish to ensure that there is a seamless and continuous effort in furtherance of the goals of the MOU during 2017, given the end of the mitigation flows identified in the 2003 Quantification Settlement Agreement (QSA) agreements, the importance of actions to support implementation of existing Colorado River conservation actions, and additional actions that may be taken in light of the ongoing historic drought on the Colorado River." (Addendum, p. 1.)

As fully discussed above, all of the legislation, the findings of the Order, the uncontested testimony at multiple workshops before the State Water Board, including that of the CNRA, and the federal MOU, demonstrate that there can be no question that restoration of the Salton Sea is feasible. Because it is feasible, it is the obligation of the State of California to undertake restoration of the Sea.

V. FAILURE OF THE STATE WATER BOARD TO MODIFY THE CONDITIONS OF THE ORDER WILL RESULT IN IMMEDIATE, PALPABLE AND IRREPARABLE INJURY.

As shown in the Declaration of Tina Shields (attached hereto as Exhibit D), IID will fully meet its mitigation water delivery obligation under the QSA agreements and the Order by December 31, 2017, if not sooner, after which mitigation water to the Salton Sea will end.

When IID completes deliveries of mitigation water to the Salton Sea and begins to ramp up the conserved water transfers in 2018, the rate of elevation decline at the Salton Sea and the rate at which playa becomes exposed will both increase dramatically. (Order, p. 43.) As shown in the Declaration of Ms. Shields, once the deliveries of mitigation water cease, it is expected that an average of approximately 3,300 to 5,600 acres of playa will be uncovered each year for the next decade totaling over 50,000 acres of exposed Salton Sea playa by 2028.

There is no scientific dispute that as greater areas of Salton Sea playa are exposed the rates of fugitive dust emissions (PM_{10}) will increase dramatically. As established in the County Agencies' public comments for the March 2015 State Water Board workshop, those fugitive dust emissions will increase the rates of respiratory disease, asthma, lung damage, bronchitis and lung cancer in the Imperial and Coachella valleys, which are already among the highest rates in California. (ICAPCD March 2015 workshop public comments, http://www.waterboards.ca.gov/waterrights/water_issues/programs/salton_sea/docs/comments031115/ryan_kelley.pdf; Imperial County March 2015 workshop public comments, pp. 3-5 http://www.waterboards.ca.gov/waterrights/water_issues/programs/salton_sea/docs/comments031115/ryan_kelley_031115.pdf.) There was also no question that those fugitive dust emissions – mostly $PM_{2.5}$ and PM_{10} – would pose increased threats to human health, particularly in young children and in the elderly. (ICAPCD March 2015 workshop public comments. *supra*.) Furthermore, the County of Imperial contains one of the highest rates of unemployment in the State, with high poverty rates paralleling the unemployment rate, particularly among minority populations. (Imperial County March 2015 workshop public comments, *supra,* p. 7.) Thus, the failure to restore the Sea will visit upon these most vulnerable of populations the misfortune of higher rates of respiratory distress and asthma while the conserved water transfers to the more urban and economically prosperous populations on the urban coast continue without interruption.

Moreover, the accelerated decline in Salton Sea elevation also means that the already high salinity levels will continue to increase such that it is unclear if the tilapia fishery will

survive much longer, let alone reproduce in the Sea's high salinity in order to continue serving as the primary food source for millions of migrating waterfowl along the Pacific Flyway. (Order, p. 46.) Unless aggressive action is taken by the State of California to develop and implement a 10-year roadmap to restore the Salton Sea, when the mitigation water deliveries are completed the inevitable public health and environmental catastrophe in the Imperial and Coachella valleys will be exactly as anticipated by the State Water Board when it imposed the condition to restore the Sea in the Order. The very life of the Salton Sea ecosystem relies on enforcement of the condition imposed by the State Water Board in the Order for restoration of the Sea.

As set out above, the approval of the long-term QSA conserved water transfers was expressly conditioned on the development of a Salton Sea restoration plan during the 15-year SSHCS period. Because restoration of the Sea has not happened, the inevitable health risks anticipated by the State Water Board in the Order and starkly described in the multiple workshops before the State Water Board are now about to occur. The *quid pro quo* for the condition that IID deliver 15 years of mitigation water to the Sea was straightforward and understood by all: In exchange for delivery of this mitigation water, the State would study the feasibility of restoration and develop a plan to make this happen. All parties – including but not limited to the State of California – knew that the conserved water transfers would cause significant harm to air quality and habitat. IID was asked to and faithfully delivered the mitigation water so as to stabilize regional environmental and air quality conditions for a long enough period for the State to study the feasibility of long-term restoration actions, develop a plan for restoration and begin implementation of that restoration plan. (Order, pp. 47, 53, 60, 66, 74, 77, 87.) IID lived up to its part of the bargain; an evidentiary hearing would ensure that the State lives up to its commitment. The State Water Board must order that the commitment it demanded in the Order be carried out. There simply is no tenable alternative to fulfilment of the State's obligation to restore the Sea. There is no time to look in vain for a less expensive, less difficult "Plan B."

The Order is not ambiguous. The State Water Board in 2002 understood it could not approve a transfer that would cause substantial damage to environmental habitat and to human health. On the other hand, it also understood that it was essential to provide needed water supplies to urban areas of Southern California and address the environmental needs of the Bay-Delta area. (Order, p. 44.) To allow the conserved water transfers to go forward, the State Water

Board imposed, among others, a condition on the approval of the QSA conserved water transfers that IID would provide a 15-year period of mitigation water deliveries to reduce the threat of fugitive dust emissions. (Order, p. 47, 86.) In return, the State was required to evaluate the feasibility of restoration and if restoration were feasible, it would develop a plan for restoration of the Salton Sea. (Order, p. 87.)

In the Order, the rationale of the State Water Board was clear. It made two findings that provide guidance for this Motion. First, the State Water Board found that the QSA conserved water transfers are of overriding importance to the State's water supply reliability. (Order, p. 73.) Second, the State Water Board found that the QSA conserved water transfers could only be permitted if the anticipated Salton Sea air quality and habitat impacts were addressed. (Order, pp. 72-73.) The State Water Board has the opportunity to address these findings through an evidentiary hearing and modification of the Order, as IID and the County Agencies are requesting.

VI. REQUESTED RELIEF.

In these waning months of the 15-year period provided to the State for the preparation of a plan for restoration of the Salton Sea, IID and the County Agencies respectfully request that the State Water Board conduct an evidentiary hearing and exercise its duty and the continuing authority it expressly reserved in Condition Seven of the Order to modify Condition Five. That hearing would address the State's SSMP for implementation of the next steps to be taken for restoration of the Sea. The proposal would be presented "in light of the results of the study on the feasibility of restoration" and would inform the State Water Board as to the progress that has been made by the State during the last 15 years. (Order, p. 87.)

An evidentiary hearing is required because IID and the County Agencies recognize that the CNRA will within a few months, if not weeks, finalize the SSMP. If the SSMP contains all components that are necessary for a restoration plan, an evidentiary hearing is required to memorialize this plan within the Order. If it falls short, nothing less than a full evidentiary hearing is required to allow this Board to modify Condition Five to require that the plan be modified to include all of the components necessary for restoration of a smaller but sustainable Salton Sea. It is incumbent upon the State Water Board, in the exercise of its jurisdiction, to work with IID and the County Agencies and ensure that the State of California, acting through the CNRA, meets its obligation to protect its citizens and the ecosystem of the Salton Sea region

The failure of the CNRA to develop a credible 10-year roadmap in its SSMP will have repercussions, not only for the State of California but throughout the west. California has been cooperating with the other six Basin States on the Colorado River to develop a plan to proactively address the ongoing 17-year drought. All Lower Basin states have been attempting to develop an agreement to reduce Colorado River water delivered to them to maintain elevation or build storage in Lake Mead. Major California water users, IID and the Metropolitan Water District of Southern California, have been at the forefront of these discussions.

But IID, while fully engaged in these important negotiations, now faces a serious dilemma. IID is willing, under certain rules of operational access, to store conserved water in Lake Mead to build elevation through storage programs and defer use of that water within IID until the drought abates. It is self-evident, however, that storage of IID conserved water in Lake Mead will mean reductions in delivered water to IID and its users, which in turn will mean less agricultural return flows to the Salton Sea. Preparation of the SSMP in the abstract, without addressing the realities of drought on the Colorado River, will make it of little or no value other than as an esoteric exercise. Simply stated, the absence of a restoration plan for a smaller but sustainable Salton Sea precludes IID from participating in the federal Drought Contingency Plan (**DCP**) developed for the Colorado River. IID cannot sacrifice the Salton Sea for the benefit of the DCP. The impasse is clear. The State Water Board can break that impasse by holding an evidentiary hearing and modifying the Order to mandate the Sea's restoration in concrete and measurable ways.

There can be no claim of surprise at the issues raised by IID and the County Agencies in this Motion. IID and the County Agencies have made it clear to the State Water Board throughout 2016 that a 10-year roadmap is required for restoration of the Salton Sea; a plan that will protect the public health of the Imperial and Coachella valleys and the ecosystem at a scale that is sustainable over time at the Sea.

The State Water Board has a simple choice before it. It can notice and schedule an evidentiary hearing as requested by this Motion to consider modification of Condition Five of the Order pursuant to California Water Code sections 1735, *et seq.*, Title 23 of the California Code of Regulations sections 648, *et seq.*, and as anticipated in the Order itself. This would be consistent not only with the Order, but with California law, the Governor's Agency Actions Plan, as affirmed in the California Action Plan and the recent federal MOU. This evidentiary hearing

will allow the State Water Board to evaluate the State's progress over the last 15 years and either memorialize an acceptable SSMP through modification of the Order or it can mandate that the CNRA prepare a legally binding and enforceable SSMP containing a 10-year restoration roadmap that will in fact result in the restoration of a smaller but sustainable Sea.

Due to the urgency and priority of this Motion to protect the public health of the communities of the Imperial and Coachella valleys and to protect the fish and wildlife habitat at the Salton Sea, IID and the County Agencies request the State Water Board determine, not later than April 18, 2017, whether it will schedule and hold an evidentiary hearing no later than July 17, 2017 as requested by this Motion. IID and the County Agencies specifically request the State Water Board consider at an evidentiary hearing the modification of Condition Five of the Order by adding the following paragraphs:

> The State Water Board finds that, after 15 years of delivering up to 800,000 acre-feet of mitigation water to the Salton Sea under the Salton Sea Habitat Conservation Strategy and after several studies regarding the feasibility of restoration of the Sea, the State of California has a legal and enforceable duty to restore the Salton Sea, that restoration of a smaller but sustainable Sea is feasible and that restoration must be completed forthwith in order to avoid catastrophic consequences to the State of California as a whole and specifically to the health of the residents of the Imperial and Coachella Valleys and to the multiple wildlife habitats that exist at the Sea and serve the Pacific Flyway.
>
> The California Natural Resources Agency is hereby ordered to submit a final Salton Sea Management Program 10-year restoration roadmap to the State Water Board no later than October 1, 2017 that will include the following:
>
> a. Acreage performance standards for each calendar year from 2018 through 2025, inclusive and a corresponding schedule;
> b. Proposed permit streamlining actions for performance of the plan;
> c. An adaptive management plan for implementation;
> d. Identification of funds and actions to obtain additional funding for implementation of the plan;
> e. A 5-year consultation process to initiate the planning and management of restoration activities for the next 10 years; and
> f. A statement affirming the State's obligation to restore the Salton Sea with specific oversight actions by the State Water Board to ensure implementation of the plan.
>
> The California Natural Resources Agency shall enter into an agreement with the Permittee and the County of Imperial to implement all actions identified in the Salton Sea Management Program 10-year restoration roadmap, implementation of which shall be overseen by the State Water Resources Control Board as set forth in the Governor's Salton Sea Agency Actions Plan. The State Water Resources Control Board and the Superior Court of Imperial County shall have concurrent jurisdiction for any actions to enforce said agreement.

IID and the County Agencies respectfully request that the State Water Board calendar this matter for a preliminary status conference at the conclusion of its regular meeting on April 4, 2017 so that the State Water Board may hear from interested parties whether they support this Motion.

In the alternative, however, the State Water Board could decide that it will not schedule a hearing in response to this Motion. IID and the County Agencies believe such inaction would place the State Water Board in a precarious legal and political position. By refusing to enforce its own condition of the Order retaining continuing jurisdiction over the environmental issues at the Salton Sea related to the QSA conserved water transfers, it would needlessly call into question the validity of its own Order approving the QSA conserved water transfers. By refusing to insist on real progress toward the restoration of the Salton Sea, the State Water Board would be refusing to implement the Agency Actions Plan promulgated by the governor. The State Water Board should expect that IID and the County Agencies, as well as numerous other stakeholders, will strongly object to any such inaction on the part of the State of California, especially when the health of the people of the Imperial and Coachella valleys and the continued viability of the Pacific Flyway are at stake. Given the need for immediate action to protect the public health of the Imperial and Coachella valleys and the wildlife habitat of the Sea and its role in the Pacific Flyway, IID and the County Agencies will have no other option if the State Water Board fails to schedule and/or conduct a timely evidentiary hearing but to exercise all rights to utilize remedies afforded under the QSA, the law and by the courts.

Despite the express language in the Order and the multiple statutes committing the State to restoration of the Salton Sea, commitments that were reaffirmed in the federal MOU as recently as August 2016, the State of California has taken limited action that will restore the Salton Sea and thereby comply with the Order. To the degree that the State of California has to date not made the policy choice to adequately fund the restoration effort, IID and the County Agencies wish to make clear that they are not asking the State Water Board to direct the Legislature to appropriate funds. Rather this Motion is requesting that this Board direct the CNRA, working with the California Department of Fish & Wildlife and the California Department of Water Resources, to prepare an SSMP, including a 10-year restoration roadmap for the Salton Sea, as specified above and in conformance with the material presented at the

evidentiary hearing, and that they expend the funds needed to restore the Salton Sea while pursuing all funding alternatives. The State Water Board must notice and hold an evidentiary hearing to hear and evaluate evidence from all interested parties whether modification of the Order as proposed in this Motion is appropriate and necessary.

For the reasons set forth above, Petitioner IID and Intervenors the County Agencies respectfully request that the State Water Board commence a hearing no later than July 17, 2017 and issue a decision no later than December 15, 2017, for the purposes set forth above and in the Petition. The people of the Imperial and Coachella valleys have waited more than two years for the State Water Board to take action on the Petition; they cannot be expected to wait any longer.

Respectfully submitted,

evidentiary hearing, and that they expend the funds needed to restore the Salton Sea while pursuing all funding alternatives. The State Water Board must notice and hold an evidentiary hearing to hear and evaluate evidence from all interested parties whether modification of the Order as proposed in this Motion is appropriate and necessary.

For the reasons set forth above, Petitioner IID and Intervenors the County Agencies respectfully request that the State Water Board commence a hearing no later than July 17, 2017 and issue a decision no later than December 15, 2017, for the purposes set forth above and in the Petition. The people of the Imperial and Coachella valleys have waited more than two years for the State Water Board to take action on the Petition; they cannot be expected to wait any longer.

Respectfully submitted,

Dated: March 15, 2017

DOWNEY BRAND LLP

By: _____

DAVID R.E. ALADJEM
Attorney for Imperial Irrigation District

Exhibit A

Aladjem, David

From: Lauffer, Michael@Waterboards <michael.lauffer@waterboards.ca.gov>
Sent: Friday, April 24, 2015 5:02 PM
To: Aladjem, David
Subject: Imperial Irrigation District - Salton Sea Petition

David,

As part of your inquiry related to ex parte communications and the above matter, you requested clarification on the status of the Imperial Irrigation District petition filed last November. The petition remains active before the State Water Board, even though no hearing is presently noticed that would trigger the prohibition on ex parte communications.

The petition process could resume apace at any time. At this time, though, the State Water Board is deferring its proceedings to allow a multi-agency effort on Salton Sea mitigation and potential restoration to proceed. That effort is being coordinated under the auspices of the Governor's Office. Depending on the outcome of that process, the State Water Board could resume the petition process, potentially culminating in a hearing before the State Water Board.

-maml

CALIFORNIA Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

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Save Our Water

For tips on what you can do to save water, visit http://saveourwater.com/

Exhibit B

CALIFORNIA natural resources AGENCY

CalEPA California Environmental Protection Agency

Salton Sea Task Force
Agency Actions

The implementation of sustainable habitat and air quality management and mitigation at the Salton Sea through a Salton Sea Management Program is critical for the protection of regional air quality, natural resources at the sea, and the management of a stable Colorado River Supply for California. The Salton Sea Task Force recognizes the contributions of the local leadership, plans, and initiatives that have informed the Task Force process. Following meetings with key stakeholders, the Task Force finds that implementation of a successful Salton Sea Management Program depends on the following three principles: 1) strong state, federal, and local partnerships; 2) clear and achievable milestones with state-directed plans to achieve them; and 3) committed participation from all stakeholders who share the goals of protecting air quality, reducing habitat impacts, and maintaining a secure Colorado River Water Supply. These three factors will drive decision-making on a short- and a medium-term plan while leveraging fiscal and technical resources to deliver projects in an expedited manner.

The Natural Resources Agency will take the following actions over an accelerated timeline:

- **Begin immediate implementation and further development of Salton Sea management plan**
  - The plan will prioritize actions that respond to air quality and natural resources impacts while incorporating opportunities for regional economic development, including recreational and renewable opportunities that benefit implementation of the plan.
  - A science advisory committee will be utilized to provide scientific expertise into plan development.
  - Colorado River stakeholders will be asked to assist with the development of the plan. The Salton Sea Authority and its members will be asked to help facilitate local involvement.

- **Improve public outreach and local partnership**
  - Air quality and environmental impacts of a reduced Salton Sea will be felt foremost by the residents of the region. The state will provide a meaningful public forum to discuss Salton Sea issues locally and to develop future plans and actions.

- **Accelerate project implementation and delivery**
  - The state will work with Salton Sea, Colorado River partners to accelerate planning, state and federal permitting and construction.

- **Meet a short-term goal of 9,000-12,000 acres of habitat creation and dust suppression projects at the sea**
  - Projects to meet short-term goals will be achievable with available funding.
  - Short-term projects will address dust suppression and natural resources needs while laying the foundation for a long-term Salton Sea management framework.
  - Projects will be staged to address the expected progression of playa exposure and designed to provide access corridors for renewable energy development on those lands.

- **Set medium-term goal of 18,000-25,000 acres of habitat creation and dust suppression projects at the sea**
  - Funding plans to meet medium-term goals will need to be developed by the state with Salton Sea and Colorado River partners.

Ensure Oversight by Regulatory Agencies:

- The State Water Resources Control Board will regularly monitor and assess progress on the implementation of the Salton Sea Management Program, including the development of management plans and funding options, and any potential action by the State Board.

- The State Water Resources Control Board will periodically hold public workshops as part of its monitoring and assessment function.

- The State Water Resources Control Board will work with the Colorado River Regional Water Board and the Administration to improve water quality and upstream co-benefits in the New River and the Alamo River.

- The California Air Resources Board will coordinate with local partners to address air quality impacts from the Salton Sea, work with Imperial and South Coast air districts to monitor air quality, and provide technical and scientific expertise to ensure effective mitigation of dust impacts from exposed playa.

Consider opportunities for increasing renewable energy development at and around the Salton Sea:

- As part of the implementation of the Clean Energy and Pollution Reduction Act of 2015 (SB 350), the California Energy Commission and the Public Utilities Commission will evaluate how renewables at and around the Salton Sea will further the goals of the integrated resources plans, including a balanced resource mix and the minimization of localized air pollutants.

- Within the next year, as part of planning to meet the 2030 greenhouse gas goals, the Public Utilities Commission, the Energy Commission and the Independent System Operator will consider renewable energy opportunities at and around the Salton Sea and the region, and any additional transmission that may be needed for the near term or long term.

Exhibit C

MEMORANDUM OF UNDERSTANDING

BY AND BETWEEN

THE UNITED STATES DEPARTMENT OF THE INTERIOR

AND

THE STATE OF CALIFORNIA NATURAL RESOURCES AGENCY

REGARDING THE COORDINATION OF ACTIVITIES TO MANAGE THE SALTON SEA

I. INTRODUCTION AND BACKGROUND

The Salton Sea (Sea), an endorheic water-body, is California's largest lake and located in Imperial and Riverside Counties. The Sea is the modern incarnation of Lake Cahuilla, a prehistoric, intermittent freshwater sea that filled and evaporated multiple times over thousands of years as the Colorado River (River) meandered on its delta—shifting between emptying into the Gulf of California, or diverting northwest, into the Salton Trough.

In 1905 when the River flood flows breached an inadequate diversion structure (built by what was then the California Development Company), the full might of the River emptied once again into the basin. After 2 years the River's course was engineered back to the Gulf, and left behind was the Salton Sea. In 1924, certain specified lands beneath the Sea were designated a drainage reservoir by Presidential Order. Where the Sea would have evaporated once more, agricultural runoff from the Imperial and Coachella Valleys (with water from the Colorado River) and other sources has maintained its elevation and affected its composition over the last century.

The Sea loses approximately one million acre-feet of water a year to evaporation. Early on, the accumulation of salts and nutrients in the terminal lake, by its sustaining agricultural drainage waters, were acknowledged as a challenge to the future viability of the Sea. From the start, various studies were conducted to assess the issue, but no comprehensive actions were taken. Thirty or more species of sport fish were stocked by the California Department of Fish and Game between 1929 and 1956, and soon the Sea was enjoying more yearly visitors than Yosemite National Park. After a period of developmental boom and recreational success at the Sea, a series of storms and heavy River water use in 1977 and 1978 caused widespread flooding and inundation of seaside developments, and the properties were soon abandoned.

With nearly 90 percent of California's wetlands lost to development, the Sea over the last century has become a vital stop on the Pacific Flyway for millions of birds. A refuge for several endangered species, over 400 bird species have been identified at the Sea. In 1992, an estimated 150,000 eared grebes died at the Sea, and as one of the largest bird die-offs in U.S. history, it brought national attention to the Sea's plight. In 1996 and 1998 there were further die-offs of fish and birds due to large algal blooms that drew oxygen from the waters, killed large numbers of fish, and spread botulism killing fish-feeding birds.

In response to the declines, in 1992 Congress passed the Reclamation Projects Authorization and Adjustment Act (Public Law 102-575) that directed the Secretary of the Interior to "conduct a research project for the development of a method or combination of methods to reduce and control salinity, provide endangered species habitat, enhance fisheries, and protect human recreational values in the area of the Salton Sea." In addition, the Salton Sea Reclamation Act of 1998, (Public Law 105-372), was enacted by Congress and directed the Secretary to "complete studies including, but not limited to, environmental and other reviews of the feasibility and benefit-cost of various options that permit the continued use of the Salton Sea as a reservoir for irrigation drainage..." Congress further required in the Salton Sea Reclamation Act of 1998 that any such studies performed by the Secretary, "shall not include any option that—(i) relies on the importation of any new or additional water from the Colorado River."

In 2003, following years of negotiation and analysis, a number of actions and agreements – often commonly and collectively referred to as the "Quantification Settlement Agreement" (QSA) were adopted. The QSA "settle[d] a variety of long-standing Colorado River disputes regarding the priority, use and transfer of Colorado River water, established the terms for the further distribution of Colorado River water among [Coachella, the Imperial Irrigation District, and Metropolitan] for a period of time. ... These conserved water transfers and the [Quantification Settlement Agreement] are critical components of the State's efforts to comply with the California Limitation Act of 1929, Section 4 of the Boulder Canyon Project Act of 1928 and to implement the California Constitutional mandate of Article X, Section 2 (which mandates that 'water be put to reasonable and beneficial use')."

Under the QSA, the State of California agreed to assume responsibility for environmental mitigation requirements in excess of $133 million (in 2003 dollars), the amount that the QSA requires three local water agencies to pay for this purpose. This MOU does not modify the responsibilities of the State of California in this regard.

