AGENDA: **BOARD OF DIRECTORS MEETING**
DATE: **Thursday, February 15, 2024, at 10:00 a.m.**
LOCATION: **Coachella Valley Water District**
Steve Robbins Admin Bldg.
75515 Hovley Lane East
Palm Desert, CA 92260

The Following Salton Sea Authority Directors will be attending via video/teleconference from:

Amended 2/14/24 at 10:00 a.m.

Director Yxstian Gutierrez
Riverside County 5th District
14375 Nason St. Suite 207
Moreno Valley, CA 92555

Director Alex Cardenas
CASA of Imperial County
229 South 8th Street Suite B
El Centro, Ca 92243

Director Luis Plancarte
Imperial County
Imperial County Admin Center,
940 W Main St. Suite 209
El Centro, CA. 92243

Remote viewing and participation for this meeting is accessible at:
http://www.SaltonSea.com/meetings

I. CALL TO ORDER

PLEDGE OF ALLEGIANCE

ROLL CALL

***A copy of the agenda and supplemental materials will be available for viewing or download from* SaltonSea.com/meetings**

II. PUBLIC COMMENTS

This Public Comments time is reserved for commenting on any item not on the agenda. California law prohibits members of the Board from taking action on matters not on the agenda.

Members of the public may address the Board regarding any matter within the Authority's jurisdiction but are asked to speak to any specific item on the agenda at the time it is called.

Speakers should state their name for the record and address all comments to the Chair, limiting remarks to three (3) minutes.

In person attendees should complete a "request to speak" form and provide it to the Clerk of the Board. Remote speakers must use Zoom's "raised hand" feature (or if by phone, press *9) to be recognized.

Written comments may be emailed to **info@saltonsea.com**, or delivered by hand or mail to 82995 Highway 111, Suite 200, Indio, California, "Attn: Clerk of the Board, Salton Sea Authority". Please include "Public Comment, 2/15/2024 Board meeting" in the subject line, and also include your name and address (addresses will be redacted), referencing the specific agenda item if appropriate.

All written comments will be distributed to the Board, posted on **SaltonSea.com** for public viewing and, **if received before noon on Wednesday, February 14,** will be publicly acknowledged during the Board meeting. (Written comments will be included in the public record but not be read aloud.)

III. BOARD MEMBER COMMENTS

This time is set aside for members of the Board to share thoughts and concerns regarding general Authority matters not on the agenda, ask questions of staff, and request items to be added to a future agenda.

The Brown Act expressly prohibits lengthy Board Member discussion of matters not on the agenda. The Board may at its discretion (by 4/5 vote) add items deemed to be an emergency to the agenda to allow for public discourse.

IV. ITEMS FOR DISCUSSION AND POSSIBLE BOARD ACTION

A. CONSENT CALENDAR – Approve, Receive, and File
   1. Minutes of Salton Sea Authority Board Meeting January 18, 2024
   2. Salton Sea Authority Warrant Register Ratification for January 31, 2024
   3. Salton Sea Authority Internal Financial Report for December 2023

B. Monitoring and Public Health
   a. Monitoring, Mitigation and Enforcement at Owens Lake, CA - Phill Kiddoo, Air Pollution Control Officer - Great Basin Unified Air Pollution Control District
   b. Update on research regarding microbial toxins at the Salton Sea – Dr. David Lo, Senior Associate Dean for Research at the University of California, Riverside School of Medicine, and a Distinguished Professor in the Division of Biomedical Sciences.
   c. Review of current relevant legislation – Oracio Gonzalez, Ollin Strategies
      i. Assembly Bill 1834, "An act relating to public health" – Garcia
      ii. Senate Bill 937, Pilot project relating to dust forecast, etc. - Padilla
   d. Review Board direction to Staff

C. Desert Shores – Gafcon Update and Amended Scope of Work – Gafcon representatives, Staff

D. Other Project Updates
   a. North Lake Pilot Demonstration Project

V. REPORTS

A. Federal

   1. Federal Activities – Lisa Moore Lehman, Partner, Cultivating Conservation

2. US Bureau of Reclamation – Jeremy Brooks - No Report

B. State

1. State Advocacy Report – Oracio Gonzalez, Principal, Ollin Strategies
2. State of California – Mr. Miguel Hernandez, Public Affairs Officer, California Natural Resources Agency
3. Salton Sea State Recreation Area Update on Activities – Enrique Arroyo, District Superintendent, California State Parks – Introduce/Welcome as the new Parks Superintendent

C. Local

1. Salton Sea Action Committee – Alan Pace, SSAC President

D. Executive Director's Report and Comments - G. Patrick O'Dowd, Executive Director/GM, Salton Sea Authority

VI. ADJOURNMENT

NEXT MEETING TIME & LOCATION:

The Salton Sea Authority board is scheduled to meet on:

Thursday, March 21, 2024, at 10:00a.m.
Imperial County BOS Chamber
940 West Main Street
El Centro, CA 92243
442-265-1020

Any public record, relating to an open session agenda item, that is distributed within 72 hours prior to the meeting is available for public inspection in the lobby at the front desk of the County Law Building located at 82995 Highway 111, Indio, CA 92201.

Salton Sea Authority

OFFICIAL PROCEEDINGS

SALTON SEA AUTHORITY
BOARD OF DIRECTORS MEETING
January 18, 2024

I. CALL TO ORDER

The regularly scheduled meeting of the Salton Sea Authority ("Authority") Board of Directors ("Board") was called to order by Altrena Santillanes, President, at 10:10 a.m., January 18, 2024, at the County of Imperial Board of Supervisors Chamber, and via Zoom Webinar.

PLEDGE OF ALLEGIANCE

ROLL CALL

DIRECTORS PRESENT ON SITE	AGENCY
Altrena Santillanes, President	Torres Martinez Desert Cahuilla Indians
Luis A. Plancarte, Director	Imperial County, Arrived after IV.B
Alex Cárdenas, Director	Imperial Irrigation District

DIRECTORS PRESENT VIA ZOOM	AGENCY
V. Manuel Perez, Director	Riverside County
Yxstian Gutierrez, Treasurer	Riverside County

DIRECTORS ABSENT	AGENCY
Cástulo R. Estrada, Vice-President	Coachella Valley Water District
John Aguilar, Director	Coachella Valley Water District
Ryan E. Kelley, Director	Imperial County
Thomas Tortez, Director	Torres Martinez Desert Cahuilla Indians
Gina Dockstader, Secretary	Imperial Irrigation District
Ex-Officio Samantha Arthur	CNRA

SALTON SEA AUTHORITY STAFF PRESENT

G. Patrick O'Dowd, Executive Director/GM (in person)
Carlos Campos, Best Best & Krieger, Legal Counsel (in person)
Bob Hargreaves, Best Best & Krieger, Legal Counsel (Via Zoom)

MEMBERS OF THE PUBLIC PRESENT

On Site:

Via Zoom: Jessica, Humes, IID, Tina Shields, IID, Joanna Hoff, IID, Antonia Ortega, IID, Mario Llanos, CNRA, Jesus Gonzalez, Assemblymember Garcia's office and 24 others.

II. PUBLIC COMMENTS

Nathan White, Chief Environmental Officer, Agess, Inc discussed a Binational event, highlighted a tour conducted with U.S. EPA and Mexico's Secretary of Education. He advised Mexico was interested in regional hydrology, and reiterated his personal interest in water importation.

III. BOARD MEMBER COMMENTS

Director Cardenas recognize Mr. Nathan White for his efforts and commitments to our shoreline communities.

IV. ITEMS FOR DISCUSSION AND POSSIBLE BOARD ACTION

A. CONSENT CALENDAR – Approve, Receive, and File
   1. Minutes of Salton Sea Authority Board Meeting November 16, 2023
   2. Salton Sea Authority Warrant Register Ratification for November 2023
   3. Salton Sea Authority Warrant Register Ratification for December 2023
   4. Salton Sea Authority Internal Financial Report for October 2023
   5. Salton Sea Authority Internal Financial Report for November 2023

Motion made by Cardenas, second by Gutierrez, *the Board* ***approved*** *the Consent Calendar to be received and filed.*

Approved by the following vote:
AYES: *President Santillanes, Treasurer Gutierrez, Director's Cardenas and Perez.*
NOES: *0*
ABSENT: *Directors Tortez, Kelley, Plancarte, Aguilar, Dockstader and Estrada*
ABSTAINED: *0*
MOTION PASSED: *4-0*

B. Review and accept fiscal year 2023 Audited Financial Report - Shannon Ayala, CPA / Partner, Davis Farr, LLP gave an overview. Directors Cardenas and Perez asked Ms. Ayala to clarify the Best Practice recommendations, and directed staff to:
   1. Update State and Federal advocacy by the next Board meeting;
   2. Reconcile the Authority's GM's accrued vacation policy with RIVCO policy.

Motion made by Cardenas, second by Perez, *the Board* ***approved*** *the Fiscal Year 2023 Audited Financial Report to be received and filed.*

Approved by the following vote:
AYES: *President Santillanes, Treasurer Gutierrez, Director's Cardenas, Plancarte and Perez.*
NOES: *0*
ABSENT: *Directors Tortez, Kelley, Aguilar, Dockstader and Estrada*
ABSTAINED: *0*
MOTION PASSED: *5-0*

C. Update on Imperial Irrigation District (IID) Salton Sea mitigation efforts - Jessica Humes, Senior Environmental Project Manager, IID gave a presentation on the Salton Sea Air Quality Mitigation Program. This program was developed in 2016 to provide a comprehensive mitigation adaptive approach to assess air quality. The funding comes from the QSA JPA who administers funding for QSA transfers environmental mitigation requirements. Directors Perez, Cardenas Santillanes, Tom Sephton, Jasmyn Philips, Nathan White and Jeremy Brooks commented on the presentation.

D. Review of Governor's Proposed 2024/2025 Budget - Oracio Gonzalez, Ollin Strategies gave an update on the 2024-2025 State Budget. Bonds are still part of the conversation, including new money proposed for Salton Sea, including a bond proposal from Assemblymember Garcia from last year which included $400 million for the Salton Sea. Director's Cardenas and Plancarte noted that there will be a substantial deficit in the state budget. Mr. Gonzales recommended we draft a letter, Director Cardenas agreed and requested the letter be provided to member agencies for their review, and place this item on their legislative calendar.

E. US Army Corps of Engineers "Imperial Streams and Salton Sea Ecosystem Restoration Feasibility Study" Status Report – Executive Director O'Dowd

In December 2022, the state delivered its Long Range Plan, which became the foundational document to inform the Corp Feasibility Study. Against that backdrop, the Authority and California Department of Water Resources (DWR) as "Local Sponsors" of the planning effort, working for the past year with the Corps team as the federal sponsor to develop a scope to complete the study in a responsible fashion. The 2020 WRDA authorization provides a 3-year, $3 million framework, which we knew since the onset was insufficient. In the past, wavers have been granted in order to allow certain project to proceed as a "Mega Study", a designation within the Corps which provides both greater resources and increased time. However, the Mega Study has been challenged due to interpretation of policy which would strictly limit the effort to the $3 million initial appropriation and its 3-year timeframe. Ms. Moore provided some historical context on such studies, and noted this Corps Mega Study was always likely to take longer and cost more than one more conventional. The state and the Authority agreed to pursue the necessary waivers and funding to implement the Mega Study, expected to take 6 to 8 years and cost approximately $16 million (or $8 million each from the federal and state sponsors). In the meantime, the existing

appropriations are being used to address the front end, technical components of the effort.

F. CNRA Agreement # 0CA21020 - "Public Outreach and Engagement Services" - Status Report and Update – Staff - Executive Director O'Dowd, highlighted a contract that was signed between CNRA and the Authority September 2022, providing some history and context for its negotiation, drafting, and subsequent implementation - and the challenges associated therewith. The state contract is divided into 3 tasks, of which only Task 3, a joint effort with CNRA and a group that the onboarded to do some studies, called the Better World Group, has been operationalized in any material sense to date. As contemplated by the contract, and after a long search we were able to onboard a qualified Public Relations Director, but due to market forces and other opportunities, just one month after date of hire that individual resigned to take a position elsewhere. Recruiting to fill this position has resumed, but want to firm up this contract before any new hire is made. Per the terms of th contract, the Authority is requesting a 2-year extension to allow for the full implementation of tasks 1 and 2.

G. Project Updates-

a. North Lake Demonstration Pilot Project - Executive Director O'Dowd gave a brief update. Dudek is working on Geotechnical surveys, with equipment on site. We are expecting a revised budget and schedule as early as next month. At that point we will be able to begin designing this project, including a robust public engagement process.

b. Desert Shores, Executive Director O'Dowd gave a brief update. At our last meeting we approved Gafcon as a consultant. They have made significant process in analyzing the current state of the activities there. Gafcon has outlined additional tasks to help scope out the project more fully. At our next board meeting we intend to bring back a revised agreement to carry this effort through the design phase. As part of their feasibility study, Gafcon will also be conducting a Charrette, a gathering of all stake holders, which will take place as soon as schedules and facilities allow.