The California Legislation enacted in 2003 to facilitate the implementation of the QSA required the Secretary of the California Natural Resources Agency, in consultation with other entities, to undertake an ecosystem restoration study to determine a preferred alternative for restoring the Sea ecosystem and permanently protecting the wildlife dependent on it. That preferred alternative was selected in 2007, and came with a cost of $9 billion in 2007 dollars. In the following years, a recession hit, administrations changed, and the plan was subsequently deemed financially infeasible. Instead, the State moved forward with "no regrets" projects around the Sea for air quality and habitat benefits, and commenced development of a comprehensive Salton Sea Management Program.

Recognizing that the QSA only provided mitigation flows for the Sea through 2017, and the need for projects that would acknowledge the current and projected resource conditions at the Sea, the State established the Salton Sea Task Force, by order of the Governor of California, in May 2015. Through the work of the Task Force, the State recognizes that immediate implementation of sustainable habitat and air quality management and mitigation at the Sea through a Salton Sea Management Program is critical for the protection of regional air quality, natural resources at the sea, and the management of a stable River water supply for California. After meetings with key stakeholders, the Task Force identified acreage targets for wildlife habitat, mitigation, and other projects, and found that implementation of a successful Salton Sea Management Program depends on the following three principles: 1) strong Federal, State, and local partnerships; 2) clear and achievable milestones with State-directed plans to achieve them; and 3) committed participation from all stakeholders who share the goals of protecting air quality, reducing habitat impacts, and maintaining a secure Colorado River Water Supply. These three principles are driving State-led decisionmaking on short, medium, and long term plans and projects, and require coordinating all available fiscal and technical resources to deliver them in an expedited manner.

The United States and the State have significant and complementary interests regarding development and enhancement of activities that provide certainty to the Sea, anticipate changes in the Sea's elevation, water quality and associated regional environment, and recognize the multiple values and unique opportunities the Sea embodies in the face of a changing climate, resource constraints, and the need to build resiliency and certainty in affected Tribal and regional communities.

II. PARTIES

This Memorandum of Understanding (MOU) is entered into by and between the United States through the Department of the Interior (DOI), and the State of California, through the California Natural Resources Agency (CNRA), and, hereafter referred to as "the Agencies," and will become effective as of the latest date shown below on the signature page.

The Agencies recognize the unique role and interests of tribal governments, including jurisdiction and decisionmaking, in the future of the Sea. The United States recognizes the United States' trust responsibility to all federally recognized Indian tribes and the duty to engage in meaningful government-to-government consultation prior to any action related to the Sea that impacts a tribe. Future activities to address conditions at the Sea must recognize Federal and State responsibilities to any affected tribes pursuant to applicable law (including settlement acts) and agreements, ensure protection of trust resources, and work in a spirit of partnership with affected Indian tribes.

Though not a party to this MOU, other Federal and State agencies, local governments and agencies, and non-profit, philanthropic, and academic institutions are recognized as potentially having jurisdiction, resources, decisionmaking roles, and common interests at the Sea, and will be essential to include for successful management activities and outcomes at the Sea. The Agencies will coordinate and consult with all of these entities as appropriate to develop specific tasks, timelines, and form subsequent agreements to further future partnership at the Sea.

F. The Agencies will, within existing authorities, perform an analysis of land ownership, any existing Indian settlement obligations, leases, and other land use agreements in the region to facilitate project development and identify necessary coordination between parties to achieve the purpose of this MOU.

G. The Agencies will, within existing authorities, expand and integrate Sea science and monitoring programs to better inform decisionmaking, coordinate investigations, and aid adaptive management of the Sea. The Agencies will also assess the cost benefit of sharing office or other physical spaces in order to reduce the cost of science activities and increase their efficacy.

H. The Agencies will pursue a multi-year partnership with United States Department of Agriculture (USDA) Natural Resources Conservation Service, tribal governments, local agencies, and others, to advance projects to protect air quality and improve water quality of major inflows to Sea habitat.

I. The Agencies shall make every effort to ensure resources are allocated to expedite and prioritize permitting processes at the Sea.

J. The Agencies will explore the feasibility of developing a common decision support system that integrates the analyses called for in this MOU, the existing wealth of studies and data on the Sea, and any additional information necessary, into a single platform that facilitates the work of the Salton Sea Management Program and the purpose of this MOU.

In furtherance of these Objectives, the United States agrees to pursue the following, in accordance with applicable statutes, and to the extent appropriate and consistent with legislative appropriations, approved budgets, and funding opportunities:

1. $20 million to operation and maintenance costs of habitat and dust suppression projects associated with the SSMP;
2. $10 million for State managed monitoring of SSMP projects;
3. Continued USGS scientific and technical support on Sea issues during the implementation of the SSMP;
4. Continued USGS scientific input on, and review of, selenium management measures and target concentrations for selenium in created habitat at Sea;
5. Consideration of a Pilot Project under Phase 2 of the Colorado River Basin Study to continue the ongoing innovative and collaborative efforts underway at the Sea to increase security for California's Colorado River water supplies, consistent with DOI's efforts to increase security for other Basin States' water supplies.

V. GENERAL PROVISIONS

A. This MOU is subject, as applicable, to the laws of the United States of America and the State.

III. PURPOSE

The Agencies enter into this MOU to ensure that long-term coordination between the Federal and State and Government will be recognized as a priority and will occur in order to facilitate prompt and informed decisionmaking regarding the natural and economic resources of the Sea.

The Agencies recognize that the purpose of this coordination is to facilitate specific, incremental and sequential projects in a timely manner that improve upon air and water quality, existing obligations to Native American communities, fish and wildlife habitat, water security, resource management processes and decisionmaking economic opportunities, and collaboration of scientific research efforts. Coordinating limited resources will be necessary to achieve common goals that address the natural resources and regional interests associated with the Sea.

IV. OBJECTIVES

Recognizing the State's role as lead on Sea management, in line with the findings of the Salton Sea Task Force, and the United States' agreement through this MOU to support the goals and principles of the Salton Sea Management Program (SSMP), and in furtherance of the purpose of this MOU, the Agencies affirm their commitments to undertake the following objectives:

A. In order to facilitate prompt decisionmaking, permitting accountability, and high-level coordination, the Agencies shall each identify at least one senior level policy official to participate in a Salton Sea Working Group (SSWG) tasked with ensuring interagency continuity in Sea management efforts and overseeing the implementation of—and any necessary updates to—this MOU.

B. The Agencies will work together as they coordinate with affected Colorado River Basin States, tribes, and local governments regarding implementation of this MOU.

C. The Agencies recognize that the State has identified a goal of 25,000 acres of wildlife habitat, air and water quality projects, and other projects as necessary to minimize human health and ecosystem impacts at the Sea in the mid-term (through 2025). See "Salton Sea Task Force – Agency Actions" – Attachment 1. The Agencies acknowledge this goal as critical, and a common target to reasonably work toward.

D. The Agencies will undertake an analysis of current Federal and State laws applicable to the Salton Sea to assess existing authorities, identify common objectives, explore opportunities to align authorities that benefit the purpose of this MOU, and inform areas for further coordination.

E. The Agencies will perform a funding analysis that identifies all current Federal and State spending on programs, projects, and studies related to, potentially benefiting, or impacting the Sea. The analysis should also identify opportunities to better coordinate and match existing spending and programs, and provide a foundation for further discussions on the anticipated financial need to reach acreage goals and creative means to meet them.

B. Nothing in this Agreement may be construed to obligate the United States or the State to any current of future expenditures in advance of the availability of legislative appropriations. Nor does this agreement obligate the United States or the State to spend funds on any particular project or purpose, even if funds are available.

C. The mission requirements, funding, personnel, and other priorities of the Agencies may affect their ability to fully implement all the provisions identified in this MOU.

D. Specific activities that involve the transfer of money, services, or property between the Agencies will require execution of separate agreements or contracts.

E. Nothing in this MOU is intended to or will be construed to restrict the Agencies from participating in similar activities or arrangements with other public or private agencies, organizations, or individuals.

F. Any information furnished between the Agencies under this MOU may be subject to the Freedom of Information Act, 5 U.S.C. 552, et seq. (FOIA) and the California Public Records Act, Gov. Code 6250, et.seq. (CPRA). The United States and the State agree to consult each other regarding any such relevant requests and prior to releasing potentially privileged or exempt documents, subject to any applicable regulatory, statutory, or judicial timeframe.

G. This MOU is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States or the State; their respective departments, agencies, or entities; their respective officers, employees, or agents; or any other person.

H. The Agencies anticipate consensus implementation of this MOU. In the unforeseen event that any disputes arise between the Agencies, the respective representatives and leadership of DOI and CNRA will work promptly to resolve any such matter.

I. This MOU shall remain in effect for an initial term of 10 years after its effective date and may be renewed if both Parties agree. This MOU may be terminated at any time by mutual consent of both Parties, or unilaterally by either Party after 30-days written notice to the other Party of intent to terminate.

J. Either Party to this MOU will consult with the other party in a timely manner prior to release of any statements for publication or public dissemination that refers to this MOU, to the Parties in connection with this MOU, or the name or title of any employee of the Parties in connection with this MOU.

K. Nothing in this MOU may be interpreted to imply that the United States endorses any product, service or policy of the State. Nothing in this MOU may be interpreted to imply that the State endorses any product, service or policy of the United States. Neither Party will take any action or make any statement that suggests or implies such type of endorsement.

L. The DOI and CNRA may amend or modify this MOU only by agreement of both Parties.

VI. APPROVALS

For the Department of the Interior:

Michael L. Connor
Deputy Secretary

8/31/16
Date

For the State of California:

John Laird
Secretary for Natural Resources

8/31/16
Date

CALIFORNIA natural resources AGENCY

CalEPA California Environmental Protection Agency

Salton Sea Task Force
Agency Actions

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The Natural Resources Agency will take the following actions over an accelerated timeline:

- **Begin immediate implementation and further development of Salton Sea management plan**
  - The plan will prioritize actions that respond to air quality and natural resources impacts while incorporating opportunities for regional economic development, including recreational and renewable opportunities that benefit implementation of the plan.
  - A science advisory committee will be utilized to provide scientific expertise into plan development.
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- **Improve public outreach and local partnership**
  - Air quality and environmental impacts of a reduced Salton Sea will be felt foremost by the residents of the region. The state will provide a meaningful public forum to discuss Salton Sea issues locally and to develop future plans and actions.

- **Accelerate project implementation and delivery**
  - The state will work with Salton Sea, Colorado River partners to accelerate planning, state and federal permitting and construction.

- **Meet a short-term goal of 9,000-12,000 acres of habitat creation and dust suppression projects at the sea**
  - Projects to meet short-term goals will be achievable with available funding.
  - Short-term projects will address dust suppression and natural resources needs while laying the foundation for a long-term Salton Sea management framework.
  - Projects will be staged to address the expected progression of playa exposure and designed to provide access corridors for renewable energy development on those lands.

- **Set medium-term goal of 18,000-25,000 acres of habitat creation and dust suppression projects at the sea**
  - Funding plans to meet medium-term goals will need to be developed by the state with Salton Sea and Colorado River partners.

Ensure Oversight by Regulatory Agencies:

- The State Water Resources Control Board will regularly monitor and assess progress on the implementation of the Salton Sea Management Program, including the development of management plans and funding options, and any potential action by the State Board.

- The State Water Resources Control Board will periodically hold public workshops as part of its monitoring and assessment function.

- The State Water Resources Control Board will work with the Colorado River Regional Water Board and the Administration to improve water quality and upstream co-benefits in the New River and the Alamo River.

- The California Air Resources Board will coordinate with local partners to address air quality impacts from the Salton Sea, work with Imperial and South Coast air districts to monitor air quality, and provide technical and scientific expertise to ensure effective mitigation of dust impacts from exposed playa.

Consider opportunities for increasing renewable energy development at and around the Salton Sea:

- As part of the implementation of the Clean Energy and Pollution Reduction Act of 2015 (SB 350), the California Energy Commission and the Public Utilities Commission will evaluate how renewables at and around the Salton Sea will further the goals of the integrated resources plans, including a balanced resource mix and the minimization of localized air pollutants.

- Within the next year, as part of planning to meet the 2030 greenhouse gas goals, the Public Utilities Commission, the Energy Commission and the Independent System Operator will consider renewable energy opportunities at and around the Salton Sea and the region, and any additional transmission that may be needed for the near term or long term.

Addendum to the August 31, 2016, Memorandum of Understanding

By and Between

The United States Department of the Interior

and

The State of California Natural Resources Agency

Regarding

The Coordination of Activities to Manage the Salton Sea

Whereas the Parties to the August 31, 2016, Memorandum of Understanding (MOU) have worked assiduously since its adoption to better identify actions and strategies that can further the purposes of the MOU; and

Whereas the Parties wish to ensure that there is a seamless and continuous effort in furtherance of the goals of the MOU during 2017, given the end of the mitigation flows identified in the 2003 Quantification Settlement Agreement (QSA) agreements, the importance of actions to support implementation of existing Colorado River conservation actions, and additional actions that may be taken in light of the ongoing historic drought on the Colorado River.

Therefore, the Parties find and agree that it is appropriate to supplement the MOU as follows:

1. The State of California (State) will coordinate with the Joint Powers Authority (JPA) parties to develop and implement a plan to facilitate and expedite use of the remainder of the JPA funds on projects to mitigate air quality impacts from emissions in the Salton Sea area resulting from the implementation of the QSA. The State will advocate, through the existing JPA budget process, for a plan that addresses air quality impacts as early as possible, while also maximizing cost-effective use of the funds to accomplish mitigation of air quality impacts. The State will consider strategies that will expend all the JPA funds by December 31, 2025, but such consideration will not foreclose strategies that extend the use of such funds beyond such date if such an approach is found to be more cost-effective and appropriate.

2. The Parties will comply with all applicable requirements of the Federal Clean Air Act and all implementing rules and regulations in connection with potential air quality emissions from Salton Sea playa lands owned or managed by the Parties that are exposed as a result of decline in elevation of the Salton Sea.

3. The State will adjust current targets for air quality and habitat projects at the Salton Sea when hydrology modeling is completed to reflect updated anticipated rates of exposure.

4. The Parties will coordinate on opportunities for renewable energy and economic development in the Salton Sea area as part of the Phase I - 10 year plan.

Signatures

For the Department of the Interior:

Michael L. Connor
Deputy Secretary

JAN 18 2017
Date

For the State of California:

John Laird
Secretary for Natural Resources

Date

Exhibit D

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the matter of:

IMPERIAL IRRIGATION DISTRICT'S (IID) AND SAN DIEGO COUNTY WATER AUTHORITY'S (SDCWA) AMENDED JOINT PETITION FOR APPROVAL OF A LONG-TERM TRANSFER OF CONSERVED WATER FROM IID TO SDCWA AND TO CHANGE THE POINT OF DIVERSION, PLACE OF USE, AND PURPOSE OF USE Under Permit 7643 on Application 7482 of Imperial Irrigation District (counsel listed on next page)	Declaration of Tina Anderholt Shields in Support of Motion of Petitioner Imperial Irrigation District and Intervenor County of Imperial for the State Water Resources Control Board to Conduct an Evidentiary Hearing to Commence No Later than May 1, 2017 to Modify the Provisions of State Water Resources Control Board Water Right Order No. 2002-13 (revised)

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ATTORNEYS FOR INTERVENORS
COUNTY OF IMPERIAL & IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT

I, Tina Anderholt Shields, declare as follows:

1. I am over the age of 18, have personal knowledge of the following statements and, if called as a witness to testify, I could, and would testify competently thereto.

Professional Experience

2. I have been employed by the Imperial Irrigation District ("District") since 1992. Currently, I hold the position of Water Department Manager, and have worked for the District in that position since October 2012.

3. My entire employment with the District has included positions relating to water resource management, water supply planning and Colorado River resource policy, including positions such as: "Assistant Water Department Manager for Water Supply Planning – Colorado River & QSA", "Assistant Water Department Manager for the Resources Planning & Management Section" and "Colorado River Resource Manager."

4. I have been a Registered Civil Engineer in the State of California since 1997. I also hold a Bachelor of Science in Civil Engineering (1992), completed coursework for a Masters of Public Administration (1997).

5. I am a licensed Professional Engineer-Civil Engineering in the State of California, a Land Surveyor-in-Training, and completed the Water Education Foundation's "Water Leaders Program" in 2001.

6. I am familiar with the Colorado River system, the Quantification Settlement Agreement and related agreements ("QSA"), and the Bureau of Reclamation rules, policies, procedures and practices for administering Colorado River water and its distribution. I am also familiar with the effects of the QSA on the Salton Sea, having been involved on behalf of the District with the proceedings that led up to the State Water Resources Control Board's decision on the QSA (Water Right Order No. 2002-13 (revised); the negotiations that resulted in the QSA in 2003; the effort by the California Department of Water Resources that culminated in a Draft Environmental Impact Report for the restoration of the Salton Sea in 2006; and the current efforts by various agencies at the Salton Sea, including the current draft Salton Sea Management Plan that was released to the District as a working draft by Bruce Wilcox, Assistant Secretary for

Salton Sea Policy for the Natural Resources Agency. In my role at the District, I have had the professional responsibility to advise the District staff and Board of Directors regarding these issues, and so my opinions in this Declaration are based not only on my experiences on behalf of the District but also on my study and research of these matters, which has been ongoing since the beginning of my employment with the District in 1992.

7. In my employment at the District, I implement Board directives, develop policy recommendations, and implement programs such as the District's: Temporary Land Conversion Fallowing Policy, Equitable Distribution Plan, agricultural fallowing programs and both system and on-farm efficiency programs.

8. During my employment at the District, I have directed and supervised professional staff of up to 30 employees within the District's Water Department and currently manage a department of nearly 450 employees.

9. In my previous positions at IID and current position as Water Department Manager, I regularly attend Colorado River Board of California meetings and meetings of the Colorado River Basin States. I also regularly attend technical meetings with and/or hosted by the Bureau of Reclamation, such as the yearly consultations involving the Annual Operating Plans for Colorado River Reservoirs and various hydrology modeling workgroups. Over the past several years, I have regularly met with representatives of state and federal agencies on matters relating to the restoration of the Salton Sea and I have attended each of the workshops that have been held by the State Water Resources Control Board on the Salton Sea. Finally, I am familiar with the work that has been done by Michael Cohen of the Pacific Institute regarding the Salton Sea and have been consulted by Mr. Cohen in the course of his work for the Pacific Institute.

Termination of Mitigation Water in 2017

10. Under the terms of the State Water Resources Control Board's decision on the QSA, the District was required to provide up to 800,000 acre-feet of "mitigation water" to the Salton Sea for a period of fifteen years. The purpose of the "mitigation water" was to volumetrically offset the salinity impacts of the reduced Salton Sea inflows resulting from generating conserved water for the QSA transfers while the State of California determined if the

restoration of the Salton Sea would be feasible, and if so to develop an implementable restoration plan and funding mechanism.

11. Based on the volumetric impact calculations, if the District were to transfer 100,000 acre-feet of water generated from efficiency conservation measures to the San Diego County Water Authority in a given year, the District would have the obligation to provide 100,000 acre-feet of "mitigation water" during the 15-year planning period to the Salton Sea to offset the salinity effects of that transfer. Similarly, using these same impact calculations, if the District were to transfer 100,000 acre-feet of water generated from fallowing conservation programs to the San Diego County Water Authority in a given year, the District would have the obligation to provide 50,000 acre-feet of "mitigation water" during the 15-year planning period to the Salton Sea to offset the salinity effects of that transfer on the Salton Sea.

12. The "mitigation water" water obligation required the IID board of directors to set aside a negotiating precept that prohibited fallowing for transfer purposes (due to its negative third-party socioeconomic impacts) in order to minimize the impacts to the Salton Sea. It also effectively doubled the District's conservation requirements for the QSA transfers and its participating water users. Not only were IID's growers obliged to fallow productive agricultural fields to reduce IID's diversion of water to provide flows for coastal water purveyors under the terms of the QSA transfers, they were also required to fallow additional agricultural lands to provide an offsetting quantity of water to be delivered to the Salton Sea to mitigate the transferred water. To meet these requirements, the District was scheduled to create 1,500,000 acre-feet of conserved water from fallowing agricultural lands within the IID service area from 2003 to 2017.

13. This fifteen-year period, during which the District must provide up to 800,000 acre-feet of "mitigation water" to the Salton Sea, concludes this year and it is my professional opinion that the District will fully discharge its obligation to provide this "mitigation water" to the Salton Sea by December 31, 2017.

<u>The Effects of Terminating "Mitigation Water" on the Salton Sea</u>

14. The State Water Resources Control Board, in its order approving the QSA transfers, authorized the "mitigation water" strategy during the fifteen-year restoration planning

period during which the State of California has determined that restoration of the Salton Sea is feasible. Evidence previously submitted to the State Water Resources Control Board demonstrated that, without the District providing "mitigation water," the elevation of the Salton Sea would have declined more quickly, uncovering thousands of acres of additional playa. An example of the evidence that was presented to the State Water Resources Control Board is shown at page 43 of Water Right Order 2002-13 (revised). Figure 3.3-7 assumed that what would become "mitigation water" would be provided by the District through 2030, not 2017, however what is important to note is the shape of the "project" curve as to the impacts on the sea's elevation. After the termination of "mitigation water", regardless of the duration of these deliveries, the elevation of the Salton Sea drops quickly and dramatically, thereby uncovering thousands of acres of playa.

15. The District has modeled the likely declines in the elevation of the Salton Sea during the term of the QSA and the consequential increase in the acreage of exposed playa. Assuming the Governor's Salton Sea Task Force Agency Actions plan is fully implemented, which would involve the creation of 25,000 acres of habitat or air quality mitigation projects between now and 2025 (using a proposed annual acreage milestone schedule), the net effects of which are summarized in the table below. This table shows that, between now and 2025, it is likely that over 38,000 acres of playa will be uncovered, in addition to the nearly 19,000 acres of playa that have been uncovered as a result of the QSA transfers since 2002. Even if the Governor's plan was to be fully implemented, this table shows that there would still be approximately 32,000 acres of playa that will be exposed by 2025 since the QSA water transfers began in 2003, an increase from the current 19,000 acres of exposed playa. Obviously, if the Governor's proposed program were not fully implemented, the area of exposed playa would increase to over 57,000 acres.

2018-2025 Roadmap to Salton Sea Task Force Milestones

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Projected Salton Sea Exposed Playa Acreage	18,625	22,172	26,381	31,427	37,011	42,540	47,863	52,752	57,067
Annual Projected Increase in Exposed Playa Acreage		3,547	4,209	5,046	5,584	5,529	5,323	4,889	4,315
Cumulative Projected Increase in Exposed Playa Acreage		3,547	7,756	12,802	18,386	23,915	29,238	34,127	38,442
Annual Playa Acreage Coverage Milestones		2,300	2,700	3,300	3,600	3,600	3,500	3,200	2,800
Cumulative Playa Acreage Coverage Milestones		2,300	5,000	8,300	11,900	15,500	19,000	22,200	25,000

Mid-Term SSMP Playa Coverage Acreage Target/Eight-year (2018-2025) Cumulative Projected Increase in Exposed Playa = 25,000/38,442 = 65.03% 18,625 acres of playa are projected to be exposed prior to 2018, this acreage is not included in the 65% playa coverage calculation.

16. In its 2002 order, the State Water Resources Control Board acknowledged that reducing the elevation of the Salton Sea would have severe adverse impacts on air quality in the vicinity of the Salton Sea because the uncovered playa is highly emissive and will, given the winds that are a regular feature of the environment of the Imperial and Coachella valleys, produce large quantities of fugitive dust.

17. Michael Cohen, of the Pacific Institute, has analyzed the potential impacts of lowered Salton Sea elevations on air quality in his report, *Hazard's Toll: The Cost of Inaction at the Salton Sea.* A copy of this report is attached hereto as Exhibit A and incorporated herein by reference as if set forth in full. Mr. Cohen's synthesis of the current scientific understanding of the effects of lowered Salton Sea levels on air quality and habitat has been widely cited by the scientific and environmental communities. On behalf of the District, I have relied upon this report, together with many other scientific reports, in crafting the District's efforts to restore the Salton Sea.