V. REPORTS

A. Federal

1. Federal Activities – Lisa Moore Lehman, Partner, Cultivating Conservation gave her report during item # IV.E. Spoke in detail about the Mega report.

2. US Bureau of Reclamation – Jeremy Brooks, gave an update on the commitment agreements they are working on. $72 million awarded from the $250 million, $70 million of that has been allocated to the state of CA, CNRA and DWR for expansion of the SCH, $2 million to the Torres Martinez Cahuilla Indian Tribe to expand and support the states 10 year plan that award was mandated last year in August and announced in December. BOR and the state issued a land use agreement to expedite issuance of land use.

Quarterly Salton Sea principal meetings are being held, including Secretary Crowfoot and Commissioner Touton. The Authority ED/GM also attends thos meetings.

B. State

1. State Advocacy Report – Oracio Gonzalez, Principal, Ollin Strategies gave an update on the State Budget in item IV.D. and also mentioned that the conservancy legislation remains on the Senate floor and is technically eligible for action at any time.
2. State of California – Mr. Miguel Hernandez, Public Affairs Officer, California Natural Resources Agency – No Report
3. Salton Sea State Recreation Area Update on Activities – Enrique Arroyo, District Superintendent, California State Parks – No report

C. Local

1. Salton Sea Action Committee – Alan Pace, SSAC President gave an update on the Salton Sea Summit being held October 18-19.

D. Executive Director's Report and Comments - G. Patrick O'Dowd, Executive Director O'Dowd gave a brief update and emphasized on how important it is to continue to collaborate in putting the community engagement tours together so that we can achieve the best objective and align messaging. The Authority has also been working with Assemblymember Garcia on an "Assurance Program" for health and safety, as discussed in November.

VI. ADJOURNMENT

Meeting Adjourned 11:50 a.m.

NEXT MEETING TIME & LOCATION:

The Salton Sea Authority board is scheduled to meet on:

Thursday, February 15, 2024, at 10:00a.m.
Coachella Valley Water District
Steve Robbins Administrative Building
75515 Hovley Lane East
Palm Desert, CA 92260
760-398-2651

Any public record, relating to an open session agenda item, that is distributed within 72 hours prior to the meeting is available for public inspection in the lobby at the front desk of the County Law Building located at 82995 Highway 111, Indio, CA 92201.

Salton Sea Authority
Checking Account Activity
January 1, 2024 through January 31, 2024

Date	Number	Vendor Name	Description	Amount
01/11/2024	EFT	Pacific Western Bank	Visa billing cycle ended 12/23	(1,101.74)
01/26/2024	ACH	SystemGO IT LLC	SystemGo IT Website 12/23	(382.00)
01/26/2024	ACH	Cultivating Conservation	Consulting services 12/23	(7,350.00)
01/26/2024	ACH	Best, Best & Krieger	Services 12/23	(655.50)
01/26/2024	ACH	Eide Bailly LLP	Accounting services 11/23	(3,753.85)
01/26/2024	ACH	Ollin Strategies	Consulting services 1/24	(7,000.00)
01/26/2024	ACH	Bravata, Lisa	Mileage 1/18-1/20/24	(180.23)

Beginning Cash Balance	**$**	**215,211.76**
Monthly Activity		**(20,423.32)**
Ending Cash Balance	**$**	**194,788.44**

Salton Sea Authority
Budget to Actual
General Fund (Unaudited)
For the Period July 1, 2023 through December 31, 2023

		A	B	C	D	C / D	C - D
		November 2023	December 2023	YTD FY 24	Budget FY 24	YTD Target 50%	$ Variance
1	**REVENUE**						
2	Local Government / Member Assessments	$ -	$ 266,600	$ 666,600	$ 800,000	83%	$ (133,400)
3	Other Federal / State / Local Contributions	-	-	-	25,000	0%	(25,000)
4	Sponsorships	-	-	-	25,000	0%	(25,000)
5	Grant and Other Reimbursements to General Fund	16	3,309	4,458	194,400	2%	(189,942)
6	**TOTAL REVENUE**	16	269,909	671,058	1,044,400	64%	(373,342)
7	**EXPENSES**						
8	**SSA Administration**						
9	Salaries & Benefits						
10	Total Salaries	19,206	20,204	112,719	309,300	36%	(196,581)
11	Total Employee Benefits	9,076	10,113	57,918	171,600	34%	(113,682)
12	Total Salaries & Benefits	28,281	30,317	170,637	480,900	35%	(310,263)
13	Contract / Professional Services						
14	DC Advocates	8,740	7,350	45,490	94,200	48%	(48,710)
15	Sacramento Advocates	7,000	7,000	42,000	88,200	48%	(46,200)
16	Attorney Fees	552	656	12,366	54,000	23%	(41,634)
17	Audit & Accounting	11,456	3,419	32,042	76,200	42%	(44,158)
18	Total Contract / Professional Services	27,748	18,425	131,898	312,600	42%	(180,702)
19	Travel/Mileage	987	713	12,533	40,000	31%	(27,467)
20	Equipment / IT Maintenance	382	382	2,292	8,300	28%	(6,008)
21	Non-capitalized Office Equipment	-	-	-	8,000	0%	(8,000)
22	Insurance	944	944	5,666	11,600	49%	(5,935)
23	Office Expense/Operating Supplies	1,210	189	1,680	8,700	19%	(7,020)
24	Office Expense/Online Services	489	365	2,148	4,000	54%	(1,852)
25	Dues, Subscriptions	669	669	4,414	10,000	44%	(5,586)
26	Operating Expenses / County Charges	178	167	3,289	7,400	44%	(4,111)
27	Board Room Usage and Recordings	-	2,388	2,388	2,400	100%	(12)
28	Interest Expense	-	(18)	1,092	-	N/A	1,092
29	**TOTAL EXPENSES**	60,888	54,541	338,037	893,900	38%	(555,863)
30	**NET REVENUE / (EXPENSES)**	**$ (60,872)**	**$ 215,368**	**$ 333,021**	**$ 150,500**	**221%**	**$ 182,521**

*No assurance is provided on these financial statements. The financial statements do not include a statement of cash flows. Substantially all disclosures required by accounting principles generally accepted in the U.S. are not included.

Salton Sea Authority
Budget to Actual
DWR - Proposition 68 Grant (Unaudited)
For the Period July 1, 2023 through December 31, 2023

		A	B	C	D	C / D	C - D
		November 2023	December 2023	YTD FY 24	Budget FY 24	YTD Target 50%	$ Variance
1	**REVENUE**						
2	State of California Grant (Prop 68)	$ -	$ 51,543	$ 51,455	$ 2,000,000	3%	$ (1,948,545)
3	**TOTAL REVENUE**	-	51,543	51,455	2,000,000	3%	$ (1,948,545)
4	**EXPENSES**						
5	Salton Sea Authority Salaries	-	2,891	2,891	79,700	4%	(76,809)
6	Department of Water Resources-North Lake Demo	-	48,652	48,564	1,920,300	3%	(1,871,736)
7	**TOTAL EXPENSES**	-	51,543	51,455	2,000,000	3%	(1,948,545)
8	**NET INCOME / (LOSS)**	$ -	$ -	$ -	$ -		$ -

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Salton Sea Authority
Budget to Actual
BOR -DSR (Unaudited)
For the Period July 1, 2023 through December 31, 2023

		A	B	C	D	C / D	C - D
		November 2023	December 2023	YTD FY 24	Budget FY 24	YTD Target 50%	$ Variance
1	**REVENUE**						
2	Bureau of Reclamation Grant	$ -	$ 397	$ 9,974	$ 750,000	1%	$ (740,026)
3	**TOTAL REVENUE**	-	397	9,974	750,000	1%	$ (740,026)
4	**EXPENSES**						
5	Riverside County Salaries	-	397	1,423	25,000	6%	(23,577)
6	Bureau of Reclamation-Desert Shores Revitalization	-	-	8,550	725,000	1%	(716,450)
7	**TOTAL EXPENSES**	-	397	9,974	750,000	1%	(740,026)
8	**NET INCOME / (LOSS)**	$ -	$ -	$ -	$ -		$ -

*No assurance is provided on these financial statements. The financial statements do not include a statement of cash flows. Substantially all disclosures required by accounting principles generally accepted in the U.S. are not included.

Salton Sea Authority
Balance Sheet
(Unaudited)
As of December 31, 2023

1	**ASSETS**		
2	Checking/Savings	$	267,980
3	Prepaid Items		10,943
4	Grants Receivable		130,645
5	**TOTAL ASSETS**		**409,568**
6	**LIABILITIES & FUND BALANCE**		
7	**LIABILITIES**		
8	Accounts Payable		16,097
9	Credit Card Payable		1,258
10	Accrued Payroll		12,247
11	Due to Imperial County		8,395
12	Due to Riverside County		117,298
13	Accrued Vacation		51,800
14	**TOTAL LIABILITIES**		207,094
15	**FUND BALANCE**		202,474
16	**TOTAL LIABILITIES & FUND BALANCE**	**$**	**409,568**

*No assurance is provided on these financial statements. The financial statements do not include a statement of cash flows. Substantially all disclosures required by accounting principles generally accepted in the U.S. are not included.

ASSEMBLY BILL No. 1834

Introduced by Assembly Member Garcia

January 16, 2024

An act relating to public health.

LEGISLATIVE COUNSEL'S DIGEST

AB 1834, as introduced, Garcia. Public health: Salton Sea region.

Existing law establishes the State Department of Public Health to implement various programs throughout the state relating to public health. Existing law authorizes the department to implement the required programs through, or with the assistance of, local health departments.

This bill would state the intent of the Legislature to enact legislation to authorize the public health agencies of the Counties of Imperial and Riverside to conduct an assessment to identify the specific communities or neighborhoods of the Salton Sea region that are most likely to be negatively affected by degrading air quality and increasing heat stress.

Vote: majority. Appropriation: no. Fiscal committee: no. State-mandated local program: no.

The people of the State of California do enact as follows:

SECTION 1. It is the intent of the Legislature to enact legislation to authorize the public health agencies of the Counties of Imperial and Riverside to conduct an assessment to identify the specific communities or neighborhoods of the Salton Sea region

that are most likely to be negatively affected by degrading air quality and increasing heat stress.

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SENATE BILL No. 967

Introduced by Senator Padilla
(Principal coauthor: Assembly Member Garcia)

January 24, 2024

An act to add Article 8.1 (commencing with Section 92688) to Chapter 6 of Part 57 of Division 9 of Title 3 of the Education Code, relating to air pollution.

LEGISLATIVE COUNSEL'S DIGEST

SB 967, as introduced, Padilla. University of California: pilot project: dust forecast and warning system: Imperial County and Coachella Valley.

Existing law generally designates the State Air Resources Board as the state agency with the primary responsibility for the control of vehicular air pollution, and air pollution control districts and air quality management districts with the primary responsibility for the control of air pollution from all sources other than vehicular sources.

The California Constitution provides that the University of California constitutes a public trust, and requires the university to be administered by the Regents of the University of California, a corporation in the form of a board, with full powers of organization and government, subject to legislative control only for specified purposes.

This bill would request the Regents of the University of California to conduct a pilot project in the County of Imperial and the Coachella Valley to develop a 3-day wintertime regional dust forecast capability and a dust storm early warning system for the monsoon season, as specified.

Vote: majority. Appropriation: no. Fiscal committee: yes. State-mandated local program: no.

The people of the State of California do enact as follows:

SECTION 1. Article 8.1 (commencing with Section 92688) is added to Chapter 6 of Part 57 of Division 9 of Title 3 of the Education Code, to read:

Article 8.1. County of Imperial and Coachella Valley Dust Forecast and Warning System Pilot Project

92688. (a) The Regents of the University of California are hereby requested to conduct a pilot project in the County of Imperial and the Coachella Valley to develop a three-day wintertime regional dust forecast capability and a dust storm early warning system for the monsoon season.

(b) The goals of the pilot project shall be to demonstrate the capacity to improve on existing dust forecasts and air quality information, and to quantify the value of these products within the County of Imperial and the Coachella Valley.

(c) In conducting the pilot project, the Regents of the University of California are hereby requested to do both of the following:

(1) Work with local groups to identify effective communication strategies and to focus initial effort on providing actionable information to historically underserved groups in the County of Imperial and in the Coachella Valley.

(2) Identify opportunities for citizen science and education applications of the pilot project.