18. Mr. Cohen's report indicates that, after the conclusion of the District's "mitigation water" delivery obligation to the Salton Sea in 2017, the elevation of the Salton Sea will decline rapidly and that the effects of fugitive dust on public health will be potentially catastrophic. Mr. Cohen estimates that the cost in terms of public health cost would be estimated to have present

value of between $21 billion and $37 billion between now and 2047. Moreover, because the Salton Sea is a key stopping point on the Pacific Flyway, Mr. Cohen believes that the end of "mitigation water" without an aggressive plan to restore the Salton Sea will lead to the collapse of the Pacific Flyway. Mr. Cohen concludes the executive summary of his report by stating: "The consequences of continued inaction at the Salton Sea will be felt most directly by the 650,000 people who live in harm's way by the Salton Sea's dust, as well as by the birds and other life that depend on the lake. These consequences generate real costs. These considerable costs, estimated for the first time by this report, demonstrate the urgent need for action at the Salton Sea." *Hazard's Toll*, p. vii.

19. Mr. Cohen has presented these findings to many different organizations, including the State Water Resources Control Board. I am unaware of any credible scientist who has challenged his conclusions in any substantial way. Assistant Secretary for Salton Sea Policy Bruce Wilcox has not disagreed with Mr. Cohen's conclusions regarding the potential impacts of the end of "mitigation water" on the Salton Sea's elevation or on the potential consequences of the exposed playa for fugitive dust emissions or loss of habitat to the Pacific Flyway.

I declare under the penalty of perjury and the laws of the State of California that the foregoing is true and correct to the best of my knowledge.

Executed on this 15th day of March, 2017 at Imperial, California.

Tina Anderholt Shields

Tina Anderholt Shields

Exhibit A

PACIFIC INSTITUTE

Hazard's Toll

The Costs of Inaction at the Salton Sea

September 2014

HAZARD'S TOLL

The Costs of Inaction at the Salton Sea

September 2014

by Michael J. Cohen

The full report is available online at
http://pacinst.org/publication/hazards–toll

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About the **Pacific Institute**

The Pacific Institute is one of the world's leading nonprofit research and policy organizations working to create a healthier planet and sustainable communities. Based in Oakland, California, we conduct interdisciplinary research and partner with stakeholders to produce solutions that advance environmental protection, economic development, and social equity – in California, nationally, and internationally. We work to change policy and find real-world solutions to problems like water shortages, habitat destruction, global warming, and environmental injustice. Since our founding in 1987, the Pacific Institute has become a locus for independent, innovative thinking that cuts across traditional areas of study, helping us make connections and bring opposing groups together. The result is effective, actionable solutions addressing issues in the fields of freshwater resources, climate change, environmental justice, and globalization. More information about the Institute and our staff, directors, funders, and programs can be found at www.pacinst.org.

About the **Project Team**

Michael Cohen

Michael Cohen is a senior research associate at the Pacific Institute and is based in Boulder, Colorado. He is the lead author of two previous Pacific Institute reports on the Salton Sea: *Haven or Hazard*: *The Ecology and Future of the Salton Sea* (1999), and *Hazard: The Future of the Salton Sea With No Restoration Project* (2006), as well as several articles and opinion pieces about the Salton Sea. He served on California's Salton Sea Advisory Committee. Mr. Cohen has a Master's degree in Geography, with a concentration in Resources and Environmental Quality, from San Diego State University, and a B.A. in Government from Cornell University.

Jason Sauer

Jason Sauer provided invaluable research assistance for this project, tracking down relevant articles, experts, and data. He recently graduated with a Bachelor's of Science in environmental geosciences and policy from the University of Colorado at Boulder, and is currently pursuing a master's degree in water resources at the University of Connecticut. Mr. Sauer is chiefly concerned with meeting the water needs of humans and ecosystems, in light of changes in land usage and climate.

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GIS and cartography by Brian Cohen, The Nature Conservancy.

Executive Summary

The Salton Sea, a 350 square mile saltwater lake in southeastern California, faces disaster. In the next fifteen years:

- The amount of water flowing into the lake will decrease by about 40%;
- Its surface will drop by twenty feet and its volume will decrease by more than 60%;
- Salinity will triple; and
- The shrinking lake will expose 100 square miles of dust-generating lake bottom to the region's blowing winds, worsening the already poor air quality in the region.

To date, neither the state legislature nor any other agency has taken any action to fund any Salton Sea revitalization plan. In 2003, California accepted responsibility for funding air quality management projects at the Salton Sea, but the legislature has yet to take any action to fund such projects. A local agency is developing plans for air quality management on a portion of the exposed Salton Sea lakebed, but it lacks the funding necessary to implement these plans. With the exception of three relatively modest habitat projects scheduled for construction next year, no projects are currently funded or expected to be constructed at the Salton Sea in the near future. As a result, the lake's habitat value for hundreds of species of resident and migratory birds will rapidly decline, affecting hundreds of thousands of birds and diminishing the lake's appeal.

If current trends continue, by 2045:

- As much as 150 square miles of lakebed will be exposed;
- Exposed lakebed will add as much as 100 tons of fine dust into the air *per day*;
- The total population of the air basin (currently about 650,000) will nearly double;
- The lake will be filled with algae, bacteria, and viruses, providing no value to birds or people.

The deteriorating conditions at the Salton Sea will have adverse impacts on public health, property values, agricultural production, recreational revenue, and the region's habitat value for birds and wildlife generally. These impacts impose costs on people in the area and, to a lesser extent, on Californians generally.

Many people assume that deferring Salton Sea-related decisions and actions will not result in any additional costs, implicitly assigning these impacts a value of zero. Decision-makers have weighed the high costs of Salton Sea revitalization and the lower but still significant costs of mitigation against this assumed zero cost of not taking action, and have yet to approve or fund any major projects at the Salton Sea. This inaction and delay imposes real costs.

Objective

The objective of this report is to estimate the costs of inaction – defined as the absence of any large-scale revitalization or air quality management project – at the Salton Sea, to provide decision-makers and the general public with information for deciding on a path forward. Specifically, this report estimates the impacts of the deteriorating Salton Sea on:

- health care costs, due to the adverse impact that increased dust emissions have on human health;
- regional property values, due to real and perceived health threats and declining aesthetic value;
- agricultural productivity, due to dust emissions and loss of the Sea's buffering impacts on temperature and humidity in nearby farmland;
- recreational revenues; and
- ecological values, including impacts to threatened and endangered species.

The Costs of Action

The California Natural Resources Agency estimated the capital cost for its 2007 preferred Salton Sea revitalization alternative at about $10 billion (all costs adjusted to 2013 dollars), plus annual operations & maintenance costs of $150 million once fully constructed, yielding a total present value of $9.6 billion at a 4% discount rate, through the year 2047. These projected revitalization costs are separate and distinct from the costs projected for mitigating (off-setting the impacts of) the Imperial Valley-San Diego water transfer. The present value of the state's conceptual mitigation plan is about $1.7 billion through 2047. These values represent the costs of 'action' at the Salton Sea.

Inaction Costs – Public Health

Many scientific and medical studies document the link between blowing dust and a broad range of public health impacts, including childhood and adult asthma, cardiac disease, lung cancer, and increased mortality rates. Two previous studies suggest methods to estimate the magnitude of these costs at the Salton Sea: based on the estimated per capita cost of exceeding federal air quality standards, or based on a cost per unit of exposed dust. Using the first method, the public health costs of continuing not to meet federal air quality standards - exacerbated by expected Salton Sea dust emissions and a rapidly growing population - generate a present value as high as $21 billion. Using the second method, under a worst case scenario, with high projected dust emissions and very limited air quality management, the present value cost of uncontrolled dust emissions on public health could be $37 billion through 2047. Assuming a much lower rate of emissions and implementation of dust control measures on portions of the exposed Salton Sea lakebed reduces the estimate of public health costs to about $3 billion. Annual public health costs increase as the Salton Sea shrinks, exposing more dust-emitting lakebed; but even in the near term, they could still exceed hundreds of millions of dollars per year.

Inaction Costs – Property Value

Studies on the economic impacts of environmental hazards in other areas, such as landfills, confined animal feeding operations, and refineries, offer methods for estimating potential impacts to property values at the Salton Sea. Regional or state polling data on public perceptions of the Salton Sea would be informative, but no such polls have been conducted in at least a decade. Blowing dust and the stigma associated with a deteriorating lake pose a risk to property values within several miles of the lake, suggesting that property devaluation in the immediate area associated with the deteriorating Salton Sea is likely to be at least $400 million. Dust and noxious odors could also depress property values and revenues in the Coachella Valley more broadly, which includes 124 golf courses as well as numerous resorts and vacation homes, so the total impact on property values could be as much as $7 billion.

Inaction Costs – Agricultural Productivity

Insufficient information exists to estimate the potential costs associated with either the impacts of blowing dust and salt on crop productivity near the Salton Sea or the diminished micro-climate benefits that will occur as the lake shrinks. Both of these impacts will be felt within a few miles of the Salton Sea, so their overall cost may be small relative to the magnitude of Imperial and Coachella valley agriculture generally, but these impacts could be significant at the scale of the individual farm.

Inaction Costs – Recreational Revenues

The future Salton Sea will continue to experience declines in visitation to the lake and in direct recreation-related expenditures. Recent declines have caused a loss of $6 million per year in direct spending at the Salton Sea State Recreation Area relative to estimated historic rates, suggesting the loss of $110 – $150 million in present value through 2047. Given the absence of records or surveys of current and historic expenditures for Salton Sea recreation as a whole, this rough estimate should be considered very conservative.

Inaction Costs – Ecological Values

The Salton Sea currently provides tens of thousands of acres of shoreline and near-shore habitats to hundreds of thousands of birds. More than 400 species of birds use the Salton Sea, including a large number of special status species. As the lake deteriorates, the size and quality of its habitats will diminish, reducing its value to the resident and migratory birds that depend upon it. Through contingent valuation surveys and other methods, people have expressed a willingness to pay to preserve similar values at other locations. Previous studies have indicated that Californians as a whole have valued wetland habitats at about $60,000 per acre, suggesting that the Salton Sea provided some $2.6 billion annually in shoreline habitat value as recently as the year 2000. Transferring the benefits Californians have reported for Mono Lake suggests a potential non-use valuation of the Salton Sea on the order of $1.9 billion annually. Depending on the discount rate, these annual values translate into present values ranging from $10 billion to $26 billion through 2047.

Conclusion

The high costs of the California Natural Resources Agency's proposed 'preferred alternative' have inhibited deliberation and deterred any meaningful investment in the revitalization of the Salton Sea. The assumption seems to be that delaying action at the Salton Sea will result in business as usual, with no additional costs. This is clearly not the case. Because the Salton Sea has changed over the past decade and will soon enter a period of very rapid deterioration, the costs of inaction are escalating rapidly. *When* a project is implemented dramatically affects the inaction costs estimated above. Postponing decisions and actions for the Salton Sea imposes significant costs on the people and property owners in the region, and lesser costs on Californians generally.

Figure ES-1 compares the project costs of the state's proposed revitalization alternative and of its conceptual mitigation plan with the estimated inaction costs for public health and non-use benefits, and with the one-time estimated devaluation of property in the region, through the year 2047. In the figure, the higher estimated inaction costs appear in red, while the lower estimates appear in orange. These estimated costs provide an initial basis for comparison with the estimated project costs of revitalization or mitigation, shown in black, to demonstrate that the costs of inaction are not zero. Even at the low estimate, the long-term social and economic costs of a deteriorating Salton Sea could approach $29 billion, well in excess of the project cost of the state's revitalization plan. A more robust

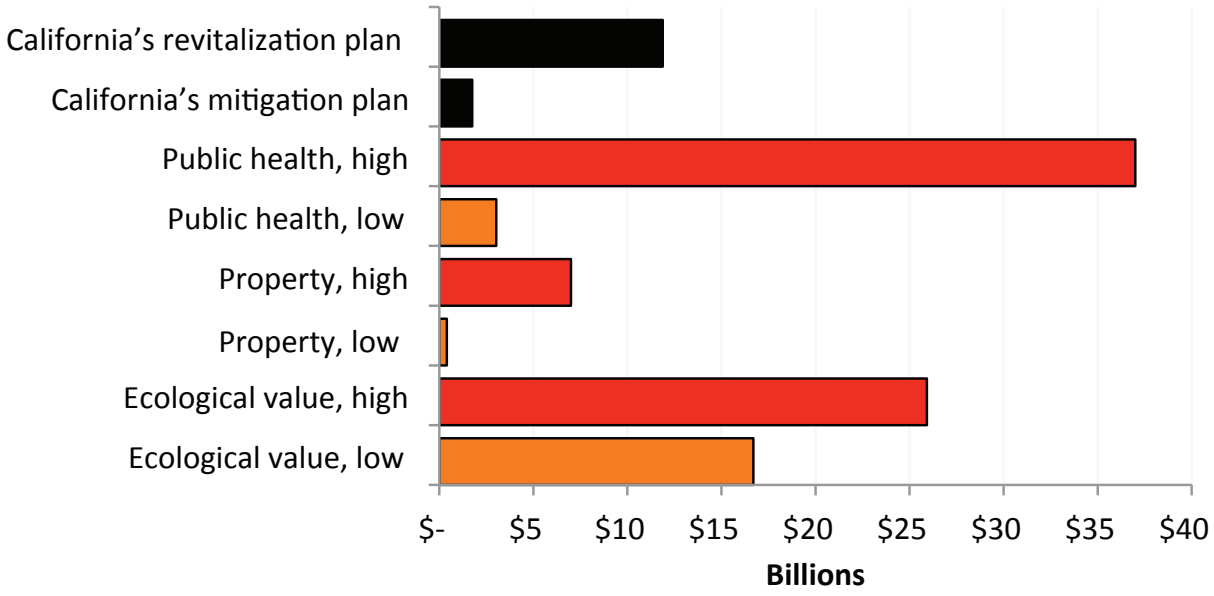

Figure ES-1. Present values of estimated costs of Salton Sea action and inaction, through 2047.

comparison would require additional information about the total economic costs and benefits of the revitalization and mitigation projects.

Figure ES-1 indicates that the costs of inaction greatly exceed the costs of action at the Salton Sea, strongly suggesting that action at the Salton Sea should be funded and implemented quickly. However, not all 'actions' would avoid the 'inaction' costs: a mitigation plan designed only to control dust emissions would not improve recreation in the region, nor would it improve property values or promote economic development; such a plan would do little to improve declining ecological values. A project that both controls dust and creates habitat could limit or avoid public health costs, reduce or eliminate impacts to property values, and maintain or even enhance ecological values. A more comprehensive revitalization plan should also be evaluated within this broader context of created benefits and avoided costs. In all cases, delaying action imposes real costs.

The consequences of continued inaction at the Salton Sea will be felt most directly by the 650,000 people who live in harm's way of the Salton Sea's dust, as well as by the birds and other life that depend on the lake. These consequences generate real costs. These considerable costs, estimated for the first time by this report, demonstrate the urgent need for action at the Salton Sea.

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Abbreviations

AF	Acre-feet (one acre-foot = 325,851 gallons)
CARB	California Air Resources Board
CNRA	California Natural Resources Agency (formerly, California Resources Agency)
CVWD	Coachella Valley Water District
DFW	California Department of Fish & Wildlife (formerly, Department of Fish & Game)
DWR	California Department of Water Resources
g/L TDS	grams per liter, total dissolved solids
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
JPA	Joint Powers Authority
$\mu g/m^3$	micrograms per cubic meter
NGVD	"National Geodetic Vertical Datum" – a vertical reference standard used by USGS
O&M	operations and maintenance
PEIR	Salton Sea Ecosystem Restoration Program Programmatic Environmental Impact Report
PM_{10}	particulate matter less than 10 microns in diameter
QSA	Quantification Settlement Agreement
Reclamation	Bureau of Reclamation, U.S. Department of the Interior
SDCWA	San Diego County Water Authority
South Coast	South Coast Air Quality Management District
SS SRA	Salton Sea State Recreational Area
SSA	Salton Sea Authority
US FWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey

1. Introduction

The Salton Sea, located in remote, southeastern California, stretches nearly 35 miles between the lower Coachella Valley in Riverside County and the Imperial Valley in Imperial County (Figure 1), in a region that has experienced rapid population growth. California's largest lake, with a current surface area of about 350 square miles, the Salton Sea is also very shallow. As the Salton Sea shrinks due to declining inflows, it exposes large expanses of lakebed, some of which will emit dust. This dust will contribute to poor air quality in a basin that already fails to meet state and federal air quality standards. The lake, reliant on agricultural runoff, lies more than 230 feet below sea level in one of the hottest deserts in the country. Lacking any outlet except evaporation and suffering from declining inflows, the Salton Sea grows ever saltier and less hospitable. Its increasingly salty, oxygen-starved waters – previously home to one of the most productive fisheries in the world – have lost all but the hardiest, most resilient fish. Declining numbers of fish and invertebrates mean a smaller food base for the hundreds of thousands of resident and migratory birds that depend on the lake.

The lake has a rich and storied history, replete with glamorous celebrities and international speedboat races. But the Salton Sea has fallen on hard times in the past several decades, its waters rising in the early 1970s to flood marinas and hotels, then receding in the past decade to strand shoreline properties. The hundreds of thousands of visitors who once flocked to its shores have moved on. The hotels and marinas and stores that once prospered along the Sea's shoreline have long since shut their doors.

Figure 1. California's Salton Sea.
Source: California Department of Water Resources.

The Salton Sea's future looks even more grim. The lake faces catastrophic change, driven most immediately by a massive water transfer between Imperial Valley and San Diego County and a subsequent reduction in flows to the Salton

Sea, as well as by declining inflows from Mexico, increasing urbanization, changing agricultural practices, and a hotter and drier climate (CNRA 2006). In the next fifteen years, the volume of water flowing into the lake will decrease by about 40%, the Salton Sea's surface will drop by twenty feet and its volume will decrease by more than 60%. Salinity will triple. One hundred square miles of lakebed will be exposed to the region's blowing winds, increasing dust emissions (Cohen and Hyun 2006).

The magnitude of these changes has been known for many years. There have been scores of studies and plans and proposals and suggestions for revitalizing the Salton Sea, many meetings and millions of dollars spent in pursuit of solutions. In 2007, the California Natural Resources Agency submitted a preferred Salton Sea Restoration Plan (CNRA 2007) to the state legislature that carried a $10 billion cost estimate (adjusted to 2013$[1]), plus annual operation and maintenance costs of about $150 million once fully constructed. Other proposals, such as pumping in millions of acre-feet of ocean water from the Gulf of California, have also been suggested, but they would be even more expensive, take longer to construct, and would require the negotiation of a new international treaty. The massive scale of the Salton Sea means that a bare-bones mitigation effort, simply to offset the direct impacts of the Imperial Valley-San Diego water transfer, could cost almost a billion dollars in capital expenditures alone, plus $56 million annually for operations and maintenance. The magnitude of these costs and the scale of the problem, as well as the absence of a consensus solution, have discouraged state and federal legislators from funding Salton Sea revitalization efforts and have become a ready excuse for postponing meaningful action at the Salton Sea.

Figure 2 show the costs estimated for the state's preferred alternative (CNRA 2006); the default basis of comparison for these costs has been zero, or the presumed cost of not taking any action at the Salton Sea. To date, the California legislature has not taken any action on the Resources Agency's 2007 preferred alternative, so the planning and construction underlying the cost projections shown below would be shifted by at least seven years. That is, costs projected for 2008-13 would be incurred in 2015-20 or later.

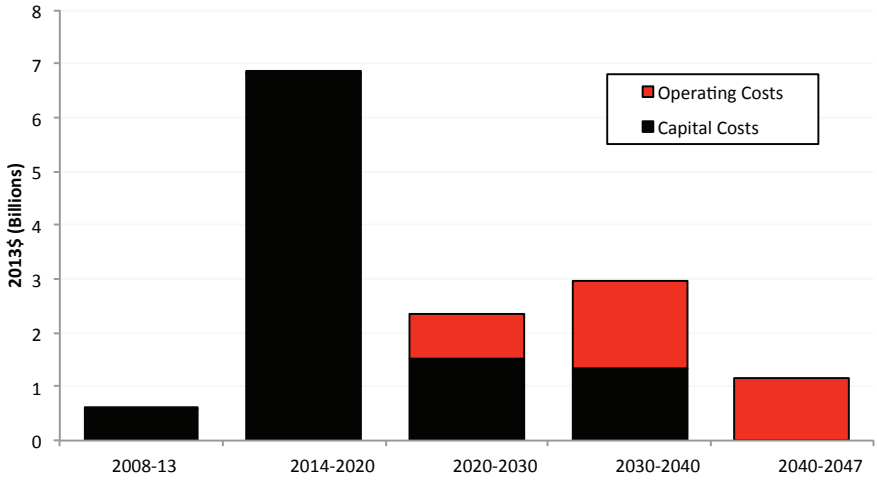

Figure 2. Projected costs of state's preferred alternative, 2008-2047.

Source: CNRA 2007.

Although future Salton Sea conditions have been projected (Cohen and Hyun 2006, CNRA 2006), the economic costs associated with increased dust emissions due to additional lakebed exposure and diminished property values due to real and perceived problems at the lake previously had not been estimated. To date, decision-makers have had to decide between the very high costs of Salton Sea restoration, the lower but still significant costs of mitigation, and the perception that deferring Salton Sea-related decisions and actions will not result in any measurable, additional costs. This report offers the first

[1] Unless otherwise indicated, all dollar values referenced in this report have been adjusted to 2013$, using the Consumer Price Index, calculated at http://www.measuringworth.com/.

estimates of the many local and regional costs associated with deferring meaningful action at the Salton Sea.

This discrepancy between the stated costs of action at the Salton Sea and the unstated and frequently ignored costs of inaction underscores one of the greatest hurdles confronting the Sea: its future condition will be dramatically worse than its current condition, significantly increasing the costs of inaction. The discontinuity between recent conditions and fundamentally different future conditions challenges efforts to plan accordingly (Tversky and Kahneman 1974, Milly et al. 2008). Although we lack certainty about the exact timing and specific, quantified impacts arising from a future Salton Sea, it is clear that the deteriorating Salton Sea will adversely affect the region, causing real, measurable adverse impacts to public and ecological health (IID 2002, Cohen and Hyun 2006, CNRA 2006). Despite the many warnings about the impending Salton Sea catastrophe, little has been done. Unfortunately, this reflects a broader trend: while society often responds quickly to existing disasters, we frequently fail to act to avert predicted future events. California's inaction with respect to the Salton Sea represents another example of failure to avoid a known threat.

The future costs of inaction – such as damages to public health and to property values – at the Salton Sea have been largely unquantified, implicitly assigning them a value of zero (Schwabe et al. 2008). This implicit zero value fosters the belief that failing to take action at the Salton Sea will not impose any new or additional costs. This report suggests preliminary estimates for these future costs of inaction, to address this obvious oversight and to offer a basis for comparing the costs of an action at the Salton Sea with the benefits of that action (in this case, both the avoided costs of inaction and the direct benefits generated by the project itself). The question should be: does the broader societal value generated by building a restoration project at the Salton Sea justify the direct cost of that project? Justifying this cost requires not only an estimate of the benefits generated by the restoration project, but also an estimate of the additional damages that could arise in the absence of the project.[2]

Yet, to date, there has not been an effort to compare the costs of restoring or rehabilitating the Salton Sea with the costs of not taking action. Because conditions at and around the Salton Sea will deteriorate in coming years (Cohen and Hyun 2006, CNRA 2006), the economic and ecologic costs of inaction could be quite significant. These costs include:

- Rising health care costs, due to the adverse impact increased dust emissions have on human health;
- Falling regional property values, due to real and perceived health threats and declining aesthetic value;
- Diminished agricultural productivity, due to dust emissions and to the loss of the Sea's buffering impacts on temperature and humidity in nearby farmland;
- Declining recreational revenues; and
- Diminished ecosystem services, including impacts to listed species and related non-market values.

Objective

The objective of this report is to estimate the costs of "inaction" at the Salton Sea, to provide decision-makers and the general public with information for deciding on a path forward for the Salton Sea.

[2] The opportunity costs of Salton Sea projects can be construed as avoided damages, or the opposite of a conventional foregone benefit of an action. In the case of the Salton Sea, not acting imposes additional costs.