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Salton Sea Authority

Memorandum

To: Salton Sea Authority Board of Directors

From: G. Patrick O'Dowd, Executive Director /GM

Date: November 16, 2023

Re: Health Assurance Plan

Over the past several months, the Authority has delved deeply into the changes taking place at the Sea and how they are affecting human health. Presentations from Dr. Lo, Comite Civico del Valle, and most recently a conversation with Dr. Brian McNeece, all highlight current and looming risks associated with the "known unknowns" which are and will continue to impact every man, woman and child in the region. Indeed, changes have been taking place at the Sea ever since most recent filling and initial designation as an agricultural sump, but those changes are occurring at an accelerated rate due a variety of both natural and man-made causes. For at least a generation and likely longer there is a lingering fear in the region that those changes are also contributing to adverse health impacts to the residents of the region. And while direct correlation to the Sea from elevated incidents of nosebleeds and childhood asthma have not been established, anecdotal evidence suggests a linkage. But the truth is, we just don't know. This year we celebrated the 20th anniversary of the Quantification Settlement Agreement's signing. As part and parcel of that agreement, the State of California agreed to restore the Sea and assume mitigation responsibility in excess of certain liabilities established within that agreement being addressed by the "QSA-JPA". And while there exist numerous efforts to evaluate this risk at the margins, there remains no independent resource that the community can rely upon to know with certainty that the changes now taking place at the Sea are not adversely affecting their health. After 20 years that should be viewed by all as unacceptable.

To be clear, there already exists extensive monitoring throughout the region. Work is being done by Imperial County Air Pollution Control District, South Coast Air Quality Management District, the California Air Resources Board, as well as work being performed under contract with the Imperial Irrigation District as part the QSA-JPA responsibilities, the Torres Martinez Desert Cahuilla Indians, and Comite Civico del Valle, and likely others not mentioned. All contribute to a data gathering effort which should be useful in informing mitigation strategies to ensure public health. But to our knowledge that information is not used on a *consolidated* basis to specifically address sea-related health impacts. Rather, the data gathering is more regional in nature, and also includes potential contributors to health risks not directly related to the Sea. It will

always be difficult to identify discreet health risks throughout the region resulting from other localized sources, including off road activity, trans-border influences, and ag and industrial contributors. But as it relates to the Sea proper and the changes occurring within the historic shoreline, those risks are knowable, and after 20 years of effort should already be known. And to the extent that those factors are negatively impacting human health, they should likewise *already* be mitigated. Most residents if asked would likely say they just don't know and have little confidence that in fact those risks are fully known and are being responsibly mitigated.

Authority staff has for some months been researching and exploring possible strategies to address this glaring deficiency in public trust. In November of 2022, the State published the "Salton Sea Monitoring Implementation Plan", which contains five goals:

(1) Identify and prioritize monitoring activities that will measure current and future conditions within the Salton Sea ecosystem (including created impoundments, emerging wetlands on the playa, and managed habitats).
(2) Establish milestones against which the data gathered during long-term monitoring can be compared.
(3) Establish methods for measuring and reporting these metrics.
(4) Identify and prioritize filling of existing data gaps.
(5) Describe a framework to store, manage, and make monitoring data publicly available in a timely manner.

The MIP provides that in conjunction therewith, an annual study plan will be developed that tiers off the MIP, which defines the following year's monitoring activities, coordinate efforts among implementing partners, and refine sampling methods and/or locations as appropriate.

Although no such plan was developed for 2023, we were recently notified that the State has initiated development of the 2024 monitoring work plan. However, it is critically important to note that this plan is simply a *monitoring* plan, not a plan of or strategy for mitigation. That work is being done variously by the QSA-JPA pursuant to their responsibilities, and by the State in accordance with its obligations under the Water Board order or otherwise. And while significant strides continue to be made on both fronts, mitigation is not being comprehensively achieved. And even if the mandated mitigation measures were being fully and timely implemented, it is still not known to any degree of certainty how and whether the changes taking place at the Sea would still be affecting human health. Dr. Lo highlighted that concern in his presentation to the Authority on microbial toxins, and legislation was authored last session by Assemblymember Garcia (AB 827) to facilitate a better understanding of that concern.

We believe that Dr. Lo's work and pursuit represents but one part of a larger lack of knowledge and understanding to which every community member is justly due. After 20 years of implementing the QSA (and now approaching 100 years of the Sea being

formally designated a sump) the lack of certainty whether the changes now taking place at the Sea are harmful to human health is simply unacceptable.

To address this urgent deficiency, the Authority has elevated discussions with our elected representatives around possible legislation which would create such assurance framework. To accomplish that it will be necessary, through the MIP or otherwise, analyze the data specifically from the perspective of human health, and identify data gaps which limit our ability to provide such assurance. In an earlier memo we discussed the Owens Lake model of assurance, where air quality within the "regulatory shoreline" is monitored every day through 127 monitoring stations, and satellite imagery is updated every 5 days to ensure coverage of exposed playa (and the failure on the part of LADWP to do so could result in significant financial penalties). When our community can be provided that level of assurance, they will know that they are safe. They have a right to know that, and we should be about the business of providing it.

Staff Recommendation: Board direction requested.

Final

SALTON SEA MONITORING IMPLEMENTATION PLAN

Prepared for
California Natural Resources Agency,
California Department of Water Resources, and
California Department of Fish and Wildlife

November 2022

Final

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
°C	degrees Celsius
°F	degrees Fahrenheit
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
AB	Assembly Bill
ADCP	acoustic Doppler current profiler
API	application programming interface
AQMIS	Air Quality Management Information System
Audubon	Audubon California
BACI	Before-After Control-Impact
BIOS	Biogeographic Information and Observation System
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
Chl *a*	chlorophyll *a*
cm	centimeter(s)
CNRA	California Natural Resources Agency
CVWD	Coachella Valley Water District
cyanoHAB	cyanobacterial harmful algal bacteria
DDT	dichlorodiphenyltrichloroethane
DO	dissolved oxygen
DWR	California Department of Water Resources
EC	electrical conductivity
EPA	U.S. Environmental Protection Agency
ft	feet
GIS	geographic information system
GPS	Global Positioning System
H_2S	hydrogen sulfide
HAB	harmful algal bloom
HDPE	high-density polyethylene
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
km	kilometer(s)
LiDAR	light detection and ranging
m	meter(s)
MAP	*Salton Sea Ecosystem Monitoring and Assessment Plan*

Acronym/Abbreviation	Definition
mg/L	milligrams per liter
MIP	*Salton Sea Monitoring Implementation Plan*
NAVD 88	North American Vertical Datum of 1988
NGVD 29	National Geodetic Vertical Datum of 1929
NLCD	National Land Cover Database
OBO	Oasis Bird Observatory
OEHHA	California Office of Environmental Health Hazard Assessment
PCB	polychlorinated biphenyl
$PM_{2.5}$	particulate matter 2.5 micrometers and smaller in aerodynamic diameter
PM_{10}	particulate matter 10 micrometers and smaller in aerodynamic diameter
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
Reclamation	U.S. Bureau of Reclamation
Refuge	Sonny Bono Salton Sea National Wildlife Refuge
RWQCB	Regional Water Quality Control Board
SALSA2	Salton Sea Elevation Model version 2
SCAQMD	South Coast Air Quality Management District
SCH	Salton Sea Species Conservation Habitat Project
Sea	Salton Sea
SNAP	Supplemental Nutrition Assistance Program
SSAQMN	Salton Sea Air Quality Monitoring Network
SSAQMP	Salton Sea Air Quality Mitigation Program
SSSP	Salton Sea Science Program
TDS	total dissolved solids
TEOM	tapered element oscillating microbalance
TSS	total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

SALTON SEA MONITORING IMPLEMENTATION PLAN

Executive Summary

Monitoring of the Salton Sea ecosystem is critical for informed decision-making and the success of mitigation and habitat restoration projects aimed at reducing the amount of exposed playa, suppressing dust emissions from exposed playa, and creating habitat for key wildlife species. The *Salton Sea Monitoring Implementation Plan* (MIP) builds on the 2013 *Salton Sea Ecosystem Monitoring and Assessment Plan* (MAP) with the goals to (1) identify and prioritize monitoring activities that will measure current and future conditions within the Salton Sea ecosystem; (2) establish milestones against which data gathered during long-term monitoring can be compared; (3) establish methods for measuring and reporting these metrics; (4) identify and prioritize filling of existing data gaps; and (5) describe a framework to store, manage, and make monitoring data publicly available in a timely manner.

The MIP provides a framework for tracking the status and trends of the land, water, air, and biota of the Salton Sea, as well as local communities and their engagement with Salton Sea Management Program activities. Priority is given to information necessary to inform management needs. The landscape covered includes the Salton Sea's open water (pelagic) zone, nearshore zone, shoreline, playa, fringing wetlands and riparian corridors, halophytic scrub, created impoundments, and agricultural drains near the playa and shore. Key indicators include the extent of playa and vegetation, inflow and water levels of the Salton Sea and groundwater, water quality (salinity, dissolved oxygen, temperature, nutrients, and contaminants such as selenium), air quality (particulate matter, hydrogen sulfide), aquatic life (plankton, fish), birds (especially waterbirds and shorebirds), and special-status wildlife species such as desert pupfish (*Cyprinodon macularius*) and Yuma Ridgway's rail (*Rallus obsoletus yumanensis*).

The MIP is intended to support a collaborative monitoring enterprise among current and potential partners. Because the Salton Sea is a rapidly changing ecosystem, the MIP will be a living document to adapt flexibly to dynamic conditions and evolving management needs. Each year, an annual study plan will be developed that tiers off the MIP. The annual study plan will define the following year's monitoring activities, coordinate efforts among implementing partners, and refine sampling methods and/or locations as appropriate. Every five years, the MIP will be reviewed and updated, if needed.

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CHAPTER 1
Introduction

1.1 Background

The Salton Sea (Sea) provides essential habitat for wildlife and migratory birds on the Pacific Flyway and serves as an important economic, cultural, and recreational resource in arid southeast California (Robertson et al. 2008; Case et al. 2013). The Salton Sea is a terminal lake (one with no outlet). Inflows are primarily from the Alamo River and New River (runoff from the Imperial Valley), as well as inflow from the Whitewater River (runoff from the Coachella Valley) and smaller inflows from agricultural direct drains and tributary creeks (Salt Creek, Hot Mineral Spa Wash). Salts carried by inflows are concentrated in the sediments and water through evaporation. Inflows into the Salton Sea declined significantly after the 2003 Quantification Settlement Agreement[1] (California Department of Fish and Game et al. 2003) as a result of water transfers, water conservation and recycling, and reduced precipitation. The rate of salinity increase has accelerated in recent years. Currently, the Salton Sea is twice as salty as the ocean (U.S. Bureau of Reclamation 2020), which has reduced the suitability of its fish and wildlife habitat. Additionally, as the Sea's elevation declines, more lakebed is exposed and air quality is affected by fugitive dust emissions from the playa (Case et al. 2013; California Natural Resources Agency et al. 2020).

State and federal agencies, water districts, and local communities are planning and implementing projects to reduce the amount of exposed playa, suppress dust emissions from the exposed playa, and create habitat (California Natural Resources Agency et al. 2020). One of these restoration efforts is the State's Salton Sea Management Program (SSMP), which is currently pursuing habitat restoration and dust control projects around the perimeter of the Salton Sea as part of its 10-Year Plan Phase I (California Natural Resources Agency et al. 2018a). The SSMP also seeks to establish a long-term pathway for the Salton Sea with consideration of further habitat restoration, dust suppression, and increased inflow. This vision will be articulated in a long-term plan that is currently being developed. Broader efforts are underway to strengthen partnerships with local leaders and communities to deliver projects and institutionalize inclusive community engagement (California Natural Resources Agency et al. 2021).

Monitoring is critical for informed decision-making and the success of mitigation and habitat restoration actions (Case et al. 2013). Information from monitoring of the Salton Sea ecosystem will be used to guide initial restoration designs and management. Monitoring will also help

[1] The Quantification Settlement Agreement consists of more than 30 agreements executed concurrently among certain Southern California water agencies in 2003. The State of California, the federal government, and others signed some of the agreements. That set of agreements is commonly referred to as the "Quantification Settlement Agreement." Imperial Irrigation District was required to provide conserved water to the Salton Sea to mitigate the effects of water transfers on salinity until 2017, at which time the delivery of mitigation water ceased.

ensure success by identifying actions that are not having the desired effect so that they can be adjusted.

The *Salton Sea Ecosystem Monitoring and Assessment Plan* (MAP) proposed a broad framework for data collection, analysis, management, and reporting to inform management actions for the Salton Sea ecosystem (Case et al. 2013). Proposed monitoring activities were directed at the regional status and trends of natural resources, species, and habitats that could be affected by or drive future restoration efforts. All monitoring activities are intended to help answer key questions likely to be asked by managers responsible for restoration of the Salton Sea ecosystem (Case et al. 2013).