This report is a companion volume to *Hazard: The Future of the Salton Sea With No Restoration Project*[3] (Cohen and Hyun 2006). The previous volume contains information on the formation, ecological processes, and hydrology of the Salton Sea, as well as an assessment of the potential ecological impacts of the Sea's current decline.

Scope

The scope of this economic assessment includes:

1. Changes in health care costs, given the projected increase in dust emissions and the link to respiratory problems, in areas downwind from the Salton Sea;
2. Changes in property values in the immediate vicinity, and in the Coachella and Imperial valleys more broadly;
3. Costs associated with impacts on local agriculture, from dust and from the loss of the Sea's microclimate;
4. Changes in recreational revenues; and
5. Changes in non-use values.

The boundaries of the Salton Sea Air Basin, including the Coachella Valley in Riverside County and all of Imperial County, constitute the geographic scope of this study (see Figure 3). This study evaluates potential economic impacts associated with a declining Salton Sea to the year 2047, coinciding with the term of the current Imperial Valley–San Diego water transfer agreement.[4]

Figure 3. Study area boundaries.
Source: California Air Resources Board.

The remainder of this introduction describes the assumptions, basic methods, and limitations for this study. The next chapter briefly describes the changing physical conditions at the Salton Sea and the institutional context framing current and future actions. Chapters 3 through 7 describe the methods used and the initial estimates of the costs of inaction on public health, property values, agriculture, recreation, and non-use values such as existence and preservation values. Chapter 8 summarizes these results, while Chapter 9 offers conclusions and recommendations.

Assumptions

This report describes the costs of "no action" at the Salton Sea. Estimating these future costs requires a number of assumptions about both the changing physical conditions at and around the Salton Sea and local, state, and federal responses to these changes. There have been, and will continue to be, some projects implemented at the Salton Sea. In this report, "no action" and "inaction" mean the absence of a large-scale Salton Sea revitalization effort. As described in the following, "no action" and "inaction" also refer to the potential delays in implementing

[3] *Hazard* is available online at http://pacinst.org/publication/restoration-project-critical-to-salton-seas-future/.

[4] Many of the public health costs associated with increased dust emissions will occur after this study period, so the suggested estimates are lower than they would be if they reflected the lifetime impacts of exposure to unhealthy concentrations of PM_{10}.

an air quality management project of a scale sufficient to address the expected dust emissions arising from the exposed lakebed.

The estimates made in this report assume the following, described in greater detail in Chapter 2, *The Changing Salton Sea*:

1. Changing physical conditions at the Salton Sea, including the rate of exposure of lakebed and changes in salinity, occur at the rates projected by Cohen and Hyun (2006) and by the California Natural Resources Agency (CNRA 2006);
2. Currently scheduled habitat projects at the Salton Sea, including California's Species Conservation Habitat (640 acres), the Red Hill Bay project (650 acres), and the Torres-Martinez wetlands (105 acres), are completed by or before 2017;
3. The state will not assume responsibility for funding air quality mitigation at the Salton Sea until 2025 (California State Auditor 2013), and possibly as late as 2048, based on interpretations of the factors triggering state liability (see following discussion);
4. The Quantification Settlement Agreement (QSA) Joint Powers Authority (JPA), responsible for implementing mitigation projects, may experience budget shortfalls prior to 2025 because expenditures in some years may exceed revenues under the QSA payment schedule, potentially delaying the implementation of mitigation projects; and
5. The QSA JPA, and subsequently the State of California, will be directly responsible for air quality management of about 58% of the Salton Sea playa[5] exposed in 2047; the remainder will be the responsibility of individual land owners. Determining responsibility for managing specific parcels of land may lead to litigation and further delay management efforts, increasing dust emissions in the interim.

Methods

This study estimates the potential economic costs of a declining Salton Sea based on published projections of future conditions, including water quality, elevation, amount of exposed lakebed, and the potential volume and frequency of dust emissions. The methods used to estimate these economic costs include both evaluations of the costs that would accrue from the five topics listed in the above scope and estimates of the costs required to avoid or mitigate these impacts, including but not limited to those developed by the State of California's 2007 Salton Sea Ecosystem Restoration Program PEIR, the QSA JPA, and the state's Species Conservation Habitat. The following chapters include detailed discussion of the methods used to estimate costs for each topic.

Unless otherwise noted, all costs are reported in 2013 dollars, adjusted using the Consumer Price Index as calculated by www.MeasuringWorth.com. Future costs are escalated at 2% per year to reflect expected increases in the consumer price index. That is, if the cost of building an air quality management project is estimated to cost $100 million in 2014, this study projects that it would cost $102 million in 2015. The present value of future costs (including capital and O&M costs) through 2047 is calculated assuming this cost escalation, and then discounted using 4% and 6% rates.

[5] "Playa" refers to exposed or dry lakebed, typically very level land lacking vegetation in arid, interior basins.

Limitations

Several factors limit the accuracy and precision of the estimates in this report, including:

1. Absence of an inventory of dust-emitting Salton Sea playa;
2. Absence of an accepted projection of future emissivity;
3. No published relationship between dust loadings (in tons/day or equivalent) from Salton Sea playa and PM_{10} concentrations (in µg/m3) in the region;
4. No published studies on PM_{10} concentrations in the Salton Sea air basin and impacts on public health or costs related to these impacts;
5. No published studies on the impacts of dust or airborne toxic materials on crop production or quality in the Coachella or Imperial Valleys;
6. Absence of recent regional or state polling data on public perceptions of the Salton Sea;
7. Incomplete information on the number and origins of Salton Sea visitors and their local expenditures;
8. Lack of survey data on homebuyers'/sellers' expectations about the future Salton Sea;
9. No published studies on the lake's reported micro-climate benefits for local crops; and
10. Absence of survey data on local, regional, state, and national willingness-to-pay to protect and preserve the Salton Sea's non-use ecosystem benefits.

2. The Changing Salton Sea

The Salton Sea has changed throughout its history. The Colorado River broke through an unprotected diversion structure to form the current incarnation of the lake in 1905, refilling an ancient lakebed that had filled and dried many times over the past several millennia. The lake quickly shrank after losing the river's inflows in 1907, but began to grow again with the expansion of irrigated agriculture and the designation of the lake as a depository for agricultural drainage in the 1920s. Figure 4 shows that the elevation and salinity of the Salton Sea have changed considerably over the past 110 years. After the initial flooding, the Sea reached its maximum size and elevation in the mid-1990s, as a result of several factors including increased agricultural acreage and more intensive irrigation practices in the watershed. Water in the Salton Sea lacks any outlet aside from evaporation, meaning that salts and other constituents washed into the lake tend to concentrate over time, as shown in the figure by salinity's rising trend since 1955.

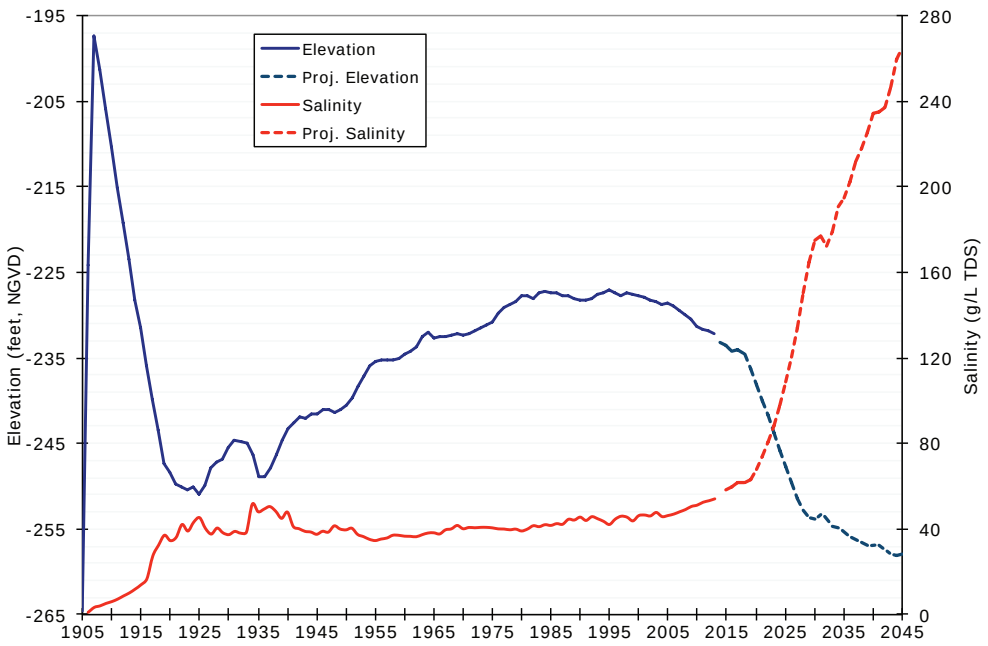

Figure 4. Annual average and projected Salton Sea elevation and salinity, 1905–2045.

Sources: USGS, Reclamation, CH2M-Hill.

The Salton Sea will change more rapidly in the future, as shown in Figure 4. Within five to seven years, the lake will no longer sustain fish; those currently living in the lake will die off, stressed by rapidly increasing salinity, decreasing concentrations of dissolved oxygen, and increased incidence of parasites and disease. The lake's habitat value for resident and migratory birds will rapidly decline, affecting hundreds of thousands of birds (Cohen and Hyun 2006). Over the next fifteen years, the volume

of water flowing into the lake will decrease by about 40%, its surface will drop by twenty feet, and its volume will decrease by more than 60%. Salinity will triple. By 2030, the surface area of the lake will shrink by about 100 square miles, exposing a similar amount of lakebed. By 2045, as much as 150 square miles of lakebed will be exposed to the region's blowing winds, increasing dust emissions in an area already suffering from poor air quality. In some areas, especially along the southern shoreline, the lake will recede as much as five miles from the shoreline established in the year 2000. (Cohen and Hyun 2006).

Several factors drive these expected changes. Key among these is the water conservation and transfer agreement signed in October, 2003, between the Imperial Irrigation District (IID) and the San Diego County Water Authority (SDCWA). Part of the 2003 QSA, the IID-SDCWA water transfer reduces the amount of water flowing into the Imperial Valley. Through the end of 2017, IID offsets the impacts of the transfer on the Salton Sea by delivering "mitigation water" directly to the lake, according to the schedule shown in Appendix A. After 2017, the mitigation water deliveries will no longer be legally required and the lake will enter a 10–12 year period of rapid decline, as shown by the dotted line in Figure 4. Other factors also affect the Salton Sea, including changing cropping patterns within the Salton Sea watershed, hotter and drier conditions that increase evaporation from the lake's surface and from agricultural fields, reductions in the volume of water flowing in the New River from Mexico, and changing land uses.[1]

In 2002, the environmental compliance report documenting the projected environmental impacts of the water transfer identified several significant but unavoidable impacts, including the degradation of air quality due to the reduction of inflows to the Salton Sea and subsequent exposure of potentially dust-emitting playa (IID 2002). That same year, California's State Water Resources Control Board (SWRCB) required the implementation of a four-step air quality monitoring and mitigation plan, to address potential air quality concerns.[2]

The Quantification Settlement Agreement (QSA) and related enabling legislation established a Joint Powers Authority (JPA) comprised of the California Department of Fish and Wildlife (DFW), the Coachella Valley Water District (CVWD), IID, and SDCWA. The QSA JPA "administers the funding of environmental mitigation requirements related to QSA water transfers" and is currently developing an air quality management plan for Salton Sea playa exposed due to the QSA itself. This plan, still in the early draft stages, is developing cost estimates for dust emission control measures and related expenditures.

California's initial estimate of the costs for dust emission control measures and other mitigation expenditures was about $920 million in capital costs, for construction of a large conveyance canal and related infrastructure as well as the unit costs for different treatment methods, and an additional $56 million per year for O&M costs, at full build-out (CNRA 2006). Assuming a 10-year construction schedule starting in 2015, with increasing O&M costs and a 2% annual cost escalation to reflect expected inflation, suggests that the present value of the state's conceptual mitigation plan would be about $1.4 billion through 2047, with a 6% discount rate. The QSA JPA air quality management plan and the state's mitigation plan are both distinct from any full-scale restoration plan. These mitigation

[1] See Chapter 5 of the Resources Agency's draft environmental impact report (CNRA 2006) for a detailed description of the hydrologic changes expected to affect the Salton Sea over the next several decades.

[2] See SWRCB WRO 2002-0013, available at http://www.swrcb.ca.gov/waterrights/board_decisions/adopted_orders/orders/2002/wro2002-13revised.pdf, and WRO 2002-0016, available at http://www.swrcb.ca.gov/waterrights/board_decisions/adopted_orders/orders/2002/wro2002-16.pdf.

plans seek to offset the water transfer's impacts on air quality and on listed species such as the endangered desert pupfish. Neither would address the full extent of air quality degradation due to the shrinking Salton Sea because both assume that individual landowners will be responsible for managing dust emissions outside of the elevations -233.5' to -247.5', identified as the elevations exposed by the water transfer itself (CNRA 2006).

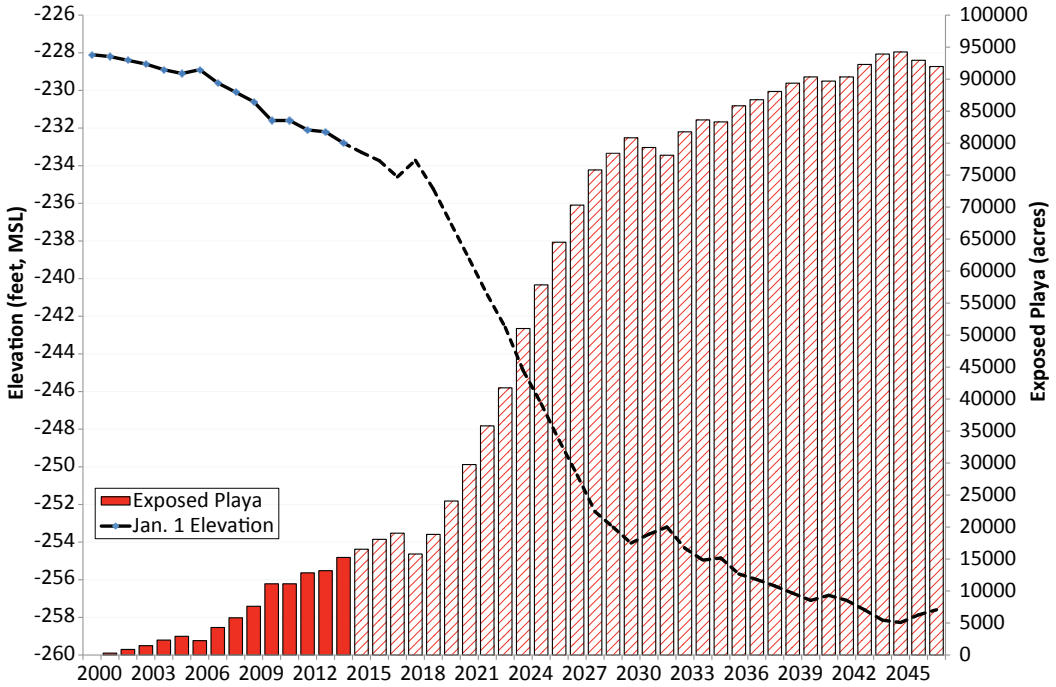

Figure 5. Historic and projected Salton Sea January 1 elevations and exposed playa relative to January 1, 2000, assuming no action.

Sources[4]: USGS, Reclamation, CH2M-Hill.

The increasing amount of exposed playa and the declining ability of the lake to sustain its current abundance and diversity of species are the major factors contributing to the costs of inaction. Figure 5 shows actual January 1 elevations (on the left axis) of the Salton Sea as a solid line, with projected January 1 elevations indicated by a dashed line. The figure also shows the amount of lakebed (on the right axis) that has been exposed (known as "playa") relative to the January 1, 2000, elevation[3], in solid bars, and projected exposures in stippled bars. Figure 5 shows that some 15,000 acres of Salton Sea playa have already been exposed since January 1, 2000. It is not known how quickly Salton Sea air quality management projects can be funded or constructed: the figure shows exposure based on an assumption that no action will be taken, though it does reflect the construction and land use of the state's Species Conservation Habitat, the Red Hill Bay project, and the Torres-Martinez wetlands, covering a total of 1,395 acres.

Figure 5 shows a slight increase in elevation in 2018 relative to the previous year and decrease in exposed playa, due to the mitigation water delivery requirements (see Appendix A). The slight increase in elevation projected for the years 2046 and 2047 reflects a relative stabilization of inflows and a decreasing rate of evaporation due to rising salinity. Projected elevations and acres of exposure come from CH2M-Hill's Salton Sea Planning Model and do not reflect the range of uncertainty inherent in these long-term forecasts.

[3] The January 1, 2000 elevation is within 0.01 foot of the average January minimum elevation for the period 1988-2000.

[4] Historic elevations reported by USGS gage 10254005 "Salton Sea Nr Westmorland CA." Elevation-Surface Area conversions from Reclamation spreadsheet on file with author. Projected elevations from CH2M-Hill model, converted to NGVD standard.

Expected Changes

Three Salton Sea habitat projects, shown in Figure 6, are scheduled for completion in the near future. California's Species Conservation Habitat (640 acres), the joint U.S. Fish & Wildlife Service/IID Red Hill Bay project (650 acres), and the Torres-Martinez wetlands (105 acres) comprise the extent of habitat or air quality management projects currently scheduled for construction around the Salton Sea by 2017. Each of these habitat projects has plans for subsequent expansion, but to date none has secured the funding necessary to grow beyond the listed acreages, so this study assumes they will cover the planned 1,395 acres. In addition to the direct habitat benefits generated by each project, they reduce the amount of exposed playa and will offer limited amenity values.[5]

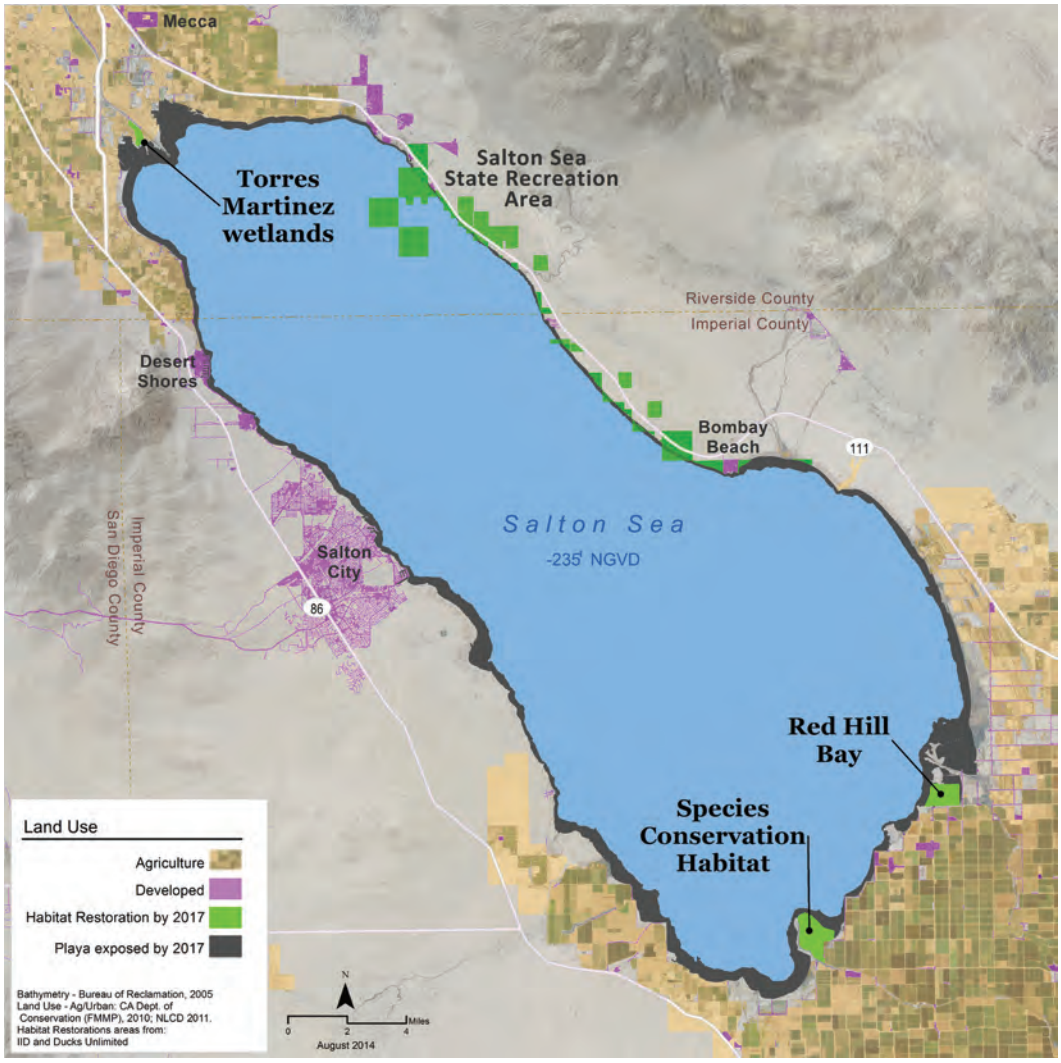

Figure 6. Salton Sea habitat projects in 2017.

Under various agreements, IID, CVWD, and SDCWA assume responsibility for the first $133 million (2003$) in environmental mitigation costs associated with the QSA. Such costs include, but are not limited to, mitigation for air quality impacts. The *QSA JPA Creation and Funding Agreement*[6] states that "The State is solely responsible for the payment of the costs of and liability for Environmental Mitigation Requirements in excess of the" $133 million from the water agencies. The California State Auditor Report (2013, p. 23) notes that "Joint powers authority (JPA) officials roughly estimate that the local water agencies could exhaust most of their environmental mitigation contributions

[5] "Amenity values means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes." Source: http://www.rmaguide.org.nz/rma/introduction/glossary.cfm.

[6] See QSA Joint Powers Authority Creation and Funding Agreement, at http://www.sdcwa.org/sites/default/files/files/QSA_jpa-funding.pdf.

under the QSA as early as 2025." However, the payment schedule for the local water agencies' environmental mitigation contributions could result in revenue shortfalls, when the actual costs of environmental mitigation requirements could exceed, on an annual basis, the agencies' annual payments. The QSA JPA funding agreement does not specify *when* state funding responsibility is triggered. In the worst case, this ambiguity about the start date of state funding responsibility and the QSA JPA payment schedule could delay implementation of air quality management projects at the Salton Sea.

There are at least three distinct conditions that could trigger state payments: 1) an annual QSA JPA budget shortfall, in which the costs of projects in that fiscal year exceed agency contributions to date; 2) when cumulative QSA JPA environmental mitigation requirements are projected to exceed an inflation-adjusted $133 million, projected by the California State Auditor (2013) to be as early as 2025; or 3) after the agencies have contributed their full $133 million in inflation-adjusted environmental mitigation contributions, currently scheduled to end in the year 2047. To date, California has not stated when it expects to begin payments, nor has the state legislature considered legislation authorizing or appropriating such payments. This uncertainty regarding the timing of the state's payments, as well as the absence of legislative activity on the subject, suggests that full funding of an air quality management plan for the Salton Sea may be delayed until 2025 or even as late as 2047, with actual construction of such projects occurring even later.

To date, the local air pollution control districts have not finalized regulations regarding the control of dust emissions from exposed Salton Sea playa. More than 40% of the exposed playa will be the responsibility of the individual landowners rather than of the QSA JPA, so these new regulations will directly affect the volume of future dust emissions. The effectiveness and timing of landowner control measures will not be known for some time. To date, landowners have implemented few if any dust control measures on the roughly 15,000 acres of playa that have already been exposed since the year 2000.