1.2 Purpose and Goals

This *Salton Sea Monitoring Implementation Plan* (MIP) builds on the MAP (Case et al. 2013) to identify, prioritize, and describe monitoring activities to track status and trends of resources (see "ambient monitoring" in **Table 1-1**) at the Salton Sea, which can be used to inform the implementation of restoration programs. The MIP addresses monitoring for several resource areas: hydrology, water quality, geography, air quality, biological resources, and socioeconomics.

TABLE 1-1
SALTON SEA MONITORING TYPES AND PURPOSES

Type of Monitoring	Purpose
Ambient monitoring	Characterize current biological, physical, chemical, and socioeconomic conditions, status, and trends. This includes baseline monitoring conducted before management actions are implemented. Ambient monitoring is the focus of the MIP.
Effectiveness monitoring	Track progress toward a project's objectives and determine whether a management action is having the desired effect on desired conditions. Performance monitoring should detect any unintended negative consequences and trigger potential corrective management actions. Project-specific effectiveness monitoring plans will be developed as projects come online. Data from the MIP's ambient sampling locations can provide a basis of comparison for evaluating restored locations.
Compliance monitoring	Determine compliance with permit requirements, such as construction to design specifications and implementation of mitigation measures. This mandatory monitoring is outside the scope of the MIP.
Special studies	Through these more detailed and/or short-term investigations, address a key knowledge gap or uncertainty. Studies are discretionary (supplementary) monitoring elements. The MIP includes some indicators that could warrant focused study but does not develop detailed plans.

NOTE: MIP = *Salton Sea Monitoring Implementation Plan*

This MIP has the following goals:

(1) Identify and prioritize monitoring activities that will measure current and future conditions within the Salton Sea ecosystem (including created impoundments, emerging wetlands on the playa, and managed habitats).

(2) Establish milestones against which the data gathered during long-term monitoring can be compared.

(3) Establish methods for measuring and reporting these metrics.

(4) Identify and prioritize filling of existing data gaps.

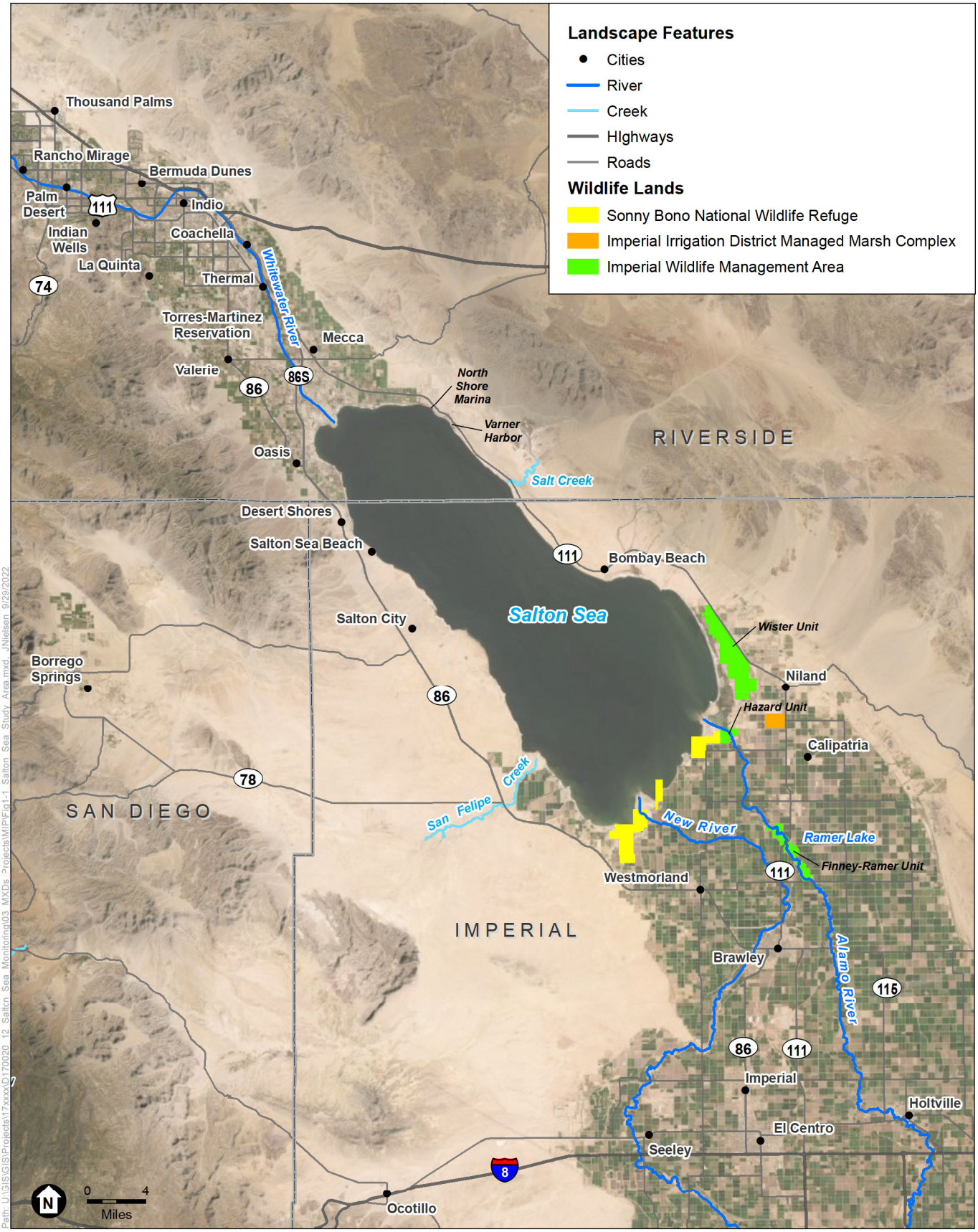
(5) Describe a framework to store, manage, and make monitoring data publicly available in a timely manner.

The MIP is intended to provide a framework for a Salton Sea monitoring enterprise. Ideally, monitoring similar environs and projects would result in comparable data that would provide a foundation allowing the assessment of systemwide effects of restoration and management. The data collected would form a basis for evaluating the overall, long-term effectiveness of aquatic habitat and dust suppression projects (e.g., a Before-After Control-Impact [BACI] study design). Ideally, each project would develop an effectiveness monitoring plan that would tier off the MIP, tailored to that project's specific objectives. This would provide a consistent methodology, facilitate comparison to regional trends, and allow the roll-up of results across multiple projects.

1.3 Study Area

The study area spans the Salton Sea ecosystem. As defined by Section 2931 of the California Fish and Game Code, the Salton Sea ecosystem "shall include, but is not limited to, the Salton Sea, the agricultural lands surrounding that sea, and the tributaries and drains within the Imperial and Coachella Valleys that deliver water to the Salton Sea" (**Figure 1-1, "Regional Location"**). The spatial extent and locations of monitoring are further focused depending on the processes that influence each resource or factor of interest. For example, air quality monitoring may extend beyond the watershed's boundaries because the processes that govern wind erosion and deposition are not limited to the watershed itself.

The biological monitoring area encompasses the habitats of the Salton Sea itself (open-water and nearshore habitats), as well as local habitats that may be affected by changes in water surface elevation, such as adjacent wetlands, vegetation expanding on the playa, and any groundwater-dependent habitats (Case et al. 2013). Biological monitoring will also include habitat for special-status species that currently occupy or historically occupied the Salton Sea and its shoreline and tributaries, such as desert pupfish (*Cyprinodon macularius*) and Yuma Ridgway's rail (*Rallus obsoletus yumanensis*). Created habitats (freshwater, brackish, and saline impoundments) located adjacent to the Salton Sea will be included as they are constructed.



SOURCE: ESRI Imagery: 06/08/2021; CDFW, 2020; DWR, 2021; ESA, 2022.

Salton Sea Management Program Monitoring Implementation Plan

Figure 1-1
Regional Location

1.4 Implementation and Updates

This MIP can guide decisions on the type and amount of monitoring to implement as resources (funding and staffing) become available. No one organization is responsible for implementing the MIP. If funding becomes available, a Salton Sea Science Program (SSSP) is recommended to coordinate monitoring and research and to be responsible for data management and reporting. Because funding and other resources are limited, not all monitoring activities discussed in the MIP may be performed. Activities will be determined by priority, funding, and availability of other resources.

Where possible, monitoring activities should be coordinated among partners to increase data sharing and realize efficiencies of scale. Implementing partners can be an agency or organization that has been recently and/or is currently monitoring (Appendix A) or could potentially monitor in the future. Implementing partners may or may not have a responsibility to monitor (e.g., regulatory requirement of a permit). State agencies (California Department of Fish and Wildlife [CDFW], California Department of Water Resources [DWR]) and federal agencies (U.S. Bureau of Reclamation [Reclamation], U.S. Geological Survey [USGS]) will play a key role for implementation, along with local air quality management districts (South Coast Air Quality Management District [SCAQMD], Imperial County Air Pollution Control District [ICAPCD]) and local water districts on their lands (Imperial Irrigation District [IID], Coachella Valley Water District [CVWD]). Educational institutions in the area are promising partners for carrying out field sampling and analysis, including community colleges, private colleges, and campuses of the California State University and University of California systems. Nongovernmental organizations such as Audubon California (Audubon), Point Blue Conservation Science (formerly Point Reyes Bird Observatory) (Point Blue), and Oasis Bird Observatory (OBO) have been critical partners for bird monitoring.

The Salton Sea is a dynamic and changing ecosystem. Therefore, this MIP will be a living document, changing to respond flexibly to unanticipated events, changing conditions, increased understanding, improved methods, and evolving management needs (Case et al. 2013). An annual study plan should be developed to guide the upcoming year's monitoring activities, with adjustments as needed based on available resources and key questions. This planning process also provides an opportunity to coordinate monitoring efforts among partners where appropriate. An annual report should also be prepared to summarize and share information from the season just completed. The MIP will be reviewed every five years and updated, if needed.

1.5 Plan Development Process

The MIP was developed by a team from DWR, CDFW, the California Natural Resources Agency (CNRA), and Environmental Science Associates (ESA).

Development of this document started with review of the MAP. Information from recent and ongoing monitoring and studies was also compiled and reviewed (**Appendix A, "Inventory of Salton Sea Monitoring Efforts and Studies"**). This inventory included planning documents,

scientific studies, technical reports, and monitoring data pertaining to the Salton Sea that have been collected by DWR, CDFW, the CNRA, the Colorado River Regional Water Quality Control Board (RWQCB), the California Air Resources Board (CARB), Reclamation, USGS, IID, ICAPCD, CVWD, SCAQMD, Audubon, the Southern California Association of Governments, and the 2019 and 2022 Salton Sea Summits.

Drafts received input from working groups consisting of key Salton Sea experts and stakeholders (see Chapter 7, "Contributors"). The working group members provided feedback on key indicators; monitoring methods, frequency, duration, and locations; information about existing monitoring efforts. The Draft MIP was released in February 2022 for public review and for independent scientific review by the SSMP Science Committee.

1.6 Document Organization

This MIP is organized as follows:

- Chapter 1, "Introduction," describes the MIP's goal, objectives, and organization, and the process of engaging stakeholders in its development.
- Chapter 2, "Salton Sea Setting and Monitoring Questions," provides a conceptual model and review of affected resources of the Salton Sea ecosystem, and identifies key questions that drive information needs and monitoring objectives.
- Chapter 3, "Indicator Selection and Sampling Design," develops a set of priority indicators for monitoring.
- Chapter 4, "Monitoring Elements," provides detailed monitoring methodologies.
- Chapter 5, "Data Management," describes data management tools and reporting procedures.
- Chapter 6, "Assessment, Reporting, and Adaptive Management," discusses analyses and annual reports, preparation of annual study plans, and periodic updates of the MIP.
- Chapter 7, "Contributors," acknowledges those who prepared and reviewed the MIP, including the working groups and the SSMP Science Committee.
- Chapter 8, "References," lists the references cited in this document.

The MIP has two supporting appendices:

- Appendix A, "Inventory of Salton Sea Monitoring Efforts and Studies."
- Appendix B, "Monitoring Indicators and Priority by Resource Category."

CHAPTER 2
Salton Sea Setting and Monitoring Questions

2.1 Conceptual Model and Indicators

This chapter reviews the current setting to provide the context for identifying and prioritizing indicators. A simplified conceptual model of the Salton Sea ecosystem (**Figure 2-1, "Conceptual Model of Salton Sea Ecosystem—Hydrology, Water Quality, Biota, and Air Quality"**) depicts linkages and functions among resources, which are discussed in more detail in Section 2.2, "Salton Sea Setting." Monitoring should track three types of attributes: controlling factors or drivers (e.g., river inflows), structural factors (e.g., playa exposure), and functional factors or ecological responses (e.g., bird community composition) (Roegner et al. 2008). The subsequent sections summarize current conditions for and understanding of each resource.

2.2 Salton Sea Setting

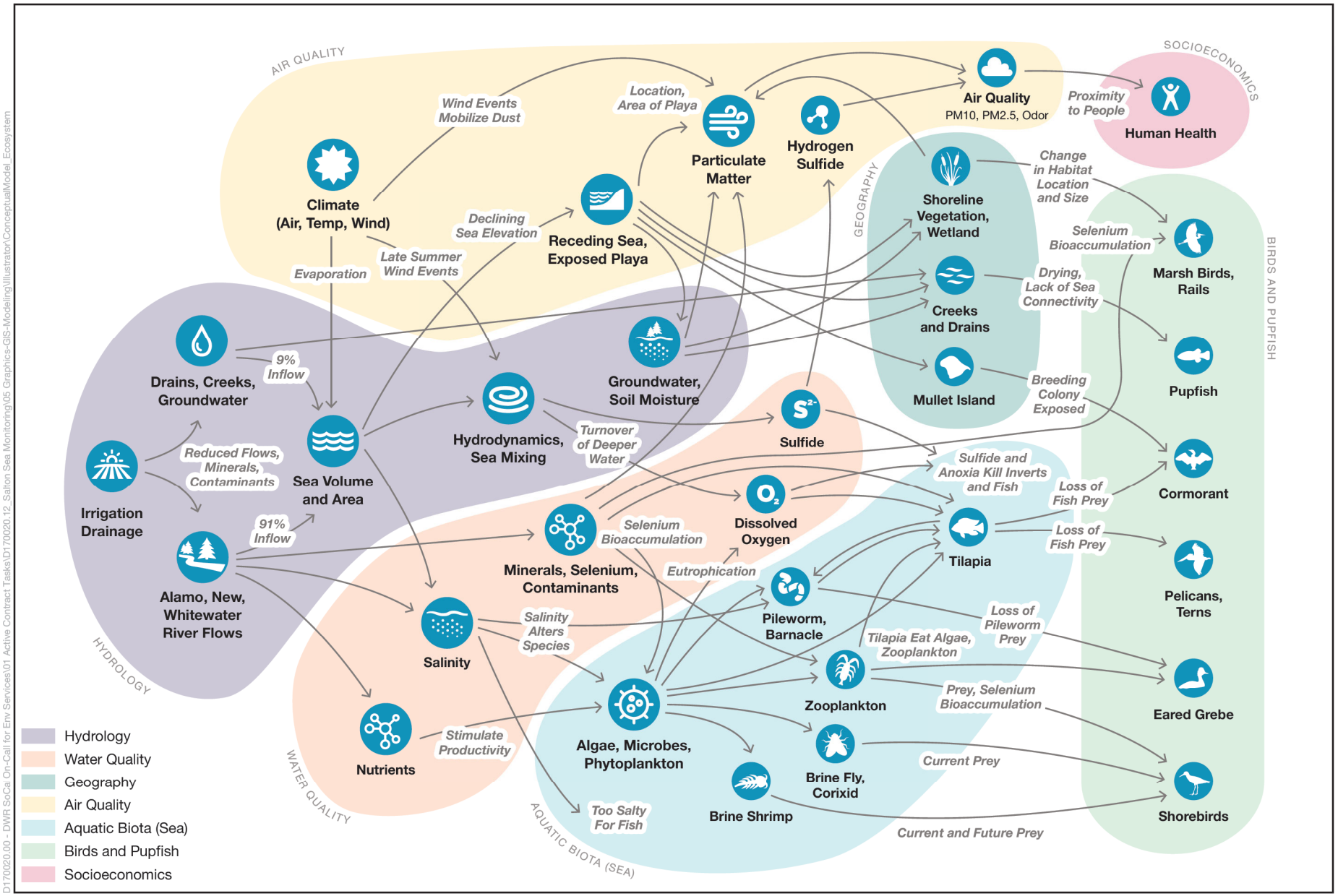
2.2.1 Hydrology and Water Quality

Inflow and Elevation

The Salton Sea is a closed-basin saline lake with no outflows. The Sea is located in the Sonoran Desert in the Salton Basin, approximately 278 feet below sea level (Imperial Irrigation District 2018). Over millennia, the Salton Basin has alternated between inundation by the Colorado River and drying into a desert basin. The modern Salton Sea was formed in 1905, when Colorado River floodwaters breached a nearby canal, sending flows into the dry lakebed (U.S. Bureau of Reclamation 2016).

The level of the Salton Sea has declined from its 1906 elevation as high rates of evaporation have led to water loss exceeding inflows. The Sea's average annual water surface elevation was -225.7 feet North American Vertical Datum of 1988 (NAVD 88) in 2000 and -235.6 feet NAVD 88 in 2020 (U.S. Geological Survey 2021a).[2] In July 2021, water surface elevation measured -238.5 feet NAVD 88 (U.S. Geological Survey 2021a). The existing Salton Sea is approximately 35 miles long and 9–15 miles wide, with about 360 square miles of water surface area and 120 miles of shoreline (Imperial Irrigation District 2018).

[2] Elevation data are from USGS Station 10254005, SALTON SEA NR WESTMORLAND CA (https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005). Note the unit conversion from the National Geodetic Vertical Datum of 1929 (NGVD 29) data to the North American Vertical Datum of 1988 (NAVD 88). The former is used by USGS in reporting Salton Sea water surface elevations, while the latter is used in most design documents. USGS data in NGVD 29 can be converted to NAVD 88 by adding 2.13 ft (California Natural Resources Agency et al. 2018b).



SOURCE: ESA, 2022

Salton Sea Monitoring Implementation Plan

Figure 2-1
Conceptual Model of Salton Sea Ecosystem – Hydrology, Water Quality, Biota and Air Quality

Currently the smain water source in the Salton Basin is imported Colorado River water that is delivered to agricultural fields in the Imperial Valley, the Coachella Valley, and Mexico. Agricultural return flows are transported to the Salton Sea via discharge from agricultural fields through tile or tailwater.

The hydrology of the Salton Sea is driven by the balance of freshwater inflows and the rate of evaporation. The Salton Sea receives most of its inflow from the Alamo River (52 percent) and the New River (34 percent), which discharge to the southern portion of the Sea. Inflow from the Whitewater River (5 percent), which discharges to the northern portion of the Sea, is substantially less (California Natural Resources Agency et al. 2021).

The remaining inflows (9 percent) come from agricultural drains that flow directly to the Salton Sea, ephemeral flows from Salt Creek on the east shore, and San Felipe Creek on the southwest shore, as well as direct precipitation and groundwater (Lawrence Livermore National Laboratory 2008; Imperial Irrigation District 2018). Groundwater historically accounts for only about 0.01 percent of annual inflow (California Natural Resources Agency 2006). Most groundwater seepage probably occurs along the east and west sides and north end of the Salton Sea adjacent to the Coachella Valley, where soils are more permeable (Amrhein et al. 2001). Some agricultural areas in the Coachella Valley are partially supported by groundwater.

Inflows have decreased as a result of the Quantification Settlement Agreement water transfers, which transferred a large portion of IID's Colorado River allocation to the San Diego County Water Authority. To reduce the impact of the water transfers, IID provided approximately 800,000 acre-feet of mitigation water from 2003 to 2017 to maintain salinity levels within the Salton Sea.

Salinity

Water quality in the Salton Sea and its tributaries is influenced primarily by the quality of Colorado River water imported into the watershed and the land-use activities (for example, agriculture) that contribute salts, selenium, nutrients, and other constituents to the Salton Sea inflows (Case et al. 2013).

The Salton Sea's high salinity is caused by historic salt accumulation, high evaporation rates, and subsequent loss of water, coupled with minimal inflows. Salinity levels[3] were 44,000 milligrams per liter (mg/L) in 1999, 46,000 mg/L in 2004, and 50,000 mg/L in 2009. Recent reductions in inflows accelerated the increase to 61,000 mg/L in 2017 and 74,000 mg/L in 2020 (U.S. Bureau of Reclamation 2020). By comparison, river salinity levels in 2020 were 1,230 mg/L in the Whitewater River, 1,860 mg/L in the Alamo River, and 3,220 mg/L in the New River.

[3] "Salinity" is a measure of the amount of salts in the water. Because dissolved ions increase salinity as well as conductivity, the two measures are related (Clean Water Team 2004). Salinity is often measured gravimetrically as total dissolved solids (TDS, mg/L) or parts per thousand (ppt); for example, the salinity of the Pacific Ocean is approximately 35,000 mg/L. "Specific conductance," also called "electrical conductivity" (EC), is a water-quality property whose value is proportional to the collective concentration of ions in solution (U.S. Geological Survey 2019). USGS typically reports the EC of water as specific conductance in units of microsiemens per centimeter (µS/cm) at 25 degrees Celsius (°C). Specific conductance is a more precise surrogate measure than TDS (Amrhein et al. 001).

Nutrients and Eutrophication

The Salton Sea is a eutrophic lake because of its high concentrations of nutrients (nitrogen and phosphorus), high biological productivity, and low water clarity (Setmire et al. 2000; Robertson et al. 2008). The degree of eutrophication in the Salton Sea is principally controlled by—or limited by—phosphorus as a result of external loading from tributaries (Robertson et al. 2008). Excessive nutrients stimulate prolific growth (bloom) of tiny floating algae (phytoplankton). Algal blooms can be measured as the density of chlorophyll *a* (Chl *a*). Concentrations of Chl *a* in the Salton Sea typically range from 12 to 194 micrograms per liter (µg/L) and average 48 µg/L (U.S. Bureau of Reclamation 2020). Sustained algal blooms and subsequent die-off and decay result in reduced levels of dissolved oxygen (DO) (Rabalais et al. 2014).

An algal bloom typically forms in the spring as the intensity of sunlight increases (Tiffany et al. 2007). This spring bloom is aided by high concentrations of nutrients present throughout the water column at the start of the bloom. The decline of the bloom and settling of biomass at the beginning of summer, when the water column begins to stratify, provides a large source of organic material to the bottom of the Salton Sea. Decomposition of the organic material by bacteria depletes oxygen in the sediments as well as the overlying bottom water. In turn, anoxic (low-DO) sediments prevent sulfide generated from the bacterial decomposition of organic matter from oxidizing to sulfate (Watts et al. 2001). Anoxic conditions (measured as redox potential) lead to many chemical transformations, including the reduction of sulfates to sulfides including hydrogen sulfide (H_2S) gas, which has a strong odor of rotten eggs, and the reduction of nitrate to ammonia, which, at high concentrations, can be toxic to fish and other biota (Setmire et al. 2000).

Stratification and Mixing

The hydrology of the Salton Sea is also influenced by winds that mix and overturn the water column multiple times per year (Watts et al. 2001). Winds increase in the spring and completely mix the water column and bring nutrients to the surface, before dying down in the summer and allowing the Sea to stratify and separate the surface from the bottom layer (Watts et al. 2001). As winds pick up in the late summer and early fall, anoxic high-sulfide bottom water is mixed to the surface, which reduces oxygen concentrations in the surface water where the plankton reside. Sulfide becomes oxidized to sulfate and depletes the remaining oxygen (Watts et al. 2001). This deoxygenation of the surface water results in massive declines of phytoplankton, zooplankton, and fish populations (Caskey et al. 2007; Dexter et al. 2007; Tiffany et al. 2007; Hurlbert et al. 2007).

Contaminants

The water and sediments of the Salton Sea, rivers, and drains are affected by contaminants associated with agriculture: nitrogen and phosphorus from fertilizer, minerals and metals (e.g., selenium, arsenic, boron), legacy pesticides (e.g., dichlorodiphenyltrichloroethane [DDT], dieldrin, and aldrin), and recent-use pesticides (e.g., pyrethroids, organophosphates, and chlorpyrifos) (Lawrence Livermore National Laboratory 2008; U.S. Geological Survey 2010a; Schlenk et al. 2014). Contaminants, especially selenium, have the potential to build up and bioaccumulate through the food web (U.S. Geological Survey 2010a; Schlenk et al. 2014).

Selenium

Selenium originates in Colorado River water used for irrigation in the Imperial and Coachella valleys. Selenium becomes concentrated by agricultural usage and is discharged from subsurface tile drains into surface drains that flow into the Salton Sea either directly or via tributaries (Saiki et al. 2010). Selenium in the Salton Sea and surface inflows has the potential to be transferred from sediments and water into the food web, where it may reach concentrations that could have harmful effects on fish and wildlife (CNRA 2006; Miles et al. 2009; Ohlendorf and Heinz 2011). Humans who consume fish and other animals from the Salton Sea also could be adversely affected.