Changes in the Built Environment

The Salton Sea is situated within the Salton Sea Air Basin (see figure 3, above) that includes more than 500,000 acres of irrigated land and several cities, including Calexico, Coachella, El Centro, Indio, La Quinta, Palm Springs, and Rancho Mirage. The total population of the air basin is currently about 650,000, and includes some of the fastest growing cities in the state. According to county-level projections, the population potentially affected by worsening air quality in the basin will almost double in the next thirty years (Table 1). People living near the Salton Sea itself are disproportionately Hispanic and poor, raising environmental justice concerns. An analysis of the census tracts immediately adjacent to the Salton Sea indicates that about 39,500 people lived within several miles of the lake in 2010. About a third of this population lived at or below the poverty line, and some 70% lived within 200% of the poverty line. More than 80% of this population was Hispanic.

Table 1. Current and projected populations in the Salton Sea Air Basin.[7]

	2013	2015	2020	2035	2045	Source
Coachella Valley	469,248	488,300	576,161	842,960	931,150	Riverside County Projections
Imperial County	179,527	192,707	222,920	277,418	311,360	California Dept. of Finance
Total	**648,775**	**681,012**	**799,081**	**1,120,378**	**1,242,512**	

[7] Coachella Valley populations beyond 2035 County projection estimated at 1% annual growth rate.

3. Air Quality and Public Health Impacts

The Salton Sea Air Basin includes all of Imperial County, subject to the jurisdiction of the Imperial County Air Pollution Control District (ICAPCD), and Coachella Valley, subject to the jurisdiction of the South Coast Air Quality Management District (South Coast). Air quality in the Salton Sea Air Basin does not meet state or federal standards for particulate matter less than 10 microns in diameter (roughly one-seventh the thickness of an average human hair), known as PM_{10}. Elevated PM_{10} concentrations are associated with many adverse health impacts (CNRA 2011).

Many scientific and medical studies document the link between PM_{10} emissions and a broad range of public health impacts. Elevated PM_{10} concentrations are associated with a decrease in the growth and development of lung function in school-aged children (Gauderman et al. 2000) and are also associated with an increase in the risk of cardiac disease, heart attacks, and mortality in adults (Peters et al. 2001). Atkinson et al. (2013) report consistent associations of elevated PM_{10} concentrations and heart failure, with a stronger association in more affluent areas. Norris et al. (1999) report that elevated PM_{10} concentrations are associated with increased asthma-related emergency room visits by children. Anderson et al. (2005) reviewed 95 papers for publication bias, finding that even with bias correction, a strong positive association exists between increasing concentrations of PM_{10} and incidences of daily mortality and with the number of hospital admissions for asthma-related symptoms. The International Agency for Research on Cancer has reported that elevated PM_{10} concentrations have been associated with an increased incidence of lung cancer (Straif et al. 2013).

Dominici et al. (2002) found a slightly less than 1% increase in mortality rate in the City of Riverside associated with a 10 unit increase in the previous day's PM_{10} concentrations, slightly higher than the average increase of about 0.5% found in their study of 88 cities nationwide. In a study in Utah, Pope et al. (1992) report that a 100 $\mu g/m^3$ increase in the five-day rolling average PM_{10} concentration was associated with a 16% increase in the daily death rate. The maximum daily PM_{10} concentration during their study period was 365 $\mu g/m^3$, less than 40% of the maximum concentration reported in the Salton Sea air basin in 2013. Zanobetti and Schwartz (2005) found that a 10 $\mu g/m^3$ increase in PM_{10} concentrations was associated with a 0.65% increase in the risk of hospitalization for heart attacks among elderly populations. These dose-response studies, in the context of the Salton Sea Air Basin's periodic instances of elevated PM_{10} concentrations, suggest that increased dust emissions from Salton Sea playa would increase the incidence of acute and chronic adverse health impacts.

PM_{10} poses a threat to public health based on the size of the particles themselves, rather than due to any specific toxins within the particles. Recent

studies suggest that Salton Sea sediments contain some constituents of concern, potentially posing additional risks. For example, Sapozhnikova et al. (2004) found PCB and DDE concentrations at levels of concern, while King et al. (2011) identified elements such as antimony, arsenic, cadmium, chromium, lead, and selenium in Salton Sea sediments. The additional public health impacts associated with toxic constituents in dust emitted from Salton Sea playa merit investigation, but insufficient information currently exists to estimate any additional public health costs due to the presence of these toxins.

The lake also creates other air quality problems. The Salton Sea's periodic hydrogen sulfide emissions exacerbate the public's negative perception of the Sea and present a nuisance, and potentially a hazard to human health (Lovett 2012). Periodic dust storms, exacerbated by exposed Salton Sea playa, can also impair visibility. Although hydrogen sulfide and impaired visibility create a nuisance and may impose measurable costs on those directly affected, this study only estimates the costs associated with increased dust emissions.

The Salton Sea air basin currently does not meet state or federal PM_{10} standards. Figure 7 shows the estimated number of days in which the basin exceeded California's 24-hour PM_{10} standard (defined as emissions greater than 50 micrograms per cubic meter (μg/m^3)) and the federal 24-hour PM_{10} standard (emissions greater than 150 μg/m^3), per year for the years 1989–2012. The figure also shows annual maximum 24-hour concentrations, along the right axis. The maximum 24-hour value reported during this period was 840 μg/m^3, in 2003. The dotted black line in the figure shows the trend in the number of days exceeding the state standard. The figure clearly shows that air quality in the Salton Sea region fails to meet state standards in more than half of the years shown below.

Figure 8 shows the locations of the six air quality monitoring stations sited around the Salton Sea, along with windrose diagrams depicting prevailing wind direction and speed on May 22, 2013. The table in the upper right corner of the figure lists wind speed and recorded PM_{10} concentrations at these stations.[1] The maximum average hourly PM_{10} concentrations at each station exceeded the state threshold for PM_{10} concentrations; the four stations that reported wind speeds in excess of 10 mph that day all exceeded the federal threshold as well.

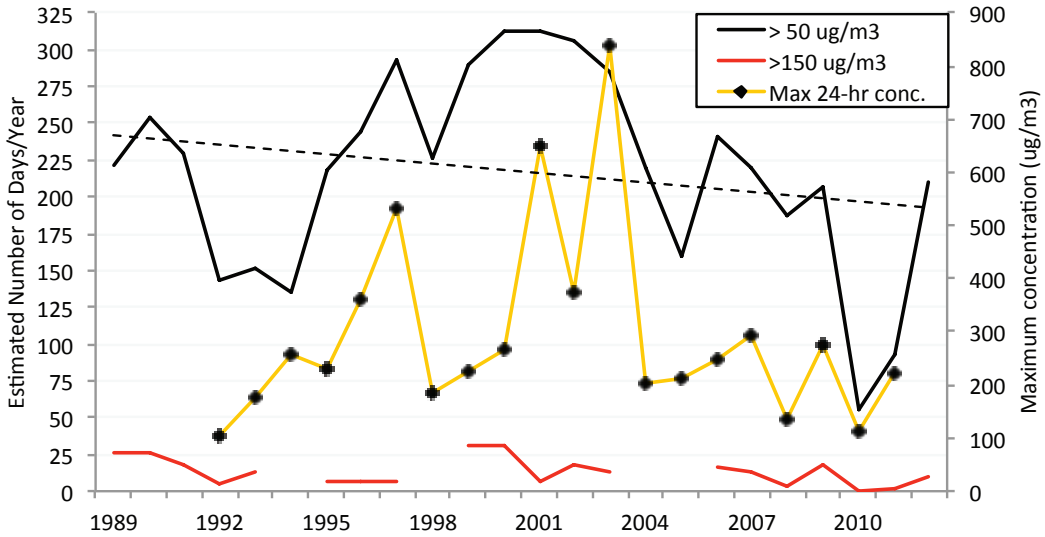

Figure 7. Number of days of exceedance of daily PM_{10} state and federal standards in the Salton Sea Air Basin.

Source: California Air Resources Board, Annual PM_{10} Trends Summary.

[1] CARB's quality assurance program flagged the maximum value reported for Salton City as unreliable; the value shown is the maximum value CARB reports as valid.

Almost 70% of the PM_{10} emissions reported for the Salton Sea air basin arise from fugitive dust,[2] as shown in Figure 9. Information about the maximum PM_{10} emissions shown in Figures 7 & 8 come from monitoring data, while the values shown in Figure 9 are estimated by CARB, based on existing inventories of emissive areas and calculated emission rates. The declining trend in the number of days exceeding daily PM_{10} state standards shown in Figure 7 is consistent with the general decline in the estimated number of tons per day of PM_{10} emissions shown in Figure 9. To date, the local air pollution control districts have not finalized or published an inventory of emissive areas or emission rates for Salton Sea playa, or from undeveloped areas in the basin generally. As the Salton Sea continues to shrink, dust emitted from exposed playa could reverse the recent trend of declining emissions. This additional dust may prevent the two local air districts from attaining state and federal air quality standards, which could lead to additional dust control requirements. Such dust control measures could inhibit other economic activity, such as construction and agriculture, with broader impacts on the regional economy.

Salton Sea Daily View: 2013-05-22 Wind Rose

Abbrev.	Site	Avg. WS (mph)	Max. WS (mph)	Avg. PM10 (ug/m3)	Max. PM10 (ug/m3)
TM	Torres-Martinez	6.9	14.3	30.1	116.9
SSP	Salton Sea Park	7.6	15.2	29.9	84.7
SC	Salton City	17.7	33.8	850.0	868.3
BB	Bombay Beach	14.3	30.2	49.8	180.3
NTS	Naval Test Site	15.9	24.6	111.8	505.1
SB	Sonny Bono	13.9	25.5	79.3	340.3

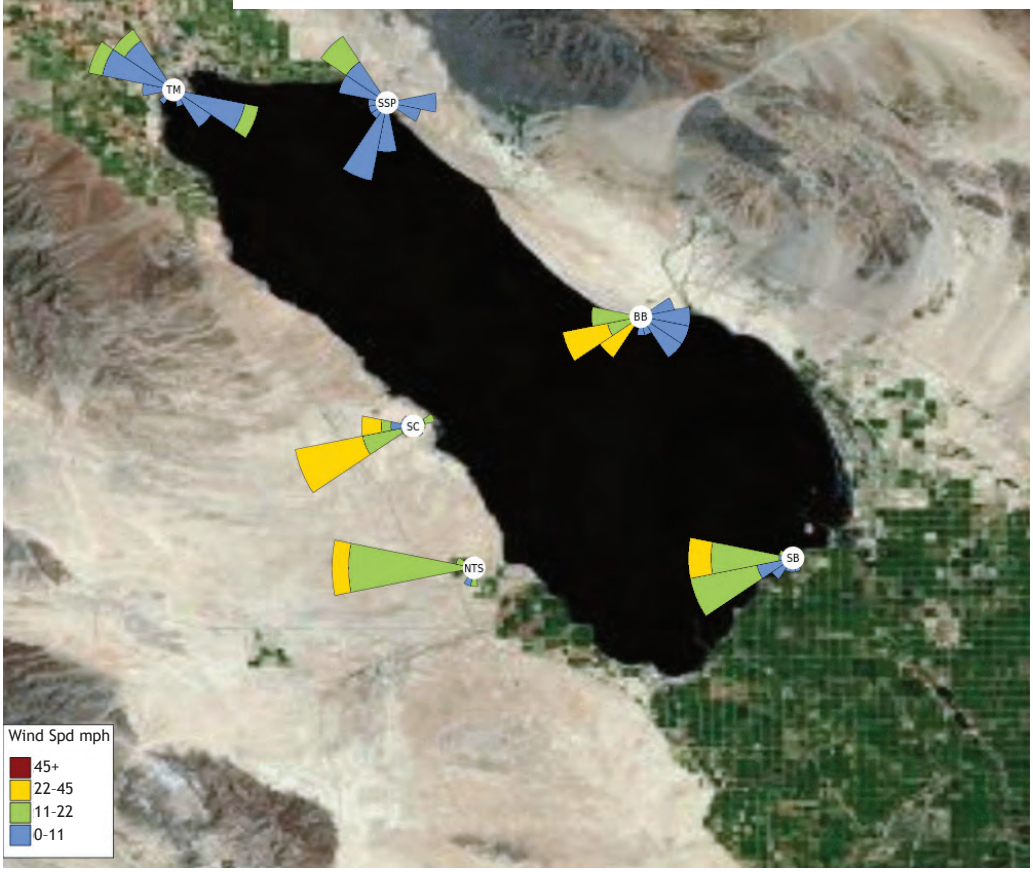

Figure 8. Salton Sea air quality monitoring stations and May 22, 2013 data.
Image courtesy of IID; data from CARB AQMIS2 and IID.

Future Air Quality in the Salton Sea Air Basin

Estimating future air quality in the Salton Sea Air Basin requires a detailed inventory of potentially emissive sites, projected emission rates for these different areas, and control measures available

[2] CARB defines 'fugitive dust' as "Dust particles that are introduced into the air through certain activities such as soil cultivation, or vehicles operating on open fields or dirt roadways. This is a subset of fugitive emissions," defined as "Emissions not caught by a capture system; which are often due to equipment leaks, evaporative processes and windblown disturbances." Source: http://www.arb.ca.gov/html/gloss.htm#F.

to manage potential dust emissions. Determining the contribution of these additional dust loadings to measurable PM_{10} concentrations in the air requires sophisticated models accounting for wind speed and direction, ambient conditions, and other factors. Determining the public health impacts of these projected increases in PM_{10} concentrations then requires an assessment of exposure rates and duration and the numbers of potentially affected people. Unfortunately, as discussed in the following, key information about each of these relationships is insufficient or absent.

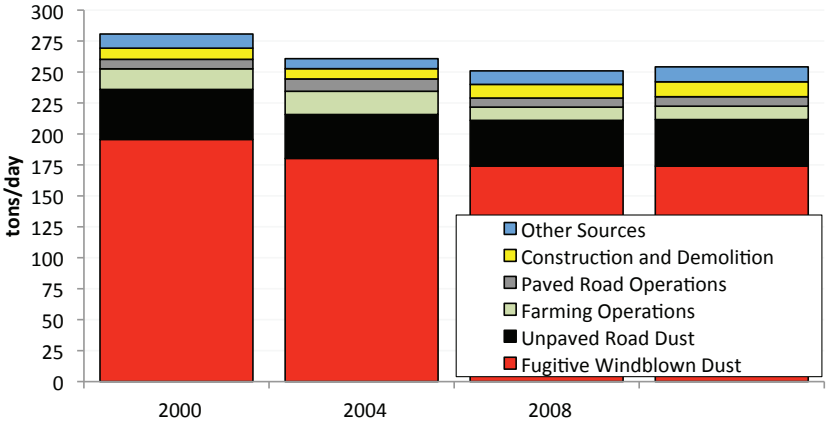

Figure 9. Total tons of PM_{10} emissions per day in the Salton Sea Air Basin, by emissions source.

Source: CARB.

The amount of dust that will be emitted from Salton Sea playa in coming years is not known, but is a "potentially significant, unavoidable impact" of the water transfer (IID 2002). The PEIR (CNRA 2006) states:

> Defining the future air quality in the Salton Sea Air Basin under the No Action Alternative is an inherently challenging task. There are several major variables at play, each with varying degrees of uncertainty. These variables include future population growth in the region, the extent of various emissions sources, emissivity of each source, and the success of the local jurisdictions and others in implementing effective air emissions control measures over the coming decades. Pollutant transport from Mexico also influences air quality compliance in the region.

The local air pollution control district is expected to publish an inventory of dust emissions from exposed playa within the coming year, but to date such an inventory is not available. Projected emissions come from two previous studies. Calculations detailed in Attachment E3 of the Draft PEIR (CNRA 2006) project that No Action conditions at the Salton Sea would result in 0.071 tons of PM_{10} emissions per acre from exposed playa each year on average, or less than a half a pound of fugitive dust per acre per day. King et al. (2011), using on-site wind tests at controlled speeds intended to mimic existing wind velocities, report a considerable range of measured emission rates, dependent on soil type, humidity and temperature, and strongly correlated with the shear velocity of the heavier particles (such as sand) that dislodge PM_{10} particles. Their results show that a shear velocity of 0.7 meters/second, equivalent to that produced by short-term (10 minute) sustained winds in the region, could generate on the order of 30 pounds of dust per acre per hour. Extrapolating from these limited, controlled measurements suggests that Salton Sea playa could emit about 800 pounds of dust per acre per year, on average. This estimate is almost six times greater than the annual average projected by the 2006 PEIR.

A related question is how much of the exposed playa will actually be emissive, and for how long. King et al. (2011, p. 78) conclude that "The Salton Sea salt-based crusts near the shoreline appeared to be significant but temporary sources of dust, limited to cool, wet months, whereas silt/clay crusted sites and dry washes (not only limited to playa-like environments) appeared to be significant sources of dust throughout the year." On-going monitoring efforts around the

Salton Sea will improve our understanding of the timing and magnitude of dust storms. Initial estimates (Cohen and Hyun 2006) assumed that 40% of exposed playa would be emissive. The state's PEIR (CNRA 2006) assumed that all exposed lakebed, including those lands not exposed due to the QSA, would have air quality control measures but that such measures would be slightly less than 100% effective, leading to very limited dust emissions. Newer planning efforts, such as the QSA JPA's on-going development of an air quality management plan and the Imperial County Air Pollution Control District's forthcoming PM_{10} state implementation plan, reportedly assume that 90–100% of exposed lakebed will be emissive and will require control measures.

Figure 10. Dust blowing from Red Hill Bay playa past Garst Road, January 13, 2010.
Photograph courtesy of FWS/Chris Schoneman.

Despite the well-documented associations of PM_{10} with adverse health impacts, only two studies that estimate the economic impact of PM_{10} emissions were found in an extensive literature search and a brief survey of air quality experts. Brajer et al. (1991) estimated the annual benefits of meeting ozone and PM_{10} air quality standards in the South Coast Air Basin (including the greater Los Angeles metropolitan area inland to parts of Riverside and San Bernardino counties) ranged from about $8.9 to $38.7 billion, primarily in the form of averted mortality associated with lower PM_{10} concentrations. More recently, Mohamed and El Bassouni (2007) estimated the total health-related costs associated with PM_{10} emissions at about $61/kg, equivalent to about $55,000/ton, based on the chronic (85%) and acute (15%) effects of direct exposure to PM_{10} on life expectancy. These two studies approached the impacts of PM_{10} on public health differently. The earlier study estimated the public health costs when daily PM_{10} concentration exceed the federal threshold in a specific populated region, while the later study assigned an estimated average cost per unit of PM_{10}, without respect to the density of affected populations, increases in PM_{10} concentrations, or local health-care costs. The Mohamed and El Bassouni (2007) study embedded several key steps in estimating the relationship between dust emissions and public health costs, and should be taken as suggestive at best. Given the absence of clear emissions data and the lack of a clear relationship between emissions and PM_{10} concentrations, and the need for some general estimates of the potential public health costs associated with a shrinking Salton Sea, Brajer et al. (1991) and Mohamed and El Bassouni (2007) offered some general guidance on estimating future costs associated with PM_{10} emissions from Salton Sea playa.

In the study period of 1984–86, Brajer et al. (1991) estimated that PM_{10} concentrations in excess of federal standards increased the risk of death of the average South Coast air basin resident by about 1 in 10,000, almost double the risk of dying in a car accident in any given year. The authors noted that the small, increased risk of premature death applied to the large population in the air basin and actuarial estimates of the value ascribed to these premature deaths generated a best estimate of $6.4 billion (1990$) for a total population of about 13 million, with a reported ten million exposures. This suggests that the value of attaining federal PM_{10} standards is

equivalent to about $880/person/year, in 2013$. Assuming approximately 650,000 people in the Salton Sea air basin (not including Mexico) and using the same value per death estimate as in Brajer et al., suggests that meeting federal PM_{10} standards in the region would currently be worth about $570 million per year, solely accounting for avoided premature death. Brajer et al. (1991) report that the cost of premature death represented a disproportionate percentage of the total economic costs associated with elevated PM_{10} concentrations. This estimate is a direct function of population; projected population growth in the basin would increase these costs proportionately. As shown in Table 1, the total U.S. population in the air basin is expected to increase by 90% by the year 2045.

Several caveats apply to the suggestion that estimated annual cost of $570 million is an appropriate value to apply to the air quality costs associated with a no-action Salton Sea. The first is that Brajer et al. (1991) report their estimate as a threshold value; since the Salton Sea air basin is already not in attainment of federal PM_{10} standards, it is not clear to what extent the additional emissions from Salton Sea playa can be captured by this threshold value. Second, the estimate itself is based on research from more than twenty years ago and may no longer reflect current actuarial estimates. Nonetheless, the study suggests that even limited exposure to PM_{10} can impose substantial costs when spread over a large population. Third, the baseline health of the South Coast air basin may be greater than that of the Salton Sea air basin, meaning that the people affected by poor air quality in South Coast may have greater resilience, while those in the Salton Sea air basin may suffer from greater vulnerability, increasing marginal damages. On the other hand, average income is greater in South Coast, so income-related impacts would be lower in the Salton Sea Air Basin (Schwabe, pers. comm.)

As noted above, estimates vary on the amount of dust that may be emitted by exposed Salton Sea lakebed. Assuming the maximum value of about 800 pounds of dust per acre per year, and additionally assuming that 100% of the maximum exposure of about 96,000 acres of playa is emissive, suggests that the lakebed could emit as much as 100 tons of dust per day. This amount is about half of the total fugitive dust emissions reported for the basin as a whole in the year 2000 (see Figure 9). Maximum daily emissions, governed by ambient conditions and windspeed, could be significantly greater. On the other hand, the state's PEIR (CNRA 2006), using different methods, estimated that average emissions without management controls would be about 14 tons day. These coarse annual estimates do not lend themselves to specific projections about maximum potential concentrations or peak emission rates, but they do offer an initial basis for suggesting the magnitude of the economic impacts of dust emissions on public health. Figure 11 depicts the estimated amount of dust emitted per year, based on these two per-acre estimates and the amount of playa exposed relative to January 1, 2000.