Groundwater Quality

Groundwater historically accounts for only about 0.01 percent of annual inflow (California Natural Resources Agency 2006). Groundwater quality varies widely in the shallow system, and groundwater commonly has high levels of salinity (Lawrence Livermore National Laboratory 2008). In the late 1990s, groundwater at the south shore of the Salton Sea measured approximately 14,000 mg/L dissolved solids.

2.2.2 Geography

Landscape or surface characteristics include lakebed elevation (bathymetry), land-surface elevation (topography), land cover, and land use (Case et al. 2013). As the Salton Sea declines and shrinks, the playa is exposed, especially in the flatter alluvial areas of the south shore and north shore. Mapping of satellite imagery from the end of 2002 (before the start of the conserved-water transfer) through 2020 estimated an increase in exposed playa of 25,589 acres, consisting of open playa (17,923 acres); small pools, drain water, and sheet flow (660 acres); and playa vegetation (7,006 acres) (Imperial Irrigation District 2022). An additional 2,400 and 2,200 acres of lakebed are estimated to have been exposed in 2020 and 2021, respectively, for a total of 28,500 acres cumulatively exposed between 2003 and 2021 (California Natural Resources Agency et al. 2022). Recession of the Salton Sea has also stranded harbors and docks and cut off most boat access to the open water.

Several biogeographic zones or strata, defined below, were identified based on their influence on bird distribution (Patten et al. 2003) to facilitate sampling design (Case et al. 2013).

Salton Sea Open Water (Aquatic)

The open-water habitat (also called the “pelagic zone”) represents most of the Salton Sea’s area. For purposes of monitoring, the MAP defined this stratum as the area more than 1 kilometer (km) from the shoreline (Case et al. 2013).

Salton Sea Nearshore (Aquatic)

The nearshore habitat is defined as the 2-meter (m) depth contour of the Salton Sea. The nearshore stations correspond with transects used in previous studies that begin at a depth of 2 m in the nearshore and extend out toward the middle of the Sea (e.g., Dexter et al. 2007). This depth contour has been demonstrated to provide refuge for pileworm populations during anoxic

conditions (Detwiler et al. 2002). Of particular interest are the areas where rivers drain into the Salton Sea. Observations at the Sea indicate that the greatest portion of bird use appears at and surrounding the inflow drain landscape (McKernan, pers. comm., 2022). The physical location and area of the nearshore stratum are expected to change as the water surface elevation of the Salton Sea fluctuates seasonally and annually.

Salton Sea Shoreline (Terrestrial and Above Water)

The Salton Sea shoreline is measured from the waterline to 25 m landward of the waterline and 1 km toward the Sea's center. This overlaps the nearshore aquatic (i.e., subsurface) zone described above. The physical location and area of the shoreline stratum are expected to change as the Sea's water surface elevation fluctuates seasonally and annually. This stratum includes beaches and nearshore habitat such as mudflats and shallow water (habitats generally up to 30 centimeters [cm]) (Case et al. 2013; Jones et al. 2016).

Wetlands and Riparian Corridors

Emergent wetland vegetation such as cattails and bulrush is found at the edges of ponds and lakes, and along rivers and ditches (Patten et al. 2003). Non-native species (e.g., tamarisk and common reed) have become dominant along rivers and agricultural return flow drains. New wetland and riparian vegetation is emerging where these drains, ephemeral washes and streams, and perennial streams discharge onto the recently exposed playa, such as near Bombay Beach (Audubon California 2020). More extensive wetlands are present on lands managed for wildlife, described below under "Created Freshwater/Brackish Impoundments."

Halophytic Scrub

Halophytic scrub includes areas that support vegetation tolerant of alkaline soils, such as iodine bush, tamarisk, and arrowweed (Patten et al. 2003). This vegetation community is generally restricted to areas with sufficient soil moisture, typically from irrigation seepage, and occurs in a thin band around the Salton Sea shoreline known as the "shoreline strand." Existing halophytic plant communities are expanding onto the playa, most often on historic "beach ridges," and particularly along the southern shoreline and areas north of the Alamo River (Imperial Irrigation District 2021).

Created Freshwater/Brackish Impoundments

The created freshwater/brackish impoundment stratum includes created waterbodies that are managed at salinity levels less than 20,000 mg/L. This stratum encompasses both seasonal and permanent waterbodies, including shallow open-water habitat and vegetated wetlands with both brackish and freshwater hydrology. Several created freshwater/brackish impoundments occur around the Salton Sea or are planned:

- **The Imperial Wildlife Area**, located in the southeast and managed by CDFW, includes seasonally flooded ponds to support waterfowl and permanently flooded impoundments managed for rails. This wildlife area includes Finney and Ramer lakes, freshwater ponds, and a treatment wetland system along the Alamo River, and the Wister Unit along the southeast shoreline near Niland.

- **The Sonny Bono Salton Sea National Wildlife Refuge (Refuge)** includes freshwater marsh and brackish water ponds and is managed by the U.S. Fish and Wildlife Service (USFWS) for rails and other waterfowl. There is also a pond at the Refuge that will be managed for desert pupfish.
- **The IID Managed Marsh Complex**, located about 2 miles south of Niland, was constructed in phases between 2009 and 2019 to mitigate increases in salinity and potential selenium impacts within IID's agricultural return flow drains. A conservation easement with CDFW will be put in place once completed.
- **The Torres Martinez Wetlands Project** is planned on the Torres Martinez Desert Cahuilla Indian Tribe's reservation land on the northwest shoreline in Mecca (Imperial Irrigation District 2017).
- **The Coachella Valley Multiple Species Habitat Conservation Plan** will provide for additional created freshwater/brackish impoundments that will be incorporated into the SSMP monitoring program as they are constructed. For example, 25 acres of desert pupfish habitat will be created at the north end of the Salton Sea and 66 acres of Yuma Ridgway's rail habitat will be created as mitigation for drain maintenance in CVWD drains.

Created Saline Impoundments

The created saline-impoundment stratum will include created waterbodies that are managed at salinity levels greater than 20,000 mg/L. DWR recently broke ground on the Salton Sea Species Conservation Habitat Project, which will cover exposed playa near the mouth of the New River and create saline impoundments to provide habitat and prey for piscivorous (fish-eating) bird species (California Natural Resources Agency 2015). In addition, some areas within the ponds are expected to support desert pupfish and the connectivity of drain habitat. Newly constructed saline impoundments will be incorporated into the SSMP monitoring program as they are constructed.

Direct Drains

The direct drain stratum includes agricultural return drains and ponds in the study area with a direct connection to the Salton Sea, from the point of discharge upstream to the first pump or check structure. This portion of the drains either currently connects or historically connected directly to the Salton Sea and supports aquatic species (desert pupfish) that move between the drains and ponded areas on the playa, and the Sea. CVWD manages approximately 25 drains on the north shore and IID manages approximately 30 drains and a couple of ponds on the south shore. Vegetation along agricultural drains consists mainly of common reed and tamarisk, with some small areas of cattails and bulrushes. CVWD and IID are responsible for maintaining their drains and regularly clear vegetation to maintain conveyance (Daniels, pers. comm., 2022).

Agricultural Land

Agricultural lands include actively managed agricultural areas within the study area that support irrigated crops, as well as areas that are temporarily or permanently fallowed. Agricultural lands typically provide one or more habitat functions for wildlife species, including foraging and roosting habitat for birds. The extent of use by wildlife is generally influenced by crop type, agricultural practices, and proximity to other features such as the Salton Sea (Case et al. 2013). As water availability changes, agricultural practices and land uses may shift (e.g., from flood

irrigation to drip irrigation, changes in crop types, more agricultural lands fallowed), which will influence wildlife use. There are also a few fish farms in the lower East Coachella Valley.

2.2.3 Air Quality

Particulate Matter

The exposed playa contains areas with highly emissive surfaces that are a potential source of dust during wind events. Suspended dust from the playa has the potential to increase airborne particulate matter, thereby reducing air quality in the Imperial and Coachella valleys.

The major source of Imperial County's airborne particulate matter is fugitive windblown dust, with additional contributions from entrained road dust, farming, construction activities, off-road vehicles, and managed burning. Between July 2019 and June 2020, estimates of the median emissions of particulate matter 10 micrometers and smaller in aerodynamic diameter (PM_{10}) were 1.17 tons per day for exposed playa and 83.1 tons per day for the adjacent, more expansive desert (Imperial Irrigation District 2022).[4] Elevated PM_{10} events have been directly attributed to high-wind-driven dust storms in which precursor emissions played an insignificant role (Imperial County Air Pollution Control District 2018; California Air Resources Board 2018; South Coast Air Quality Management District 2002, 2017). Periods of high winds typically occur from April to early June (California Natural Resources Agency 2020). Wind speeds are typically higher on the central and southern shores than on the north shore.

Exposure to elevated outdoor levels of PM_{10} and particulate matter 2.5 micrometers and smaller in aerodynamic diameter ($PM_{2.5}$) is associated with lung- and heart-related respiratory illness, including asthma (Johnston et al. 2019; Farzan et al. 2019). Metals and pesticides in the Salton Sea sediments may be suspended in dust and could increase the toxicity of particulate matter (Parajuli and Zender 2018). The populations most likely to experience adverse health effects with exposure to PM_{10} and $PM_{2.5}$ include older adults with chronic heart or lung disease, children, and asthmatics (California Air Resources Board 2021a). $PM_{2.5}$ is a significant portion of PM_{10} only in urban areas where mechanically generated and windblown dust are not significant source contributors.

Sites for dust suppression projects were identified by IID's Salton Sea Air Quality Mitigation Program (SSAQMP) and the SSMP's Dust Suppression Action Plan based on information about air and water quality, soil properties, wind, and sand-related dust emissions (Imperial Irrigation District 2016; California Natural Resources Agency et al. 2020). Areas along the western shoreline have the highest emissions potential, attributed primarily to the presence of surface sand caused by the migration of sand from the western desert (Imperial Irrigation District 2021). Additional dust suppression project sites close to residential populations (North Shore and Bombay Beach) were identified to benefit communities. Other factors related to the feasibility of

[4] These emissions estimates are not approved by ICAPCD, CARB, or the U.S. Environmental Protection Agency as emissions inventories for the Salton Sea playa or Salton Sea Air Basin. They are not intended to be the actual inventory numbers for regulatory purposes. Rather, the estimates are intended to prioritize dust source areas for mitigation.

implementation were also considered: permitting, access authorization, and water supply for certain suppression methods (California Natural Resources Agency et al. 2020).

Hydrogen Sulfide

Hydrogen sulfide (H_2S), a colorless gas that smells like rotten eggs, is formed by anaerobic organic decay at the bottom of the Salton Sea. Upwelling or mixing of the Sea by regional winds can bring H_2S to the surface (Hurlbert et al. 2007) and into nearby communities, causing foul odors that can affect residents in the Coachella Valley and beyond (South Coast Air Quality Management District 2021, 2022a, 2022b). These events are more prevalent during the hot summer months, especially when the southeasterly "monsoonal" flow events occur, but they sometimes occur at other times of year. Elevated H_2S concentrations are typically measured near the Salton Sea during wind shifts that bring flows from the south or east. In this area, these shifts occur most often in the early morning or the late afternoon/early evening hours. The Salton Sea's receding shorelines and shallower waters may affect the number or severity of these odor events in the future.

The pollutant is detectable at only a few parts per billion (ppb). California has set a nuisance odor standard for H_2S at 30 ppb (0.3 part per million [ppm]); there is no federal standard (South Coast Air Quality Management District 2022a). Exposure to ambient concentrations exceeding the standard may result in an objectionable odor and symptoms such as headaches, nausea, dizziness, nasal irritation, cough, and shortness of breath (South Coast Air Quality Management District 2022a). Since 2013, SCAQMD has operated H_2S monitors at two locations in the eastern Coachella Valley: at the SCAQMD Mecca air monitoring station (Saul Martinez Elementary School) and at the station operated by IID (Salton Sea Near Shore, Lincoln Avenue and 73rd Avenue, Mecca) (South Coast Air Quality Management District 2020).

2.2.4 Biological Resources

Special-Status Fish and Wildlife Species

Table 2-1 identifies special-status fish and wildlife species present at the Salton Sea. The Salton Sea area supports three species that are protected under both the federal Endangered Species Act and the California Endangered Species Act—the desert pupfish, the Yuma Ridgway's rail, and the southwestern willow flycatcher:

- The *desert pupfish* occupies limited portions of the Salton Sea near freshwater flows, marinas (Varner Harbor and North Shore Marina), freshwater ponds, small tributaries (San Felipe Creek and Salt Creek), agricultural drains, and pools that form along the Salton Sea shoreline (California Department of Fish and Wildlife 2021a).
- The *Yuma Ridgway's rail* occupies herbaceous freshwater wetlands and managed marshes, such as the Imperial Wildlife Area and Wister Unit.
- The *southwestern willow flycatcher* is found in riparian areas, not necessarily close to the shoreline, but it could eventually occupy riparian scrub and forest that becomes established on the playa over time.