Based on Mohamed and El Bassouni's (2007) inflation-adjusted estimate of about $55,000 of total health care costs per ton of PM_{10} and the high dust emission estimate suggests that the total public health-related costs associated with dust emissions from Salton Sea playa could rise from about $360 million in 2014 to $1,400 million in 2025, to about $2,000 million per year after 2035, assuming no revitalization or air quality mitigation plan is in place. Completion of a functional air quality management plan would reduce the amount of fugitive dust emitted from Salton Sea playa and would dramatically reduce associated health care costs.[3] With the

[3] The scale, timing, and effectiveness of any air quality management plan for the Salton Sea are not known. The QSA JPA is currently developing such a plan, elements of which may be operational as soon as 2017, at a limited

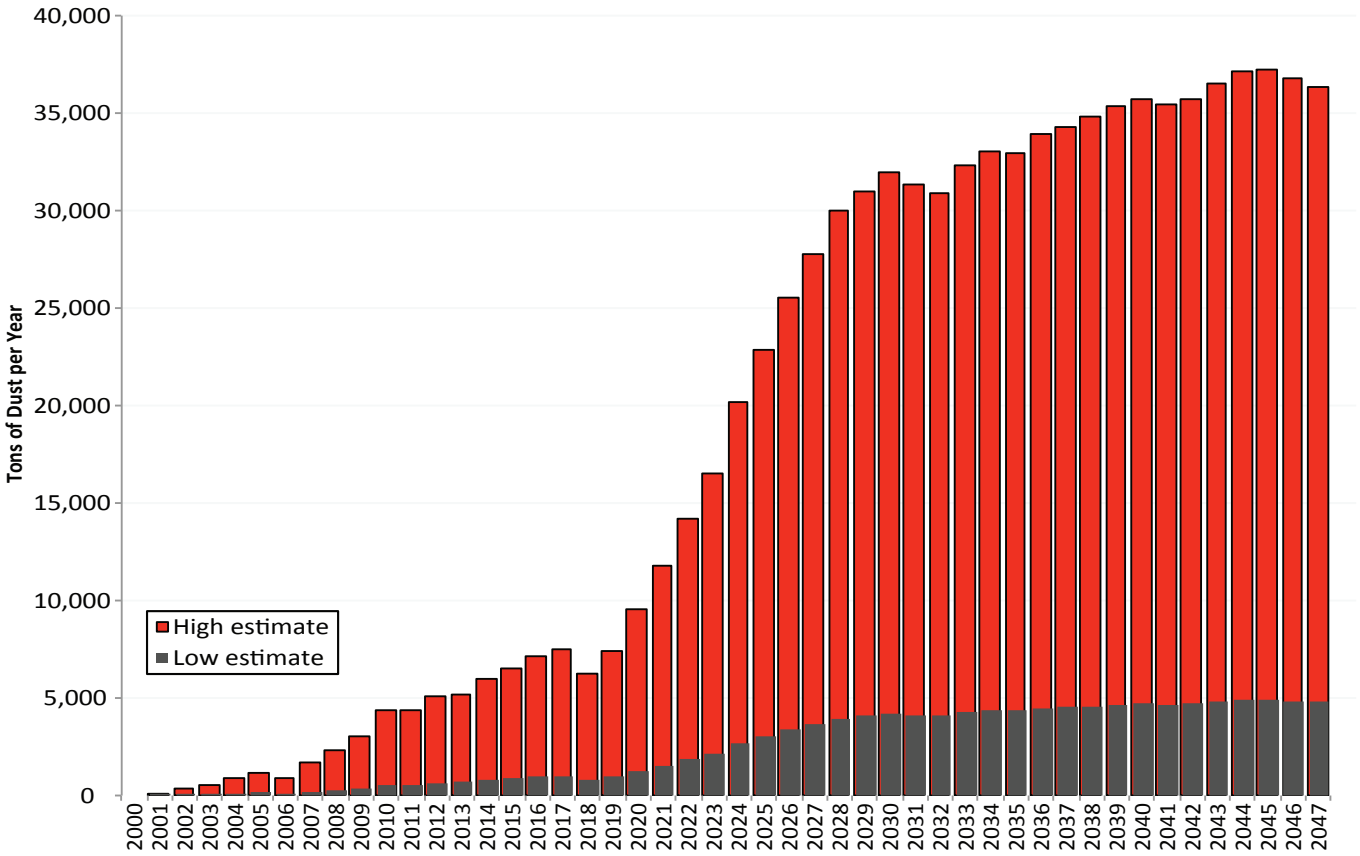

Figure 11. Estimated tons of dust emitted per year from Salton Sea playa, 2000–2047.
Based on data from King et al. (2011) and CNRA (2006).

scale. However, several factors may delay implementation of the QSA JPA air quality management plan, including a mismatch between the QSA parties' scheduled payments and the expenditures required for plan implementation. The state's conceptual mitigation plan (CNRA 2006) required the construction of extensive water delivery infrastructure, to convey drainage water to playa around the lake's perimeter. Construction of this infrastructure would be very expensive, and well beyond the QSA JPA's current budget. If required, this infrastructure component could significantly delay construction of the project and the control of dust from exposed playa. As noted previously, the State of California has yet to announce when it assumes responsibility for these payments. This could be as early as 2025, or as late as 2047. Further complicating these estimates is that the QSA JPA is not responsible for playa exposed due to factors aside from the QSA; by 2047, more than 40% of the land exposed will not be the QSA JPA's responsibility. It is not clear when these additional lands will be controlled, or how. In the worst case, only very limited amounts of land will have dust control by 2047.

low dust emission estimate, public health costs would rise from about $47 million in 2014 to $190 million in 2025, to about $260 million per year after 2035. Note that these values do not reflect costs associated with pain and suffering, often quantified as a willingness to pay to avoid these impacts, so total public health costs could be higher (Schwabe, pers. comm.).

The timing and scope of a planned JPA QSA air quality management plan directly affect the estimates of the present value of public health costs associated with dust emissions from Salton Sea playa. In the best case scenario, dust control measures will be in place on all Salton Sea playa by 2016, so that there would be essentially no

new public health impacts. In the worst case scenario, the state does not accept responsibility for QSA mitigation costs until after 2047, the QSA JPA is only able to construct minimal dust control measures due to limited funding and insufficient infrastructure, and playa exposed due to non-QSA factors is not controlled. Assuming 2000 acres of QSA JPA dust control measures, plus the roughly 1400 acres of habitat projects, means that as much as 94,000 acres of playa may still be emissive. With the low emissions estimate (140 pounds of PM_{10}/acre/year) suggested by the PEIR and a 6% discount rate, this yields a present value of more than $3.5 billion through 2047. With the higher emissions estimate (800 lbs/acre/year) and a 4% discount rate, the present value of inaction through 2047 rises to more than $37 billion. Assuming that the QSA JPA constructs dust control measures quickly, without construction or funding constraints, but still assuming that playa exposed due to non-QSA factors is not controlled, yields present values ranging from about $2.2 billion on the low end to almost $23 billion on the high end, using the estimates noted above.

Based on Brajer et al.'s (1991) estimated public health cost of PM_{10} non-compliance of $880 per person per year and conservatively assuming a 2% annual increase in such costs, as well as the population growth projections shown in Table 1, suggests that the present value of the total public health costs of continued PM_{10} non-compliance in the Salton Sea Air Basin through the year 2047 would be about $21 billion at a 4% discount rate, or more than $15 billion at a 6% discount rate. The extent to which uncontrolled emissions from exposed Salton Sea playa will contribute to or exacerbate existing non-compliance with state and federal PM_{10} standards is not known and was not estimated as part of this study.

For context, gross hospital revenue in Imperial County in 2012 was about a billion dollars, and about $12.6 billion in Riverside County as a whole. Recall the Mohamed and El Bassouni (2007) estimate that about 85% of projected health costs would be for chronic rather than acute conditions, indicating that most of the projected public health costs would not be captured by direct hospital revenues.

4. Property Values

Proximity to water typically increases the value of property, especially residential property. People tend to characterize water features such as lakes, rivers, and the ocean as amenities, desirable features contributing aesthetic value to the property and adding to the quality of life. Higher property values for waterfront property or proximity to water reflect this premium. For example, Mahan et al. (2000) found that a 1,000 foot reduction in a home's distance to open water increased the median property value in the Portland, Oregon area by more than 1%.

Proximity to the Salton Sea appears to be an exception to this general rule. An informal review of property values in the area shows little correlation with distance to the Sea. Figure 12, a screenshot of a Google Earth image of Salton Sea Beach, is typical of many of the communities around the Salton Sea: houses are not located preferentially along the shoreline, and in fact many of the lots closest to the shoreline are vacant. Housing values in shoreline communities are also lower than in more distant communities: the median housing prices of currently listed

Figure 12. Salton Sea Beach, showing home location relative to the shoreline.
Source: Google maps.

homes in Salton City is about $55,000, compared to about $250,000 for currently listed homes in Holtville, a small town about 26 miles southeast of the Sea, in Imperial County. Similarly, the median housing prices of currently listed homes in Mecca, about 3½ miles north of the Salton Sea, is about $50,000, compared to about $187,000 for currently listed homes in Coachella, ten miles farther away from the Sea along Highway 111. In Indian Wells, about 19 miles northwest of the Salton Sea, the median housing price of listed homes is about $750,000.

The low housing values of communities directly adjacent to the Salton Sea and the relative distance of such homes from the shoreline itself reflect the lake's shift from a recreational amenity in the 1960s to its current status as a disamenity. More than fifteen years ago, Bazdarich (1998, p. 12) wrote that "the Sea currently is suffering depressed economic conditions, due in large part to the afflictions of salinity and pollution in its waters and the negative reputation this has engendered among vacationers and tourists." Several years later, RSG (2003) wrote, "the perception that the Sea is dying has significantly depressed surrounding property values." The loss of the Salton Sea as a tourist attraction devastated the tourism-based economy in the immediate area, closing hotels and restaurants and stores and reducing the number of jobs in the area. But the disamenity value may be even greater adjacent to the Salton Sea than in other more remote areas in the desert, because of the general perception that current conditions are relatively worse than they used to be, even if on an absolute basis they may still be objectively better than in other, more remote areas that have not experienced any environmental degradation (cf. Davis 1959).

These depressed economic conditions have continued around the Salton Sea and offer an indication of future economic conditions under continued no action. Regional or state polling data on public perceptions of the Salton Sea would be informative, but no such polls have been conducted in at least a decade. Anecdotally, this negative reputation helps explain the depressed economic condition of the area adjacent to the Salton Sea. If no action is taken at the lake, physical and ecological conditions will continue to degrade, leading to increased dust emissions and widespread fish and bird die-offs, further diminishing the lake's amenity value. Dust emissions and the lake's diminishing reputation could have an adverse economic impact beyond adjacent areas to other downwind communities. Determining the geographic scope of these impacts would require new public surveys, but two recent data points suggest the potential extent of the Salton Sea's influence. On September 9th and 10th, 2012, strong winds transported hydrogen sulfide more than 150 miles northwest to Los Angeles, prompting hundreds of complaints (Lovett 2012). Dust emitted from Owens Lake has been detected more than 60 miles away.

Studies on the economic impacts of environmental hazards or disamenities in other areas suggest methods for estimating potential impacts to property values at the Salton Sea. Many studies have attempted to quantify the impacts of disamenities such as landfills (Brasington and Hite 2005), confined animal feeding operations (Isakson and Ecker 2008), damaged nuclear power plants (Nelson 1981), refineries (Farber 1998), superfund sites (Messer et al. 2006), and, at a finer scale, diseased trees (Kovacs et al. 2011) on the value of nearby properties.

Boyle and Kiel (2001) reviewed 38 previous studies, several of which suggest methods for estimating the potential decline in property values around the Salton Sea based on analogous disamenities. Nelson et al. (1992) found that homes located on the boundary of a landfill suffered a 12% decline in value, while those within one mile of the landfill suffered a 6% decline. Reichert al. (1992) found that homes

within about a mile of a landfill suffered a 5.5% decline in value. Smolen et al. (1992) found that there was no impact on prices beyond 5.7 miles from a hazardous waste landfill, while for houses within 2.6 miles, each additional mile from the landfill increased home values by $9,000–14,000. Kiel (1995) found that nominal housing sale prices increased by nearly $1,900 per mile from a proposed superfund site, in the late 1970s. Messer et al. (2006) argue that delayed cleanup of Superfund sites are associated with long-term declines in property values, in one case by an average of almost 40% within an 8.5 km radius of the site, due to persistent stigma associated with the location. Carroll et al. (1996) report that an explosion at a rocket fuel plant in 1988 caused prices to fall by 17.6% in Henderson, Nevada, reflecting the impacts of a catastrophic event rather than an on-going nuisance.

Clark and Nieve (1994) report that petrochemical refineries and nuclear plants diminish representative household value by about $750 and $400 respectively, per facility in a 1000 square mile area. Nelson (1981), writing in the aftermath of the Three Mile Island nuclear accident, found no significant impact in property values in the months after the accident. Folland and Hough (2000), using different methods, found significant negative impacts associated with proximity to older nuclear plants, an effect that reversed with newer plants that apparently were perceived as being safer. They found that the older plants impacted land values within a sixty mile radius, centering at about 10% of land values.

Currie et al. (2013) assess the impacts of 1,600 openings and closings of industrial plants that emit toxic particulates, finding that these industrial plants affect property values by about 1.5% within a one mile radius, and by 2–3% within a half mile radius. At a finer scale, Kovacs et al. (2011) estimate that diseased oaks on a property decrease property values by three to 6%, while a broader neighborhood distribution of diseased and dying oaks can decrease property values by eight to 15% for homes located within a quarter mile of infected trees.

Isakson and Ecker (2008) find that, for homes within three miles of a confined animal feeding operation (CAFO), location relative to prevailing wind direction is the most significant factor affecting property value (relative to other CAFO variables), while for homes beyond three miles, the size of the CAFO is the most significant factor. They report that homes within two miles of a CAFO at an average of 34° from the prevailing wind direction suffer a loss in property value of almost 17%. An additional mile from the CAFO at the same wind angle reduces the loss in property value to 3.7%; small reductions in property value were found as much as six miles downwind of a CAFO.[1]

The studies noted above offer a range of potential depreciation rates to apply to property values in the Salton Sea area. Determining which depreciation rate is most applicable requires an assessment of the magnitude of the perceived risk posed by a deteriorating Salton Sea and the degree to which that risk may affect market values. The magnitude of that risk includes the geographic scope of the impacts (such as the dispersion of fugitive dust and hydrogen sulfide), the frequency of adverse events, and the severity of these events. The reputational risk of the Salton Sea may be comparable to that of a nuclear plant in terms of familiarity with the source of the threat, but the lake's risk is

[1] The Colorado River Regional Water Quality Control Board reports that there are 27 large CAFOs in the Imperial Valley: 2 dairies and 25 feedlots. While there are no CAFOs in the Coachella Valley, as many as 26 illegal toxic dumps operated in the lower portion of the valley within the past decade, many of them on tribal lands. At least one of these was declared a Superfund site. In 2011, the EPA closed another landfill, citing complaints from nearby schools about noxious odors and health problems. There is also a 47 megawatt biomass cogeneration facility in Mecca fueled primarily by wood waste products. These and a variety of other disamenities contribute to the lower Coachella Valley's overall social and environmental vulnerability (London et al. 2013).

far lower in terms of the severity of an adverse event. The Salton Sea, like nuclear plants, suffers from a very poor reputation, but the Sea does not pose the threat of a catastrophic, life-threatening event. However, noxious events at the lake, such as dust storms and hydrogen sulfide emissions, will be common, generating a relatively high-frequency, low-to-moderate level of impact. This suggests that a better surrogate for the Salton Sea's adverse impacts on property values may be petrochemical plants or CAFOs, which represent more regular, lower-level nuisances, though the dispersion of dust suggests that the geographic extent of nuclear plants' estimated impacts on property values may be appropriate.[2]

The significant uncertainty clouding the magnitude of the future risk posed by a no-action Salton Sea precludes robust modeling efforts, suggesting instead that qualitative, order-of-magnitude level estimates are more appropriate. Additionally, developing a robust hedonic model would require conducting a survey of home buyers'/sellers' expectation about future Salton Sea conditions and a formal statistical analysis, both beyond the scope of this study. Ultimately, home buyers' expectations and perceptions about the Salton Sea and its future will determine the extent to which the lake impacts property values. As the lake continues to degrade under a no action scenario, it is likely that its disamenity value will increase and the geographic scope of this impact will similarly increase.

The depressed property values adjacent to the Salton Sea demonstrate the lake's current lack of amenity value. Bazdarich (1998) reported that the value of non-federal, state, or tribal property within one-half mile of the current Salton Sea shoreline (then at about -228.0'[3]) was $154.8 million in 1997 ($225 million in 2013$). TetraTech (2005) reported the assessed value of land within a broader study area (as much as four miles from the shoreline) as $327 million in fiscal year 2002/2003 ($414 million in 2013$). This represents about 0.6% of the total assessed property value in Imperial County and the Coachella Valley.[4]

The incremental impacts of additional Salton Sea degradation, such as increased dust emissions and decreased recreational and aesthetic amenity values, on existing near-shore properties is likely diminished because of the decades of cumulative impacts generated by a declining Sea, as well as the impacts arising from the high foreclosure rate in the area. The lower Coachella Valley and parts of the Imperial Valley include many locally undesirable land uses, such as CAFOs and toxic waste dumps, that presumably depress nearby property values. A deteriorating, no-action Salton Sea will exist within this broader context of depressed property values and environmental vulnerabilities, exacerbating already poor conditions but presumably not depressing property values as much as it would if these other disamenities did not exist. The previous section notes that the area affected by future dust storms will extend beyond the lower Coachella Valley and Imperial County, potentially affecting areas thirty or more miles downwind via increased dust emissions and the perception of additional adverse impacts. Figure 13 shows the distance of various communities from the Salton Sea, as well as the locations of existing CAFOs and other locally undesirable land uses, as context for the following discussion.

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[2] Dust transport studies from Owens Lake indicate that playa emissions from that area can lead to air quality violations 50 miles downwind.

[3] USGS reports elevations for the gaging station USGS 10254005 SALTON SEA NR WESTMORLAND CA as "Lake or reservoir water surface elevation above NGVD 1929, feet." NGVD is the "National Geodetic Vertical Datum," which USGS defines as: "As corrected in 1929, a vertical control measure used as a reference for establishing varying elevations."

[4] Although some economists prefer to use actual transaction values rather than assessed property values, the latter are publicly available and also form the basis for tax revenues for a variety of taxing jurisdictions, so assessed property values are used in this report.

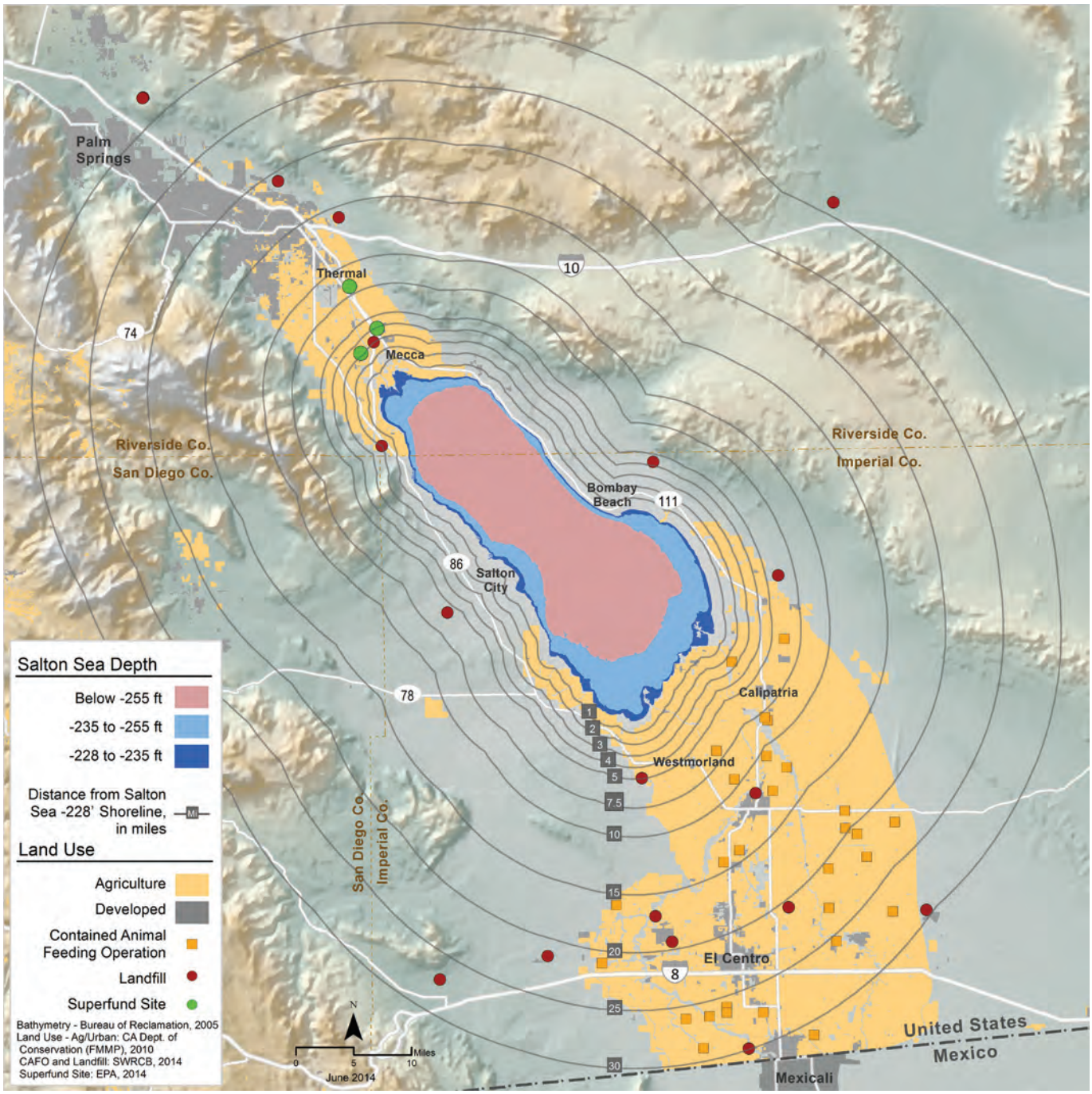

Figure 13. Distances from the Salton Sea –228' shoreline, with locations of existing disamenities.

Figure 14 shows the assessed value of property in Imperial County as a whole and of property within the Coachella Valley, in constant 2013$. Imperial County total assessed property value declined from a maximum of $11.7 billion in FY 2007/08 to $10.1 billion in the past two years, while Coachella Valley assessed property values fell from a high of about $79 billion in FY 2008/09 to about $63 billion in the most recent fiscal year, a decline of more than 20%. These changing values reflect the impacts of the recent recession and macroeconomic factors in the national and regional real estate economies; they are not intended to suggest that the deterioration of the Salton Sea caused the post-2008 decline in Coachella Valley property values.

A no-action Salton Sea could exacerbate two factors reducing local property values: 1) dust emissions and the threat to public health, and 2) the stigma (Roddewig 1996, Messer et al. 2006) associated with a 'dying' lake.[5] In the absence of public survey data, anecdotal reports of the Salton Sea's stigma suggest that concerns about the lake's smell and recurrent fish and bird die-offs could depress local property values. As described in the previous section, the magnitude and duration of dust emissions arising directly from exposed playa are not well defined and are further clouded by uncertainties about the timing and investment of the State of California and other responsible parties in mitigation efforts. The geographic scope of the potentially affected area is also not well defined, but can be estimated based on studies of other regions. Dust transport studies from Owens Lake indicate that playa emissions from that area can lead to air quality violations 50 miles downwind.[6] If we assume this bounds a worst-case scenario for the Salton Sea, dust from Salton Sea playa could affect all of the Coachella Valley (470,000 people), all of the Imperial Valley (175,000 people), and the city of Mexicali (about one million people) in Mexico.

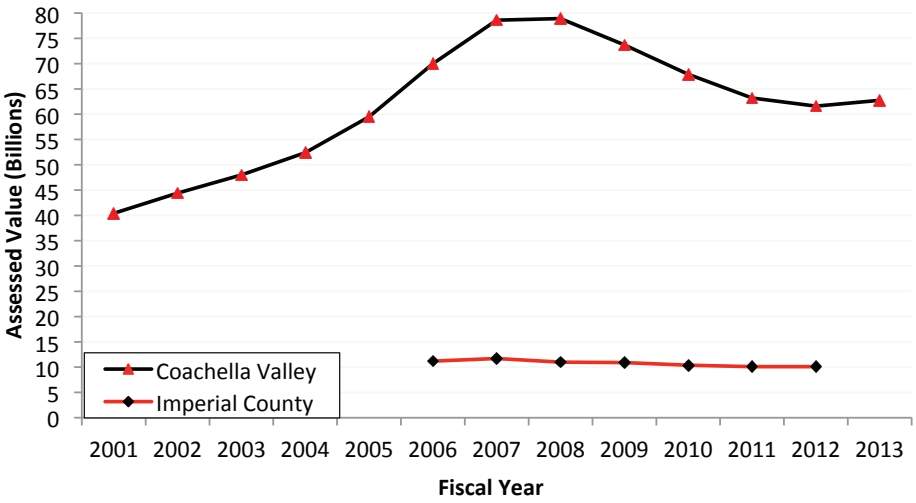

Figure 14. Assessed property values in the Coachella Valley and Imperial County by fiscal year.

Sources: CVAG, Imperial County.

As is the case for many existing environmental disamenities, the environmental baseline is already compromised, suggesting that the incremental damage to property values from new dust storms is less than it would be in pristine conditions. This suggests that the magnitude of dust-related impacts should be discounted by some value. Table 2 summarizes disamenities' impacts on property values described previously, to provide a basis for suggesting potential property value decreases due to deteriorating Salton Sea conditions under a no action scenario.