TABLE 2-1
SPECIAL-STATUS FISH AND WILDLIFE SPECIES WITH POTENTIAL TO OCCUR AT THE SALTON SEA STUDY AREA

Class	Scientific Name	Common Name	FE, SE	Other Federal Status	Other State Status
Fish	*Cyprinodon* macularius	Desert pupfish	FE, SE		
Herptile	*Phrynosoma mcallii*	Flat-tailed horned lizard			SSC
Herptile	*Scaphiopus couchii*	Couch's spadefoot		BLMS	SSC
Herptile	*Uma notata*	Colorado Desert fringe-toed lizard			SSC
Bird	*Aechmophorus clarkii*	Clark's grebe		BCC	SSC
Bird	*Aechmophorus occidentalis*	Western grebe		BCC	
Bird	*Agelaius tricolor*	Tricolored blackbird	ST	BCC	SSC
Bird	*Antigone canadensis canadensis*	Lesser sandhill crane			SSC
Bird	*Antigone canadensis canadensis*	Greater sandhill crane	ST, SFP	BLMS	
Bird	*Asio otus*	Long-eared owl		BCC	SSC
Bird	*Athene cunicularia*	Western burrowing owl			SSC
Bird	*Auriparus flaviceps acaciarum*	Verdin (Southwest)		BCC	
Bird	*Aythya americana*	Redhead			SSC
Bird	*Branta bernicla*	Brant			SSC
Bird	*Calidris canutus roselaari*	Red knot (Pacific)		BCC[1]	
Bird	*Calypte costae*	Costa's hummingbird		BCC	
Bird	*Cardinalis sinuatus*	Pyrrhuloxia		BCC	
Bird	*Charadrius montanus*	Mountain plover		BCC	SSC
Bird	*Charadrius nivosus nivosus*	Western snowy plover (Interior population)		BCC	SSC
Bird	*Chlidonias niger*	Black tern			SSC
Bird	*Coccyzus americanus occidentalis*	Western yellow-billed cuckoo	FT, SE	BCC, BLMS	
Bird	*Dendrocygna bicolor*	Fulvous whistling duck			SSC
Bird	*Elanus leucurus*	White-tailed kite	SFP		
Bird	*Empidonax traillii extimus*	Southwestern willow flycatcher	FE, SE		
Bird	*Gelochelidon nilotica*	Gull-billed tern			SSC
Bird	*Gymnorhinus cyanocephalus*	Pinyon jay		BCC	
Bird	*Haliaeetus leucocephalus*	Bald eagle	SE, SFP	BCC, BLMS	
Bird	*Hydroprogne caspia*	Caspian tern		BCC	
Bird	*Icteria virens*	Yellow-breasted chat			SSC
Bird	*Ixobrychus exilis*	Least bittern		**BCC**	SSC
Bird	*Lanius ludovicianus*	Loggerhead shrike		BCC	SSC
Bird	*Larus californicus*	California gull			WL
Bird	*Larus livens*	Yellow-footed gull		BCC	
Bird	*Laterallus jamaicensis coturniculus*	California black rail	ST, SFP		

Class	Scientific Name	Common Name	FE, SE	Other Federal Status	Other State Status
Bird	*Leucophaeus atricilla*	Laughing gull			WL
Bird	*Limosa fedoa*	Marbled godwit		BCC	
Bird	*Melanerpes uropygialis*	Gila woodpecker	SE	BCC	
Bird	*Mycteria americana*	Wood stork			SSC
Bird	*Numerius americanus*	Long-billed curlew		BCC[1]	WL
Bird	*Pandion haliaetus*	Osprey			WL
Bird	*Passerculus sandwichensis rostratus*	Large-billed savannah sparrow			SSC
Bird	*Pelecanus erythrorhynchos*	American white pelican			SSC
Bird	*Pelecanus occidentalis*	California brown pelican	Delisted	BLMS	SFP
Bird	*Phalacrocorax auritus*	Double-crested cormorant			WL
Bird	*Plegadis chihi*	White-faced ibis			WL
Bird	*Rallus obsoletus yumanensis*	Yuma Ridgway's rail	FE, ST, SFP		
Bird	*Recurvirostra americana*	American avocet		BCC	
Bird	*Rynchops niger*	Black skimmer			SSC
Bird	*Setophaga petechia*	Yellow warbler		BCC	SSC
Bird	*Spinus lawrencei*	Lawrence's goldfinch		BCC	
Bird	*Toxostoma bendirei*	Bendire's thrasher		BCC	SSC
Bird	*Toxostoma crissale*	Crissal thrasher		BLMS	SSC
Bird	*Toxostoma curvirostre palmeri*	Curve-billed thrasher (Palmer's)		BCC	
Bird	*Toxostoma lecontei*	Le Conte's thrasher		BCC, BLMS	SSC
Bird	*Tringa flavipes*	Lesser yellowlegs		BCC	
Bird	*Tringa semipalmata*	Willet		BCC	
Bird	*Vireo bellii pusillus*	Least Bell's vireo	FE, SE		
Bird	*Xanthocephalus xanthocephalus*	Yellow-headed blackbird			SSC
Mammal	*Lasiurus xanthinus*	Western yellow bat			SSC
Mammal	*Sigmodon hispidus eremicus*	Yuma hispid cotton rat			SSC
Mammal	*Xerospermophilus tereticaudus chlorus*	Coachella Valley round-tailed ground squirrel (Palm Springs round-tailed ground squirrel)		BLMS	SSC

NOTES:

FE: Federally Endangered

FT: Federally Threatened

BCC: Bird of Conservation Concern

BCC[1]: Species is a Bird of Conservation Concern in United States, but not classified as BCC in the region that includes the Salton Sea (Bird Conservation Region 33 Sonoran and Mohave Desert)

SE: State Endangered

ST: State Threatened

SFP: State Fully Protected

SSC: State Species of Special Concern

WL: State Watch List

SOURCES: Shuford et al. 2000; California Department of Fish and Wildlife 2020a

Many other special-status bird species have been documented in the Salton Sea area. Of particular note are those birds that utilize the Sea's open water (e.g., pelicans, cormorant, terns, grebes), shoreline (e.g., shorebirds), and impoundments (e.g., rails, ducks).

Special-status reptiles include the flat-tailed horned lizard and the Colorado Desert fringe-toed lizard, which prefer fine windblown sand and are found in dune areas near San Felipe Creek and on the site of the former Salton Sea Naval Test Base (located on the west shore approximately 16.5 miles northwest of Westmorland). These lizards can occur in much coarser substrate and have been observed south of the Dos Palmas Preserve (located on the east shore and upstream of Salt Creek), where dune habitat is absent.

Birds

The Salton Sea is an important stopover and wintering area on the Pacific Flyway (Shuford et al. 2000; Jones et al. 2019). The Salton Sea and surrounding area historically provided significant breeding and wintering habitat for numerous special-status bird species, such as the Yuma Ridgway's rail, western snowy plover (inland), black skimmer, gull-billed tern, American white pelican, and California brown pelican (Shuford et al. 2000). However, the populations of many of these species are declining as a result of changes in habitat quality, resource availability, and degradation of breeding habitats (Jones et al. 2019). A breeding colony of double-crested cormorants once nested on Mullet Island, a rocky island at the mouth of the Alamo River. However, this colony was abandoned in recent years after declining water levels resulted in a land bridge that allowed terrestrial predators access to the island (Jones et al. 2019).

Populations of American white pelican, double-crested cormorant, and eared grebe have experienced marked declines at the Salton Sea, which are attributed in large part to increased salinity (Jones et al. 2019). Declining fish populations have resulted in declines in the Sea's population of piscivorous birds, such as the double-crested cormorant, American white pelican, and California brown pelican. In 2017, annual monitoring conducted by CDFW and USFWS showed low numbers of both tilapia and piscivorous birds, although the numbers remained within the low range of historic estimates for both species documented by CDFW from 2003 to 2008 (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017). However, present-day salinity levels in the Salton Sea exceed tolerable levels for fish and are thus anticipated to further reduce the viability of fish populations and their capacity to support piscivorous birds into the future (Jones et al. 2019).

Eared grebe numbers have declined since the loss of their main prey, pileworms (Jehl and McKernan 2002; Anderson et al. 2007). The loss of pileworms may have caused a decline in the Sea's capacity to support eared grebes (Hurlbert et al. 2007). Recently, eared grebes have been observed foraging on water boatmen (McKernan, pers. comm., 2021). Surveys conducted by Oasis Bird Observatory from 2014 to 2022 suggest that eared grebes appeared to be over-wintering between 2014 and 2018; however, between 2019 and 2022, eared grebes may have staged or stopped over for only limited durations during the fall and early winter months, departing and then presumably returning during spring staging events (McKernan unpublished data, pers. comm.).

Aquatic Biota

The Salton Sea's aquatic food web is highly productive because of the elevated inputs of nutrients to the Sea (Robertson et al. 2008). Key components include phytoplankton, zooplankton (including water column macroinvertebrates [e.g., larvae of pileworms and barnacles, water boatmen]), and benthic macroinvertebrates (e.g., pileworm adults, barnacles, and larvae of brine fly). As noted above, the endangered desert pupfish occupies limited portions of its historic range in creeks, drains, and ponds along the shoreline (California Department of Fish and Wildlife 2021a).

Introduced species dominate the fish community in the Salton Sea and its drainages. At one time, the Sea supported introduced marine fishes such as orangemouth corvina, Gulf croaker, and sargo (Hurlbert et al. 2007; U.S. Bureau of Reclamation 2016). Tilapia, an omnivorous fish introduced in the late 1960s, subsequently became dominant. Tilapia populations fluctuated widely from the 1980s to early 2000s (Hurlbert et al. 2007; Caskey et al. 2007). Tilapia have declined greatly in recent years as salinity levels have exceeded 60,000 mg/L (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017). Safe havens may persist in estuarine areas, especially close to the Alamo and New rivers, where cooler freshwater with sufficient dissolved oxygen mixes with the Sea's waters (Reidel 2016).

Stressors to aquatic life in the Salton Sea include high salinity, anoxia, high sulfide levels, and water temperature fluctuations (Hurlbert et al. 2007; Caskey et al. 2007, Riedel 2016). Seasonal upwelling, which brings anoxic water and H_2S to the Sea's surface, has periodically caused tremendous mortality to plankton, benthic invertebrates, and fish (Hurlbert et al. 2007; Swan et al. 2010). For example, 7.6 million tilapia died from oxygen depletion in a single day in August 1999. The pileworm population has declined substantially in the deeper reaches of the Salton Sea, presumably because of increased salinity, sulfide, and anoxia (Dexter et al. 2007). Tilapia feeding on phytoplankton (Anderson et al. 2007) and pileworm larvae (Tiffany et al. 2007) may have contributed to the decline. Recent macroinvertebrate surveys have failed to detect pileworms (Jones, pers. comm., 2021).

Declining fish populations have affected piscivorous birds such as pelicans and cormorants. The shorebird community will likely shift in its diet and/or bird species composition as the invertebrate community shifts toward more saline-tolerant species such as water boatmen and brine flies, and eventually brine shrimp (Wurtsbaugh et al. 2017).

Disease

Disease outbreaks once caused massive avian mortality events at the Salton Sea, especially during the 1990s and early 2000s (Friend 2002). Avian botulism usually occurs in the springtime when strong winds cause turnover of deep Sea water, depleting the oxygen available for the fish and causing them to die (California Department of Fish and Wildlife 2020b). As the fish die, the birds eat them, and get sick and die from contracting the bacteria. Maggots feeding on the diseased carcasses can then infect more birds that feast on the maggots (Anderson 2019). The species most affected by avian botulism are waterfowl and shorebirds.

Avian cholera tends to happen in winter during migration, when birds congregate at key water sources (California Department of Fish and Wildlife 2020b). Avian cholera is transmitted easily among birds when they flock together in high densities. Newcastle disease affected breeding colonies of double-crested cormorants. In the last two decades, outbreaks have generally decreased in frequency and magnitude, but they still occur (Anderson 2019). In January 2019, thousands of waterbirds died of avian cholera at the Refuge (California Department of Fish and Wildlife 2019). Outbreaks could potentially increase if birds were to concentrate in specific areas, such as around freshwater inflows and managed ponds (Jones et al. 2019; Shuford et al. 2020a, 2020b), or if water levels and quality were to return to historic conditions to support the diversity and abundance of bacteria that cause the outbreaks.