Table 2 suggests two general analogs for estimating potential property devaluations due to continued inaction at the Salton Sea. The first is that the lake may be akin to a landfill or CAFO, emitting noxious odors on a regular basis that adversely affect those living within two to three miles of the shoreline, devaluing those properties by as much as 17%. The second analog is that the future Salton Sea may suffer from a broader stigma value akin to a refinery or an older nuclear plant, devaluing property over a much broader region. Verifying this approach would require surveying homebuyers' and sellers' expectations about the future Salton Sea and the

[5] Messer et al. (2006) describe several properties of stigma relevant to the Salton Sea: 1) contagion, associated with physical contact, such as with dust or hydrogen sulfide; 2) permanence, where the stigma does not decrease over time; 3) insensitive to dose: even non-hazardous concentrations of hydrogen sulfide could trigger the stigma response; 4) the specific source of concern may be unknown; and 5) fear of bodily harm, as is often expressed by people unwilling to bathe in the Salton Sea.

[6] People more than 100 miles away complained about the smell of the Salton Sea's September 10, 2012 hydrogen sulfide eruption, but that one-time event was likely insufficient to affect local property values.

Table 2. Reported impacts on property values, by type of disamenity.

Disamenity	Extent	Property Value Impact	Source
Landfill	0-1 mile	-12% to -6%	Nelson et al. (1992)
Landfill	2.6 miles	-5.5%	Reichert al. (1992)
Landfill	>5.7 miles	0	Smolen et al. (1992)
Landfill	<2.6 miles	+$9-14,000 per mile	Smolen et al. (1992)
Superfund site		+$1,854 per mile	Kiel (1995)
Superfund site	<5.5 miles	-14% to -39.5%	Messer et al. (2005)
refinery	1000 sq miles	-$750/house per facility	Clark and Nieve (1994)
nuclear plants	1000 sq miles	-$400/house per facility	Clark and Nieve (1994)
older nuclear plants	60 mile radius	average 10% decrease	Folland and Hough (2000)
toxics-emitting industrial plants	0.5 mile radius; 1 mile radius	-2% to -3%; -1.5%	Currie et al. (2013)
diseased oak trees	0.25 mile	-8% to -15%	Kovacs et al. (2011)
CAFO	<2 miles	-17%	Isakson and Ecker (2008)
CAFO	2-3 miles	3.7%	Isakson and Ecker (2008)

extent to which it would affect purchasing and selling decisions.

For the first approach, assuming that dust-related impacts from the Salton Sea are roughly comparable to property devaluations associated with CAFOs. At these rates, and assuming total adjacent property value as reported by Bazdarich (1998) and TetraTech (2005) suggests that total devaluation could amount to as much as $44 million. However, it is likely that existing Salton Sea property values already reflect this impact, so the actual impact on existing properties may be closer to zero. Expected catastrophic decline of the Salton Sea, manifested as recurrent fish and bird die-offs (see Cohen et al. 1999) and noxious odors, could increase the existing devaluation, though these impacts may be more directly associated with an increased stigma associated with the lake, as estimated in the following.

Using the second approach, assuming that an environmentally degraded Salton Sea would create a stigma that could adversely affect property values at a lower rate but across a much broader region, suggests that the impact could be much greater. The actual percent decrease for property values associated with a continued deterioration of the Salton Sea would require surveys regarding expected Salton Sea conditions, as noted above. Assuming a 10% decrease in property values, consistent with the rate reported by Folland and Hough (2000) for properties within a 60 mile radius of an older nuclear facility, could be considered a maximum estimate, and very likely overstates the potential impact of a declining Salton Sea because the lake does not pose a threat of catastrophic failure. 10% of the total assessed property value in the Coachella Valley and Imperial County in 2012 would be more than $7 billion. Several golf courses and private country clubs in La Quinta lie

less thirteen miles from the shoreline, suggesting that blowing dust and noxious odors could affect some high-value properties. Conservatively assuming that the real and perceived impacts of blowing dust, noxious odors, and the general stigma of a deteriorating Salton Sea have limited affect beyond the immediate area suggests a different calculation. Assuming a 5% decline in property value at 2 miles from the shoreline and a geometric decrease in the rate of decline suggests that total property devaluation due to a potential negative stigma associated with the deteriorating Salton Sea could be on the order of $400 million.

However, if the lake's stigma and dust emissions become prevalent, they could negatively impact the Coachella Valley's prominent golf industry, depressing the property value and revenues of some or many of the 124 golf courses and associated resorts in the valley. Although the economic value of this industry has not been estimated, California's golf industry generates more than $11 billion annually. Some 16% of the state's golf courses are in the Coachella Valley, suggesting that they may generate on the order of $1.8 billion annually. These courses could suffer disproportionate declines in value as the Salton Sea deteriorates, dust storms and noxious odors increase, and the attractiveness of Coachella Valley golf courses and resorts diminish as a result.

Unlike the public health costs estimated in the previous chapter, this property value devaluation represents a one-time cost, rather than an annual cost. Messer et al. (2006) suggest that the impacts associated with environmental disamenities could persist for many years, affecting property tax revenues for the local authorities, but these estimated devaluations do not reflect annual costs.

An important caveat is that these estimates arise from existing property value assessments. The projected 90% population growth by 2045 – much of which is expected to occur in unincorporated areas closer to the Salton Sea – would increase the number of housing units in the area. Although the value of this new housing is speculative, it does represent an additional baseline against which future property devaluations could occur. Alternatively, a deteriorating 'no action' Salton Sea could simply reduce the rate at which housing prices increase or, more dramatically, the actual and perceived public health threats and stigma associated with a no action Salton Sea could decrease the rate of population growth in the region, imposing additional costs. In this case, the no action Salton Sea could cause losses in housing development and decreased economic growth. These potential impacts to housing and economic growth are not estimated here, though they may be significant.

Note that these property devaluations are not solely dependent on the implementation of air quality mitigation projects. Instead, they are also contingent on the implementation of large-scale revitalization projects, which could minimize disamenities or even generate outright amenities. As described in the literature review at the start of this chapter, these impacts on property values could arise from a variety of factors, including direct impacts associated with increased dust emissions (separate and distinct from direct impacts on public health costs) and the broader loss or reduction of local amenity values due to periodic odors from the lake, as well as from a general stigma associated with the lake.

5. Impacts on Agriculture

The Salton Sea lies in the midst of an agricultural region that grows a significant percentage of the nation's winter vegetables, as well as large amounts of fruits, wheat, and forage crops. Enjoying an abundance of sunshine, senior water rights, and mild winter temperatures, the Imperial and Coachella valleys harvest an average of about 500,000 acres and 63,000 acres of crops each year, respectively. In 2010, Imperial Valley agricultural revenues, including cattle production, totaled roughly $1,600 million, while Coachella Valley agricultural revenues that year totaled about $620 million. The Imperial Valley accounts for almost 90% of total harvested acreage in Imperial County, while the Coachella Valley accounts for about 30% of total harvested acreage in Riverside County. Agriculture provides almost a third of all jobs in Imperial County, but less than 2% of all jobs in Riverside County.

Agriculture is the fundamental driver affecting Salton Sea conditions. In 1928, President Coolidge designated the Salton Sea as an agricultural sump, affording irrigators in the watershed the benefit of a gravity-fed drainage reservoir. Though naturally a part of the Colorado River delta (demonstrated by previous incarnations of Lake Cahuilla – see Cohen et al. (1999), the current Salton Sea would not exist without agricultural drainage. In return, the Sea provides two additional benefits to agriculture:

(1) *dust mitigation* – the Sea covers playa that, when exposed, will likely emit dust that may reduce crop productivity. The Sea itself also traps blowing dust and sand, entraining or capturing some of the particles that blow across its surface and reducing total particulate concentrations in the region; and

(2) *micro-climate* – the Sea reportedly buffers temperature and humidity changes in nearby fields, enabling farmers to harvest earlier and potentially reap a price advantage over more distant fields.

Neither of these current benefits has been adequately investigated or documented, so the values of these benefits cannot be clearly estimated. Nonetheless, it is useful to discuss these values, both to prompt further investigation and to draw attention to the potential costs associated with the loss of these benefits. Like other externalities arising from the decline of the Salton Sea, the loss of these current benefits, and the additional impacts caused by the decline of the Sea, would have real costs that should not be ignored simply because they have not been quantified.

As noted previously, no inaction conditions at the Sea would dramatically increase the amount of

exposed playa (see Figure 5) and dust emissions (Figure 11) in the region, simultaneously reducing the Sea's ability to capture blowing dust and sand. A smaller Salton Sea would also have less ability to buffer local temperature and humidity, a loss that would affect a small percentage of total agricultural land in the region. These two changes are discussed in the following sections.

Dust on Crops

Although there have been a number of published studies evaluating the impacts of cement dust on crops (Singh and Rao 1981, Chaurasia et al. 2013), the number of articles describing the impacts of fugitive dust on crop productivity is smaller than expected. Armbrust (1986) concluded that dust would not pose a major problem to cotton production "under normal growing conditions," though this assumed brief episodes of low deposition rates (3 days at 1.5 $\mu g/m^2$), after which wind and rain were assumed to remove >90% of the accumulated dust. However, Armbrust found that higher deposition rates (>28.6 $\mu g/m^2$) altered crop physiology and reduced plant weight by blocking plant stomata and increasing leaf temperature. Farmer (1993), in a review article of dust impacts on vegetation, summarizes impacts observed in other studies: increased water loss, decreased growth, blocked stomata, reduced transpiration, reduced seed set, and reduced photosynthesis, noting that the results varied depending on the particulate size and the specific chemistry of the dust itself. Farmer also notes that dust may exacerbate other types of stress affecting the plant. However, most of the studies that Farmer reviews evaluated dust from cement kilns and factories, rather than the soil and salt-based sources found at the Salton Sea. Although the direct physical impacts of similarly-sized particles at the Salton Sea could be comparable to those summarized by Farmer, the chemical impacts will likely differ.

A local farmer has reported that salt dust from Salton Sea playa has damaged sweet corn leaves in parcels near the Sea, and that salt dust could damage other crops such as lettuce and spinach, rendering them unfit for sale (Blake 2007). These claims have not been rigorously investigated or confirmed, but they offer a basis for estimating the magnitude of potential impacts around the Salton Sea. Lettuce has been planted extensively in the Imperial Valley, suggesting that it could be vulnerable to dust impacts and financial losses. In 2010, the Imperial Valley harvested more than 27,000 acres of lettuce, with an adjusted gross value of about $250 million (2013$). Fewer acres of lettuce were planted in 2012 and prices fell by more than 15%, so adjusted gross value declined to about $150 million that year. These declines presumably reflect broader market conditions rather than concerns about potential problems from blowing dust.

Actual locations of crops potentially affected by salt dust, such as leafy greens, vary year to year and in many cases are considered proprietary information, challenging efforts to predict how much acreage could be affected in any given year. Conservatively assuming that salt dust blown off of exposed Salton Sea playa and deposited on fields downwind were to damage 1% of the total harvested lettuce crop sufficiently to render it unfit for sale suggests that total lettuce-crop related damages could range from $1.5-$2.5 million annually. However, market prices and total planted acreage will have much greater impact on total crop-related revenues than will occur due to dust-related damage. Presumably, growers would shift to other, more marketable crops if dust problems became chronic near the Sea, so the long-term impacts of salt dust deposited on crops may be limited over time. In summary, salt-laden dust blowing from exposed Salton Sea playa may have significant impacts on a limited number of crops grown near the Salton Sea, but insufficient information exists to make credible estimates of these impacts.

Micro–Climate Impacts

The Salton Sea's large thermal mass and evaporative surface tend to buffer temperature and humidity changes in nearby fields, generating a local micro-climate benefitting local farmers, according to anecdotal reports. The Sea's thermal mass warms the surrounding air during the cooler winter months, accelerating plant growth in nearby fields and allowing farmers to harvest earlier, potentially reaping a price advantage over more distant fields. In addition to these seasonal benefits, air temperatures immediately above the Sea's surface experience less extreme highs and lows than do air temperatures above land: air blowing over the Sea at night will warm adjacent fields relative to those more distant from the Sea. Anecdotal reports suggest that crops such as cantaloupes and sweet corn planted in fields near the Salton Sea are ready for market as much as two weeks earlier than those commodities grown 25 miles away from the Sea (Kalin, pers. comm.). During the summer, warmer land temperatures relative to the Sea create localized near-shore breezes, pulling cooler air from above the Sea to reduce temperatures in adjacent fields, reducing plant wilt and stress (CNRA 2011). Humidity from the Sea combines with the Sea's ability to buffer summer temperature extremes to enable farmers downwind of the Sea to bale hay, while farmers upwind of the Sea may find their hay crop too dry and brittle to bale (Kalin, pers. comm.), providing an additional benefit to those farmers downwind from the Sea.

As the Sea shrinks it will lose more than 60% of its thermal mass, diminishing its ability to warm adjacent air in the winter. Additionally, the shrinking Sea will recede from adjacent cropland, by as much as five miles from some areas along the southern shoreline, further diminishing the impact of this buffering effect. Although no research has been done to date on the geographic extent of the Sea's micro-climate benefits, presumably these benefits will be greatly diminished or eliminated entirely under no action conditions. The absence of published measurements or specific estimates of these micro-climate benefits frustrates efforts to monetize them.

In summary, insufficient information exists to estimate the potential costs associated with either the impacts of blowing dust and salt on crop productivity near the Salton Sea nor the diminished micro-climate benefits that will occur as the lake shrinks. Both of these impacts will be felt within a few miles of the Salton Sea, so their overall cost may be small relative to the magnitude of Imperial and Coachella valley agriculture generally, but these impacts could be significant at the scale of the individual farm. Estimating these impacts requires new research.

6. Recreational Revenues

The Salton Sea was a very popular tourist destination in the 1950s and 1960s, when people visited the Sea for boating, fishing, and other recreation. The number of visitor-days at California's Salton Sea State Recreation Area (SS SRA), in the northeast portion of the lake, was almost 600,000 in fiscal year 1961–62, but then steadily declined to about 180,000 visitor-days in the early 1970s. These declines reflect the diminishing popularity of the lake as a whole, due to its increasing salinity and changing popular tastes. As shown in Figure 15, total visitation to the state recreation area rebounded in the early 1980s, declining again in the early 1990s to fewer than 100,000. Visitation records are not available for the mid- to late-1990s. The most recent three years for which records are available, through fiscal year 2011–12, show a 70% decline in visitation relative to the long-term average. This recent decline may reflect the impacts of the recession and decreased discretionary spending, though it also coincides with the accelerating decline of the Salton Sea itself and the loss of access to the lake from boat ramps. Given previous declines in reported visitation, it also may reflect diminishing interest in the Salton Sea as a desired destination due to real and perceived reductions in amenities.

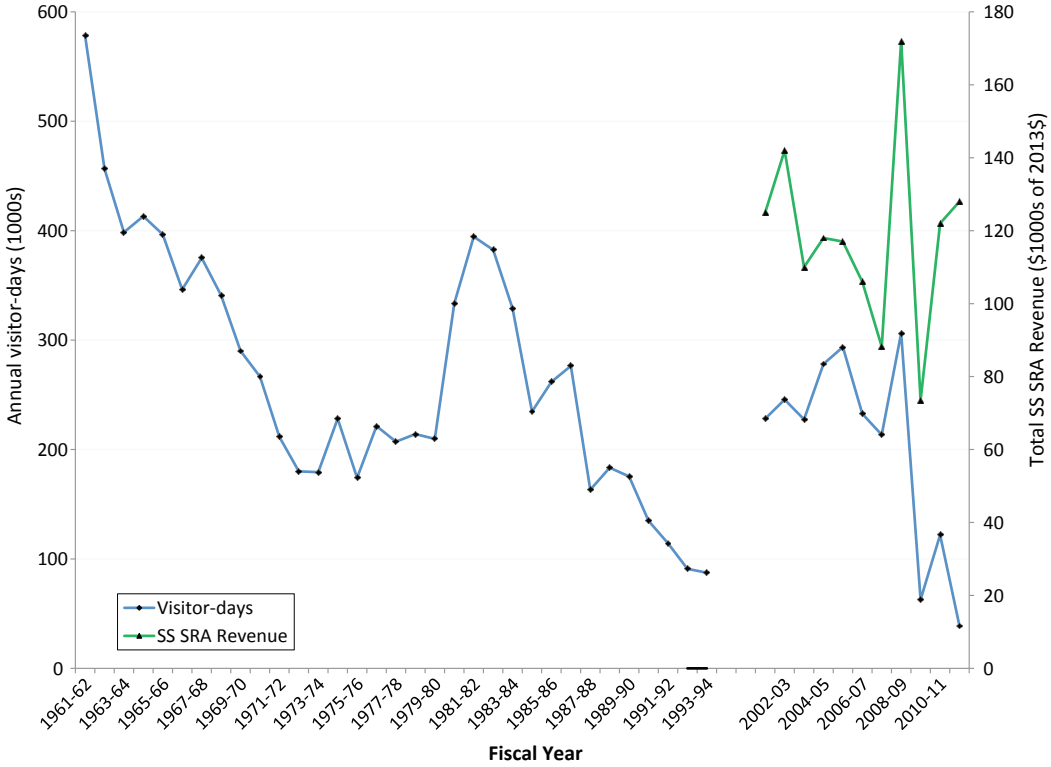

Figure 15. Number of annual visitor-days and annual park revenue at the Salton Sea State Recreation Area (SS SRA), FY 1962–2012.

Sources: California State Parks Archives; California State Parks Annual Statistics reports; SSA 1995.

Figure 15 also shows total direct annual revenues reported by the SS SRA for the fiscal years 2001–02 to 2011–12. The recreation area's direct average annual revenue over this period (in constant 2013$) was about $118,000, or an average of less than one dollar per visitor-day. These values only reflect revenue reported by the SS SRA itself and do not reflect total visitor spending. Despite the dramatic reduction in the number of visitor-days in the most recent three-year period, reported revenue in the past two years has remained above the average for the period as a whole. The reason revenues remained relatively high despite declining visitation was not determined. The cause of the spike in visitor-days and revenues in 2008/09 is not known.

An economic profile study prepared for the Salton Sea Authority (1995) notes that the federal wildlife refuge at the southern end of the Salton Sea attracted about 31,000 visitors per year for the years 1984–1993, while the Imperial Wildlife Area Wister Unit attracted about 15,000 visitors annually over that same period. It is not known how many people may have visited more than one of these sites: the number of visitor-days at the various sites should not simply be added together.

The Sonny Bono Salton Sea National Wildlife Refuge Complex estimates its current visitation rate at about 27,000 people per year over the past decade, slightly lower than the 1984–1993 average, and about 25,000 in 2013. These data suggest a slight downward trend in the number of visitors to the refuge over the past several decades, but much more consistent visitation numbers than reported by the state recreation area.

The state's PEIR (CNRA 2006) asserts that "On average, visitors to the Salton Sea State Recreational Area (SS SRA) spent $92.50 per visitor per day," (about $117/day in 2013$) though this appears to be based on a report estimating that same expenditure rate for visitors to Riverside County generally. SSA (1995) cite a 1995 report estimating that bird-watchers at the wildlife refuge spent $19 per person per day (about $30/day in 2013$). Given that full hook-up sites currently cost $30/night at the SS SRA headquarters campground, and primitive campgrounds at the SS SRA currently cost $10/night, as well as the direct revenues reported by the SS SRA itself, actual daily expenditures by Salton Sea visitors are likely closer to $30/person than to the $92.50/person reported by the PEIR.

Inaction conditions at the Salton Sea would adversely affect some but not all Salton Sea-related recreational uses. Hunters and birdwatchers visiting California's Imperial Wildlife Area will likely continue to visit at historic rates, since the wildlife area enjoys a dedicated water supply and will not be directly affected by declining Salton Sea elevations. Some camping and day-use will likely continue at the SS SRA despite the decline in Salton Sea conditions, though the recession of the shoreline by half a mile or more will strand existing facilities and diminish the appeal of the site. Most of the land owned by the National Wildlife Refuge is currently under the Salton Sea; much of this land will be exposed as the Sea recedes, allowing the refuge to expand its operations and potentially increasing visitation rates to managed areas. However, to date no plans to develop these exposed lands have been published. This area may also suffer from large dust storms due to the amount of playa exposed in the area, diminishing visitation rates. In the absence of specific projections, this study assumes that visitation rates to the refuge will continue to fall at recent rates.

Assuming about $30 in expenditures per person per day suggests that visitors to the SS SRA spent an average of about $8 million annually (in 2013$) during the period from 1961 to 2009, decreasing to about $2 million annually in the subsequent three years. Assuming that inaction conditions at the Salton Sea further diminish the average number of visitor-days at the SS SRA by half, to

about 37,000 per year – roughly the same number reported for the most recent fiscal year – suggests that the loss of direct recreational revenues would be slightly above $6 million annually relative to historic levels, not accounting for the loss of revenues due to declining number of visitor-days at other locations around the Salton Sea. This $6 million per year difference suggests an order-of-magnitude level estimate of the total decline in total direct recreation-related expenditures due to real and perceived losses of Salton Sea recreational amenities. The total present value of this reduced recreational revenue through the year 2047, assuming an annual cost escalation of 2%, would be about $150 million with a 4% discount rate and $110 million with a 6% discount rate. These values are quite small relative to the potential costs associated with public health impacts. This coarse estimate does not account for income transfers, which would require surveys to determine the percentage of visitors coming from outside the region, versus intra-regional income transfers from local visitors spending money at the lake.

The number of people recreating at the Salton Sea has generally declined over the past fifty years, for a variety of reasons. The projected inaction conditions at the Sea will further this decline in visitation and in direct recreation-related expenditures, resulting in the loss of roughly $6 million per year in direct spending in the area relative to estimated historic rates. In the absence of robust surveys of current and historic expenditures, these $110 million – $150 million present value costs should be taken as general, order of magnitude estimates.

7. Non–Use Values

The Salton Sea provides a host of benefits, at a variety of scales, including dust prevention and interception, recreational and amenity values, and micro-climate benefits to nearby farms. As described above, many of these benefits can be quantified based on market transactions, as suggested by the values estimated previously. Many other benefits, however, do not readily lend themselves to market-based valuations. Examples of non-use benefits include the value of a species or of a particular habitat. Economists describe four general types of non-use values: option values (for goods and services that may be used in the future); altruistic values (that may be used by others in the current generation); bequest value (that may be used by future generations); and existence value (Schwabe et al. 2008).

Figure 16. Brown pelicans and terns at the Salton Sea.
Photograph © Jenny E. Ross / www.jennyross.com.

The Salton Sea's ecological importance suggests that its non-use values, particularly its bequest and existence values, may be considerable. This ecological importance has been well documented. The Salton Sea and the surrounding region support a tremendous diversity and abundance of birds (Figure 16), including many listed species. The Sea is an important stopover on the migratory corridor known as the Pacific Flyway, providing feeding, roosting, and loafing habitat for hundreds of species of birds often numbering in the hundreds of thousands of individuals, and also provides breeding habitat for several species. Cooper (2004, p. 202) states that the Salton Sea "is arguably the most important body of water for birds in the interior of California." Jehl and McKernan (2002) estimated that more than three million eared grebes were at the Salton Sea on one day in 1988. Roughly the entire western population of American white pelicans was observed at the Sea on one day in 1998 (Anderson 1999). Table 3, copied from the PEIR (CNRA 2006), lists many of the important bird species found at the Salton Sea, based on abundance or legal status.

As the Salton Sea's water quality and surface area decline over time due to no action, the value of the Sea to migratory and resident birds will diminish. The loss of the Sea's fish and many of its macro-invertebrates in the next five to seven years will enable certain salt-tolerant macro-invertebrates such as brine shrimp and brine flies to thrive, offering an abundant food source to many bird species, including grebes and gulls, but will largely eliminate the value of the Sea for many of the species and individual birds that currently depend on it. Some of these birds may be able to use other habitats, but the loss of more than 90% of the wetland habitats in California means that many or most of these birds will face increased morbidity and mortality (Cohen and Hyun 2006, CNRA 2006).

Estimated Benefits

Many studies estimate the non-use values various local and regional ecosystems provide. Economists have applied various tools to estimate the economic magnitude these non-market benefits, often relying on surveys to determine

Table 3. Focal bird species and criteria.

SPECIES	CRITERIA
Aechmophorous spp. (Includes Clark's and Western Grebes)	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
American Avocet	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
American White Pelican	DFG Bird Species of Special Concern Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Black Skimmer	DFG Bird Species of Special Concern; Service Birds of Conservation Concern - BCR 33 National Waterbird Conservation Plan (species considered Highly Imperiled or of High Concern)
Black Tern	DFG Bird Species of Special Concern
Black-necked Stilt	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Brown Pelican	Federally endangered species State endangered species
California Gull	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Cattle Egret	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)

SPECIES	CRITERIA
Double-crested Cormorant	DFG Bird Species of Special Concern; Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Dowitcher spp (Includes Long-billed and Short-billed Dowitchers)	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Dunlin	U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score)
Eared Grebe	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Gull-billed Tern	DFG Bird Species of Special Concern; National Waterbird Conservation Plan (species considered Highly Imperiled or of High Concern) Service Birds of Conservation Concern - BCR 33
Least Bittern	DFG Bird Species of Special Concern
Long-billed Curlew	DFG Bird Species of Special Concern; U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score)
Marbled Godwit	U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score) Service Birds of Conservation Concern - BCR 33
Ring-billed Gull	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Ruddy Duck	Greater than 10,000 birds counted on single survey (Shuford et al., 2002)
Snowy Egret	National Waterbird Conservation Plan (species considered Highly Imperiled or of High Concern)
Snowy Plover	DFG Bird Species of Special Concern; U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score); Service Birds of Conservation Concern - BCR 33
Western Sandpiper	Greater than 10,000 birds counted on single survey (Shuford et al., 2002); U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score)
Whimbrel	U.S. Shorebird Conservation Plan species or subspecies (4-5 priority score); Service Birds of Conservation Concern - BCR 33
White-faced Ibis	DFG Bird Species of Special Concern; Greater than 10,000 birds counted on single survey (Shuford et al., 2002)

Notes: DFG = Department of Fish and Game [now known as Department of Fish and Wildlife]; Service = U.S. Department of the Interior, Fish and Wildlife Service. Source: CNRA 2006 (App. C, Table C-1).

respondents' willingness to pay for benefits such as the preservation of habitat or protection of a species, or the general 'existence value' of the resource as a whole. Kroeger and Manalo (2007), for example, reported that California households not visiting the Mojave desert in 2003 claimed existence and stewardship values for that area at about $170 million (2013$) that year alone. It was well beyond the scope and means of this study to conduct a new local, regional, or national survey, though such a survey would offer a stronger basis for estimating such non-market values.

Instead, this study relies upon the only previous effort that sought to estimate the Salton Sea's non-use benefits. Also lacking the resources to conduct primary research, K2 Economics (2007) estimated the non-market benefits generated by the Salton Sea based on a review of 23 previous studies on species preservation or habitat values. They ultimately focused on two prior studies, which used willingness-to-pay surveys to estimate similar benefits provided by Mono Lake and by wetlands in California's San Joaquin Valley. K2 Economics reports the average annual value of the San Joaquin Valley wetlands at about $60 million (2013$) per 1000 acres. The recent USGS/CDWR *Salton Sea Ecosystem Monitoring and Assessment Plan* reports about 44,000 acres of Salton Sea shoreline habitat at lake elevation -228',[1] not including another roughly 200,000 acres of open-water habitat (Case et al. 2013). Based on this shoreline habitat acreage and further assuming that the non-market benefits provided by the Sea are comparable to those in the San Joaquin Valley suggests that these Salton Sea habitats generate roughly $2.6 billion per year in non-market benefits, not including the value of open-water and other habitats at the lake. K2 Economics cautions that "different population & site characteristics" may limit the transferability of the estimated San Joaquin Valley wetlands benefits to the Salton Sea.

K2 Economics also summarizes several contingent valuation studies estimating the value of maintaining the surface of Mono Lake at various elevations. The most conservative of these reported an annual value of $151 per California household (in 2013$), or a total of about $1.9 billion per year. While there are several similarities between the non-market values of protecting Mono Lake and protecting the Salton Sea, including the preservation of valuable migratory bird saline wetland habitats in remote parts of the state, Californians' familiarity with and support for Mono Lake exceeds that of the Salton Sea. However, the Salton Sea's surface area is roughly five times larger than Mono Lake's, and the Sea currently supports much greater species diversity, so arguably the Sea's non-use value is comparable to Mono Lake's. Additionally, San Diego's diversion of water that would otherwise flow into the Salton Sea could be characterized as similar to Los Angeles' diversion of water that would otherwise flow into Mono Lake, so San Diego residents may feel a connection to the Salton Sea.[2]

The K2 Economics study (2007) strongly cautions that the values it reports are merely suggestive and should be documented by primary valuation studies. In the absence of such studies, and more broadly in the absence of general valuation studies of the Salton Sea, we are left with the general range of $1.9 – $2.6 billion in annual non-use values generated by the Salton Sea. Presumably, these values would diminish over time as the quantity and quality of habitats decline. Arbitrarily assuming that the existing

[1] Calculated as the one-kilometer band of water closest to the shoreline plus the 25-meter band of land surface closest to the shoreline. This shoreline stratum has the greatest use by birds and fish (Case et al. 2013).

[2] In a reversal of previous opinion, the *San Diego Union Tribune* stated "The Salton Sea … is worth saving." *San Diego Union Tribune* editorial board, "Saving the Salton Sea," June 21, 2014, available at http://www.utsandiego.com/news/2014/jun/21/salton-sea-imperial-restoration-geothermal/.

habitat values decrease by 15% per year starting in 2018 suggests a potential rate of decay for these non-use values. Table 4 shows the present value of these low and high estimates through 2047, based on an assumed 2% annual cost escalation and 4% and 6% discount rates applied to these values over time. For comparison, the present value of the "Existence and stewardship values of CA households not visiting the Mojave" Desert reported by Kroeger and Manalo (2007) ranges from $3.2–$4.2 billion.

Table 4. Present value of non-use Salton Sea benefits.

$billions	discount rate	
Estimate basis	4%	6%
San Joaquin wetlands	$26	$17
Mono Lake	$17	$10

8. Summary

Southern California's Salton Sea faces significant, perhaps catastrophic changes in the next ten to fifteen years, with dramatic changes starting in less than five years. These changes, driven primarily by the effects of the IID–San Diego water transfer as well as by declining inflows from Mexico, increasing urbanization, changing agricultural practices, and a hotter and drier climate, will adversely affect human and ecological health in the region. In the next fifteen years, the volume of water flowing into the lake will decrease by about 40%, the Salton Sea's surface will drop by twenty feet and its volume will decrease by more than 60%. Salinity will triple. One hundred square miles of lakebed will be exposed to the region's blowing winds, increasing dust emissions in an area already suffering from poor air quality (Cohen and Hyun 2006). By 2045, as much as one hundred and fifty square miles of lakebed will be exposed to the region's blowing winds, increasing dust emissions in an area already suffering from poor air quality. The lake's habitat value for resident and migratory birds will rapidly decline, affecting hundreds of thousands of birds (Cohen and Hyun 2006) and further diminishing the lake's appeal.

Although these changes have been anticipated for more than a decade and many plans and projects have been discussed in the interim, to date no major Salton Sea revitalization project has been authorized or implemented. The availability of state funding for required mitigation activities is also unclear, so much of the dust emitted from exposed Salton Sea playa might not be controlled for many years. With the exception of three relatively small habitat projects scheduled for construction next year, no habitat projects are currently funded or expected to exist at the Salton Sea in the near future. This inaction at the Salton Sea, combined with the adverse public health and ecological impacts associated with the lake's rapid changes, will have significant economic costs.

The California Natural Resources Agency's estimated capital cost for the 2007 preferred restoration alternative was about $10 billion (adjusted to 2013$), plus annual operation and maintenance costs of $150 million once fully constructed. Based on the proposed construction schedule and assuming a 2% annual cost escalation through 2047, this yields a total present value of $9.6 billion at a 4% discount rate, or $7.4 billion at a 6% discount rate. The capital cost of the state's concept-level mitigation plan was almost a billion dollars, plus $56 million annually for operations and maintenance. Assuming a ten-year construction schedule (siting projects as the lake recedes) starting in 2015 and escalating O&M costs based on expanding project area, yields a total present value of about $1.7 billion at a 4% discount rate, or $1.4 billion at a 6% discount rate. These values represent the costs of 'action' at the Salton Sea, as described to date. To date, the state

legislature has taken no action on either the preferred alternative or funding authorization for any large-scale mitigation effort. Given this lack of attention and the number of years required to permit and construct any project at the scale of the Salton Sea, continued inaction appears certain for at least several more years.

This continued inaction imposes costs on the people living in the region and on the ecosystem itself. Although future Salton Sea conditions have been projected (Cohen and Hyun 2006, CNRA 2006), the economic costs associated with increased dust emissions due to additional lakebed exposure, and the diminished amenity and use values due to real and perceived problems at the lake, have not previously been estimated. Instead, these no action costs have implicitly been assigned a value of zero. To date, decision-makers have had to decide between the very high costs of Salton Sea restoration, the lower but still significant costs of mitigation, and the perception that deferring Salton Sea-related decisions and actions will not result in any measurable costs. This report offers the first estimates of the costs associated with deferring meaningful action at the Salton Sea.

The deteriorating Salton Sea will impose the following costs:

1. Increased dust emissions, from exposed lakebed, will impair public health;
2. Real and perceived threats posed by the deteriorating condition of the Salton Sea could diminish property values in the area;
3. Blowing dust and the loss of the lake's climate-buffering function could decrease agricultural productivity and revenue;
4. The decreasing amenity value of the Salton Sea will reduce recreational revenues; and
5. The changing Salton Sea will provide fewer ecosystem services, reducing non-market benefits.

Estimating the costs of inaction requires a number of assumptions, many of them based on limited information or on the basis of impacts and assessments reported for other locations. In some cases, such as the impacts of the changing Salton Sea on agricultural productivity, sufficient information does not exist to estimate potential economic costs, though we presume that these costs are greater than zero. An additional complicating factor is the growing number of people subject to degraded air quality and vulnerable to impaired health. As the population in the Salton Sea air basin is projected to almost double by 2047, many more people – and more property – will be vulnerable to the changes outlined above, increasing total costs. The Salton Sea and the region generally are dynamic, increasing the uncertainty about specific impacts.

Extrapolating from existing studies and estimates suggests that Salton Sea playa could emit as much as 800 pounds of dust per acre per year, on average. At a maximum exposure of more than 96,000 acres, exposed playa could emit more than 100 tons of dust per day, on average. Converting this projected increase into a public health impact requires information on the relationship between emission rates and concentrations in the air itself. This information is not available for the region (Zelinka, pers. comm.), meaning that it is not possible to model the relationships between estimated dust emissions, subsequent air quality concentrations, individuals' exposure and dosing, and subsequent health costs. Instead, two previous studies suggest a means of approximating an estimate: based on the estimated per capita cost of exceeding state and federal air quality standards, or based on a cost per unit of exposed dust. With a worst case scenario with the emissions rate noted above

and very limited air quality management, the latter method yields a present value cost of as much as $37 billion through 2047. The threshold costs of continuing not to meet state and federal air quality standards – exacerbated by expected Salton Sea dust emissions and a rapidly growing population – generate a present value estimate as high as $21 billion.

The potential impacts of a deteriorating Salton Sea on property values exists within the context of the lake's existing disamenity value: property values generally increase with distance from the Sea, unlike typical water features that add value. Determining how a deteriorating lake will affect future property values requires an assessment of homebuyers' and sellers' expectations about the future lake. In the absence of resources to conduct such a survey, this study relies on previous research on the impacts of disamenities on property values. The existing depressed property values near the lake suggest that a deteriorating Salton Sea will likely not have any additional impact on valuation. But the stigma associated with a deteriorating lake could pose a risk to properties further removed from the lake, suggesting that total property devaluation due to the stigma associated with the deteriorating Salton Sea could be on the order of $400 million. Dust and noxious odors could also depress property values and revenues of the 124 golf courses and resorts in the Coachella Valley, so the total impact on property values could rise to $7 billion.

Insufficient information exists to estimate the potential costs associated with either the impacts of blowing dust and salt on crop productivity near the Salton Sea or the diminished micro-climate benefits that will occur as the lake shrinks. Both of these impacts will be felt within a few miles of the Salton Sea, so their overall cost may be small relative to the magnitude of Imperial and Coachella valley agriculture generally, but these impacts could be significant at the scale of the individual farm.

The projected inaction conditions at the Salton Sea are expected to continue the recent decline in visitation to the lake and in direct recreation-related expenditures, resulting in the loss of roughly $6 million per year in direct spending at the Salton Sea State Recreation Area relative to estimated historic rates. In the absence of records or surveys of current and historic expenditures for Salton Sea recreation as a whole, this rough estimate can be considered very conservative. Assuming a 2% annual escalation rate and 4% and 6% discount rates, this conservative estimate suggests $110 – $150 million in foregone recreational expenditures through 2047.

The Salton Sea currently provides tens of thousands of acres of shoreline and near-shore habitats to hundreds of thousands of birds. More than 400 species of birds use the Salton Sea,

Figure 17. Birds at shallow Salton Sea habitat.
Photograph courtesy of Doug Barnum, US Geological Survey.

including a large number of special status species (see Table 3). As the lake deteriorates in coming years, the size and quality of its habitats will diminish, reducing its value to the resident and migratory birds that depend upon it. Through contingent valuation surveys and other methods, people have expressed a willingness to pay to preserve similar values at other locations. Previous studies have indicated that Californians as a whole have valued wetland habitats at about $60,000 per acre, suggesting that the recent Salton Sea provided some $2.6 billion annually in shoreline habitat value. Transferring the benefits Californians have reported for Mono Lake suggests a potential non-use valuation of the Salton Sea on the order of $1.9 billion annually.

Table 5 summarizes the high and low estimates of the costs of inaction. For public health impacts due to dust emissions, the year in which an air quality management plan becomes operational greatly affects the estimated cost, as does the estimated amount of emissions. A state audit suggests that California may assume funding responsibilities for the air quality management plan in 2025. Under the worst case scenario, such a management plan would not be operational before 2048 and individual landowners, controlling about 40% of the land that will be exposed, do not manage dust emitted from their lands. The non-attainment costs shown in Table 5 simply reflect estimated threshold values for failing to meet state and federal air quality standards, providing context for the previous two estimates. The property value estimates arise from the potential negative stigma that may be associated with a future Salton Sea; they range from $400 million to as high as $7 billion, though these values are speculative.

Table 5. Estimated present value of inaction at the Salton Sea through 2047, by impact area.

Impact	Scenario	Emissions	Discount	($millions) Cost Estimate
Public health	Best case	any	n/a	$0
Public health	QSA mitigation	low	6%	$2,200
Public health	Worst case	High	4%	$37,000
Public health	non-attainment		6%	$15,000
Public health	non-attainment		4%	$21,000
Property values	high			$7,000
Property values	low			$400
Dust on crops				>0
Loss of micro-climate				>0
Recreational revenues			6%	$110
Recreational revenues			4%	$150
Habitat values	San Joaquin		4%	$26,000
Preservation/existence values	Mono Lake		6%	$10,000
			High Estimate	$70,000
			Low Estimate	$11,000

Insufficient information exists to estimate the potential costs of dust on crops or the loss of the Salton Sea's climate-buffering benefits for nearby farms, though anecdotal reports suggest that these costs are greater than zero. The present values of declining recreational revenues are very conservative figures, based solely on recent trends at the Salton Sea State Recreation Area; general information on visitation to the Salton Sea as a whole is not available. The broad range of the estimated present value of lost non-use benefits reflects the uncertainty regarding the value of the Salton Sea to the broader public.

A number of factors affect these suggested costs, including the degradation of the Salton Sea itself and assumptions about public perceptions regarding these changes, but also broader regional factors such as population growth, affecting the total number of potentially vulnerable individuals as well as the total amount of affected property. As shown in Table 5, estimated public health costs are the highest market-based cost associated with a declining Salton Sea, while the loss of ecosystem services and related bequest and existence values suggest that non-use costs could be very significant as well.

Limitations

As noted previously, the lack of information on a number of important factors limits the confidence of these cost estimates. Basic information, such as the amount of dust emitted from Salton Sea playa and the impacts of dust on Imperial Valley crops, simply does not exist. We lack important survey data on public perceptions of the Salton Sea and expectations about its future, data that would inform projections of future property values in the region and would identify key concerns. Information on total visitation rates to the Salton Sea area and its value as an economic engine for the region do not exist. These factors, combined with general uncertainty about population growth rates, climate change, and changing hydrologic conditions, suggest that the above estimates should be considered indicative of a general magnitude of potential future costs, rather than precise projections.

9. Conclusion

To date, the high costs of the California Resources Agency's proposed 'preferred alternative' (CNRA 2007) have inhibited deliberation and deterred any meaningful investment in the revitalization of the Salton Sea. The underlying assumption has been that the value generated by building a revitalization project at the Salton Sea would not justify the cost of that project. The assumption also seems to have been that deferring and delaying action at the Salton Sea would result in business as usual, with no additional costs. This is clearly not the case. Because the Salton Sea has changed over the past decade, and will soon enter a period of very rapid deterioration, the costs of inaction are escalating rapidly. *When* a project is implemented dramatically affects the total inaction costs estimated above. Time, then, is money in the Salton Sea air basin. Deferring decisions about project implementation and delaying action impose real costs on the people and property owners in the region, and lesser costs on Californians generally.

In the absence of a detailed air quality mitigation plan, the state's conceptual plan (CNRA 2006) suggests a total cost for mitigation: about $1.4 to $1.7 billion, depending on the discount rate, assuming implementation starts

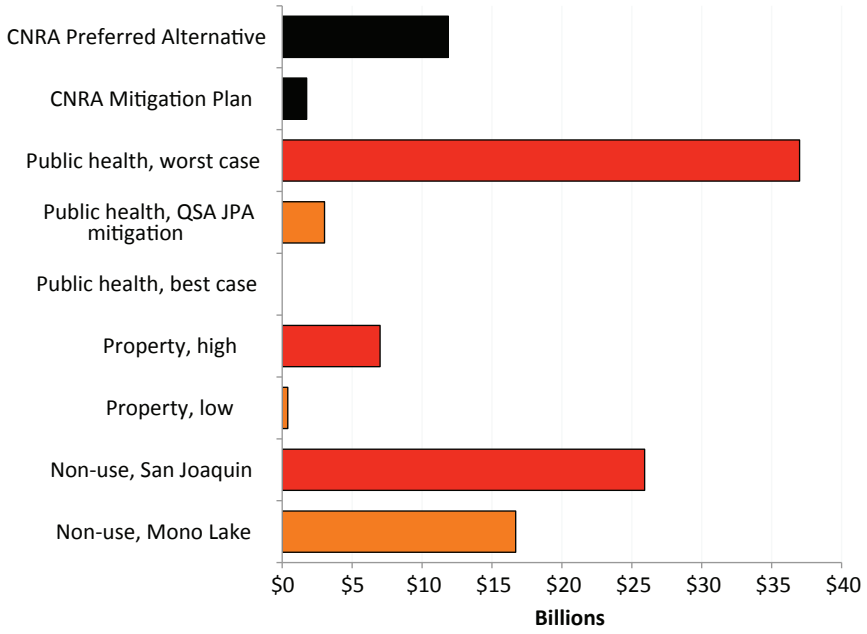

Figure 18. Present values of estimated costs of Salton Sea action and inaction.

next year. Delaying implementation another decade could defer the state's expenditures by shunting those costs onto the local population, whose health costs could rise $1.2 billion or more in the interim. Long-term failure to implement an effective air quality mitigation project at the Salton Sea could generate tens of billions of dollars of health care costs.

Figure 19. Caspian tern at the Salton Sea.
Photograph © Jenny E. Ross / www.jennyross.com.

Figure 18 compares the projected project costs of the state's proposed preferred alternative and its conceptual mitigation plan (CNRA 2006, CNRA 2007) with the estimated social and economic costs of inaction for public health and non-use benefits, and with the one-time estimated devaluation of property in the region. With the exception of the property value estimates, these costs all reflect a 2% annual escalation and a 4% discount rate, to facilitate comparison. These inaction costs, all shown in red and orange, provide an initial basis for comparison with the estimated project costs of restoration or mitigation, shown in black. A more robust comparison would require additional information about the total economic costs and benefits of the revitalization and mitigation projects. Capturing the non-use values espoused by survey respondents would require some method to monetize and collect these estimated values.

Figure 18 indicates that the costs of inaction greatly exceed the costs of action at the Salton Sea, strongly suggesting that action at the Salton Sea should be funded and implemented quickly. However, not all 'actions' would avoid the 'inaction' costs: a mitigation plan designed only to control dust emissions would not improve recreation in the region, nor would it improve property values or promote economic development; such a plan would do little to improve declining ecological values. A project that both controls dust and creates habitat could limit or avoid public health costs, reduce or eliminate impacts to property values, and maintain or even enhance ecological values. A more comprehensive revitalization plan should also be evaluated within this broader context of created benefits and avoided costs. In all cases, delaying action imposes real costs.

This report also highlights a large number of important data gaps that should be addressed in the near future. Despite many decades of study and the impending decline of the Salton Sea, we still lack information on many factors affecting life and the economy in the region.

Bill deBuys (1999, p.23) writes in *Salt Dreams*, "In low places consequences collect." The consequences of continued inaction at the Salton Sea will be felt most directly by the 650,000 people that live in the air basin, as well as by the birds and other life that depend on the lake. These consequences generate real costs. These considerable costs, estimated for the first time by this report, demonstrate the urgent need for action at the Salton Sea.

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Appendix A

Quantification Settlement Agreement Delivery Schedule By Conservation Method

QSA Year	Calendar Year	IID and SDCWA	IID and CVWD[a],	IID and MWD	Total Delivery	Total Efficiency	Fallowing for Delivery	Mitigation Fallowing	Total Fallowing
1	2003	10	0	0	10	0	10	5	15
2	2004	20	0	0	20	0	20	10	30
3	2005	30	0	0	30	0	30	15	45
4	2006b	40	0	0	40	0	40	20	60
5	2007	50	0	0	50	0	50	25	75
6	2008	50	4	0	54	4	50	25	75
7	2009b	60	8	0	68	8	60	30	90
8	2010	70	12	0	82	12	70	35	105
9	2011	80	16	0	96	16	80	40	120
10	2012b	90	21	0	111	21	90	45	135
11	2013	100	26	0	126	46	80	70	150
12	2014	100	31	0	131	71	60	90	150
13	2015	100	36	0	136	96	40	110	150
14	2016	100	41	0	141	121	20	130	150
15	2017	100	45	0	145	145	0	150	150
16	2018	130	63	0	193	193	0	0	0
17	2019	160	68	0	228	228	0	0	0
18	2020	192.5	73	2.5	268	268	0	0	0
19	2021	205	78	5	288	288	0	0	0
20	2022	202.5	83	2.5	288	288	0	0	0
21	2023	200	88	0	288	288	0	0	0
22	2024	200	93	0	293	293	0	0	0
23	2025	200	98	0	298	298	0	0	0
24	2026	200	103	0	303	303	0	0	0
25	2027	200	103	0	303	303	0	0	0
26	2028	200	103	0	303	303	0	0	0
27 to 45	2029 to 2047	200	103	0	303	303	0	0	0
46 to 75c	2048 to 2077	200	50	0	250	250	0	0	0

All values in thousands of acre-feet

a If CVWD declines to acquire these amounts, MWD has an option to acquire them, but acquisition by MWD of conserved water in lieu of CVWD during the first 15 years is subject to satisfaction by MWD of certain conditions, including subsequent environmental assessment.

b In addition to the conserved amounts shown on this Table, additional amounts of up to 25,000 acre-feet in 2006, 50,000 acre-feet in 2009 and 70,000 acre-feet in 2012 could be conserved to meet the Interim Surplus Guidelines (ISG) benchmarks. IID has the discretion to select the method of conservation used to make the ISG backfill water. If fallowing is selected to conserve water to meet the ISG benchmarks, the total acres of fallowing would be within the amount originally evaluated in the EIR/EIS.

c This assumes that the parties have approved the extension of the 45-year initial term of the IID Water Conservation and Transfer Project. Source: Imperial Irrigation District (IID), "Water Conservation and Transfer Project Draft EIR/EIS and Draft Habitat Conservation Plan," 2002.