Cyanobacteria and Harmful Algal Blooms

Harmful algal blooms, or HABs, occur when toxin-producing algae grow excessively as a result of increased nutrients, warmer temperatures, plentiful light, calm water, and stratified conditions (Berg and Sutula 2015). When HAB-forming species dominate the phytoplankton community, the transfer of carbon to zooplankton and higher trophic levels is interrupted because zooplankton do not graze on these HAB species (Rohrlack et al. 1999, 2003) and carbon may instead enter the microbial food web. In addition, release of toxins from decaying blooms may result in die-offs of higher trophic levels (e.g., invertebrates, fish, wildlife) as well as negative impacts on beneficial uses and contact recreation (Berg and Sutula 2015).

HAB species fall mainly into three taxonomic groupings: cyanobacteria, diatoms, and dinoflagellates (Huisman et al. 2005; Glibert et al. 2005). It is not known what types of HAB species—if any—bloom in the Salton Sea, with its unusually high salinity. Cyanobacterial HAB (cyanoHAB) species are freshwater species, but the Colorado River Basin RWQCB has issued warnings that blooms in the Salton Sea contain varieties of toxic cyanoHAB species despite the Sea's high salinities (State Water Resources Control Board 2021). Investigations of cyanoHAB species demonstrate that they tolerate salinities up to 10 ppt (Preece et al. 2017); however, direct field measurements suggest that they may tolerate only salinities in the range of 2–5 ppt (Sellner et al. 1988; Lehman et al. 2008). If cyanoHAB species are found in the Salton Sea, the reason could be that they originated in the rivers and tributaries to the Sea and were transported into the nearshore region via river flow. As such, cyanoHABs may be visible along the shorelines of the Sea, but the cells would not be actively growing in the Sea. Nonetheless, toxicities associated with these blooms could be high, as the cyanoHAB cells would be likely to break apart and release their toxins into the water when the cells meet the Sea's highly saline water. The toxins subsequently could become distributed around the Sea by the currents and water movement.

In addition to the potential for freshwater cyanoHABs to be transported in via rivers, satellite imagery identifies algal blooms actively growing in the pelagic, open-water areas of the Sea (Southern California Coastal Water Research Project 2022). Previous investigations of phytoplankton community's composition in this region demonstrated that 80 percent of the phytoplankton community (by biomass) is composed of dinoflagellates, with 20 percent composed of diatoms and cryptophytes. Filamentous cyanobateria are virtually absent from the community in the central, pelagic zone of the Salton Sea (Tiffany et al. 2007).

Identifying the taxonomic affiliation of potential HAB species present in the Salton Sea, whether in the nearshore associated with river inflow or in the central pelagic region, is key to developing a strategy for detecting the onset of a bloom and for mitigating their occurrence. For example, cyanobacteria have a unique pigment signature (they contain phycocyanin) that can be used to detect them via *in vivo* fluorometry (Goldman et al. 2013; Garrido et al. 2019) using an instrument such as the FluoroProbe® (Garrido et al. 2019), and also via ocean color (https://oceancolor.gsfc.nasa.gov/projects/cyan/). On the other hand, the detection of diatom and dinoflagellate HABs frequently occurs via microscopy, but also occurs via DNA probes (e.g., Bowers et al. 2000). Also, mitigating cyanoHABs that originate in the rivers may require different strategies than mitigating HABs that originate in the central Salton Sea.

2.2.5 Socioeconomic Context

Overview

This section provides background information on the social, economic, and demographic setting of the Salton Sea and its surrounding communities. Many factors beyond the environmental conditions of the Salton Sea contribute to the region's demographic makeup and social and economic well-being. Understanding this context is relevant when developing a monitoring program for SSMP activities that have the potential to indirectly benefit the socioeconomic conditions of communities around the Salton Sea. However, direct monitoring of socioeconomic conditions themselves (e.g., public health) is beyond the scope of this MIP.

Socioeconomic activity in the Salton Sea region and the larger Riverside and Imperial counties is dominated by agriculture and production of geothermal energy, followed by recreation, tourism, and real estate. A variety of communities rely on or are affected by the Sea. In addition, a variety of stakeholders living outside the immediate basin, such as bird-watching groups, derive benefits from the Sea.

Social, demographic, and economic conditions in the area have changed as the Sea's water surface elevation and water quality have declined. The Salton Sea was once a popular destination for boating and fishing. However, recreational use has plummeted with the drop in water levels, which has cut off boat access from docks and marinas, and the rise in salinity. Fishery resources are severely depressed and health advisories discourage consumption of Salton Sea fish because of elevated selenium levels (California Office of Environmental Health Hazard Assessment 2009). Recreation is largely limited to shoreline activities, such as bird-watching and off-highway vehicle activity, especially near the towns of Salton City and Bombay Beach. Poor air quality caused by airborne particulate matter and periodic dust storms contributes to public health risks.

Communities and Populations

Population Demographics

The Salton Sea basin spans both Riverside and Imperial counties and includes the cities of Brawley, Calipatria, and Westmorland (all in Imperial County), as well as the unincorporated communities of North Shore, Valerie, Oasis, and Mecca in Riverside County, and Desert Shores, Salton City, Bombay Beach, and Niland in Imperial County (Figure 1-1). **Table 2-2** shows the

population demographics of cities in the Salton Sea basin with populations greater than 5,000, and at the county and state levels, based on the 2020 census (U.S. Census Bureau 2021).[5]

TABLE 2-2
POPULATION DEMOGRAPHICS WITHIN THE SALTON SEA BASIN RELATIVE TO COUNTY AND STATE DEMOGRAPHICS (2020)

Census Data	Calipatria	Brawley	Mecca CDP	Salton City CDP	Imperial County	Riverside County	State of California
Population							
Estimated Population, 2020	6,515	24,416	8,219	5,155	179,702	2,418,185	39,538,223
Race							
American Indian and Alaska Native[1]	1.3%	1.4%	0.0%	0.5%	2.5%	1.9%	1.6%
Asian[1]	1.1%	0.4%	0.0%	1.3%	2.1%	7.2%	15.5%
Black or African American[1]	16.8%	1.0%	0.0%	2.2%	3.3%	7.3%	6.5%
Native Hawaiian and other Pacific Islander[1]	0.5%	0.2%	0.0%	0.3%	0.2%	0.4%	0.5%
White[1]	34.5%	75.6%	21.3%	55.0%	90.2%	79.6%	71.9%
Persons reporting two or more races	10.2%	9.3%	1.5%	4.0%	1.7%	3.6%	4.0%
Ethnic Origin							
Hispanic or Latinx[2]	73.2%	83.7%	100.0%	65.3%	85%	50.0%	39.4%
Education							
High school graduate or higher (percent of persons age 25+ years), 2016–2020	59.2%	72.8%	28.1%	70.6%	70.2%	82.8%	83.9%
Bachelor's degree or higher (percent of persons age 25+ years), 2016–2020	1.7%	15.0%	0.0%	7.4%	15.4%	23.2%	34.7%
Income and Poverty							
Median household income, 2016–2020[3]	$37,196	$46,177	$25,179	$29,138	$46,222	$70,732	$78,672
Percentage of persons in poverty [3]	35.4%	31.4%	28.9%	27.3%	18.1%	11.2%	11.5%

NOTES:

CDP = Census Designated Place

1 Includes persons reporting only one race.

2 According to the U.S. Census Bureau (2020), "Hispanic or Latinx" refers to an ethnicity rather than a race. Individuals responding to this question are also included in the "Race" categories above.

3 In 2020 dollars.

SOURCE: U.S. Census Bureau 2021

5 Population estimates are provided for cities and towns with a population of 5,000 or more.

A majority of the populations of Brawley, Calipatria, Mecca, and Salton City are of Hispanic or Latinx descent and speak a language other than English at home, which is reflective of the demographics of Imperial County as a whole. Income and educational levels in these communities are also lower than the state average; poverty levels range between 27.3 and 35.4 percent, more than double the state average of 11.5 percent. Furthermore, households in Brawley, Calipatria, Mecca, and Salton City have lower access to the internet than the state as a whole, with an average of 76.8 percent compared to the state average of 88.9 percent (U.S. Census Bureau 2021). Census tracts in Calipatria, Brawley, Niland, North Shore, Mecca, and Westmorland have been further identified by the California Environmental Protection Agency as "disadvantaged communities," a term that refers to areas that suffer a combination of economic, health, and environmental burdens, including poverty, high unemployment, air and water pollution, the presence of hazardous wastes, and a high incidence of asthma and heart disease (California Public Utilities Commission 2020).

Torres Martinez Desert Cahuilla Indians

The Torres Martinez Reservation consists of a patchwork of land areas on the northwest side of the Salton Sea covering parts of the communities of Salton Sea Beach, Desert Shores, Oasis, Valerie, and Martinez. The Torres Martinez Desert Cahuilla Indians' Tribal headquarters is located in Thermal. As of the 2020 decennial U.S. Census, the total population in the geographic areas of the Torres Martinez Reservation was 3,454 people; however, among these, fewer than 400 identified as "American Indian and Alaska Native" and nearly 1,900 identified as "Some Other Race Alone" (U.S. Census Bureau 2021). The population associated with the Torres Martinez Desert Cahuilla Indians lives within and outside of the reservation lands, throughout communities around the Salton Sea.

At-Risk Populations

The term "at-risk populations" refers to the groups and individuals that have a greater likelihood of experiencing disproportionate impacts from natural and human-made conditions, including environmental hazards. Generally, at-risk populations within the Salton Sea basin include people of color, low-income persons, people who are linguistically isolated, unhoused people, outdoor workers, the uninsured, children, seniors, and individuals with existing health conditions. Census tracts in Brawley, Calipatria, Niland, North Shore, Mecca, and Westmorland have been identified as disadvantaged communities. The Brawley, Calipatria, Mecca, and Salton City communities have large populations of Hispanic or Latinx people who speak languages other than English. People of color are more likely to experience discrimination, linguistic barriers, and less access to opportunities that affect their socioeconomic status. Linguistic isolation in these communities exceeds that found in 89 percent of the state's other census tracts, which greatly limits the ability of residents to access community services and health care, and to engage in civic life (California Office of Environmental Health Hazard Assessment 2021). These communities also have lower average incomes and lower levels of educational attainment than the state. Such conditions can affect financial stability and increase the risk of disproportionate health effects from air pollution.

Access to health care is also of concern, with a greater percentage of adults lacking health insurance in Oasis (31.9 percent), Mecca (25.4 percent), Niland (25.4 percent), North Shore (24 percent), Salton City (15.4 percent), and Calipatria (14.4 percent) than the state average (10.7

percent) (Public Health Alliance of Southern California 2022). Further, employment, which is defined as the percentage of individuals aged 16 and older in the labor force, is lower in Calipatria (18.5 percent), Salton City (53.4 percent), and Brawley (53.2 percent) than in the state (63.3 percent) (U.S. Census Bureau 2020). Employment in Mecca (64.5 percent) is on par with employment in the state. This is significant, as long-term unemployment has been linked to stress, chronic illness, and shorter life spans.

Economy

In 2018, Imperial County had a gross domestic product of $8.0 billion, ranking 30th out of the state's 58 counties (U.S. Bureau of Economic Analysis 2019). Agriculture and its related industries drive Imperial Valley's economy. Annual harvested acres declined from 2018, when 537,192 acres produced approximately $2.3 billion in farm commodities (Imperial County 2019), to 2020, when 494,679 acres produced approximately $2.0 billion (Imperial County 2020). The commodities with the highest production values in 2020 included vegetables and melons ($896 million), livestock (primarily cattle, $490.6 million), field crops ($444.7 million), lettuce ($251.1 million), and alfalfa ($200.4 million), as well as fruit and nut crops, sweet corn, Bermuda grass, and seed and nursery crops (Imperial County 2020).

In Imperial County, the agricultural industry provides the greatest number of jobs, contributing 17.9 percent of all employment (Southern California Association of Governments 2019a). The agricultural industry is also known to contribute to other economic sectors that provide employment, including retail/sales (13.8 percent) and transportation (6 percent) (Southern California Association of Governments 2019a). Government agencies also contribute high levels of employment, with a combined 33.2 percent of jobs in the public and education sectors (Southern California Association of Governments 2019a). Jobs in these sectors are associated with school and utility districts, prisons and detention facilities, and border security agencies operating in Imperial County. In 2021, the unemployment rate in Imperial County totaled 17.3 percent, higher than the statewide average of 7.3 percent (U.S. Bureau of Labor Statistics 2020).

Riverside County as a whole is more geographically and economically diverse, ranging from the agricultural Coachella Valley in the east near the Salton Sea, to desert resort towns, and farther west to large cities near Los Angeles. Riverside County has a much higher gross domestic product than Imperial County, totaling $79.8 billion in 2018 and ranking 10th overall in the state (U.S. Bureau of Economic Analysis 2019). As a whole, Riverside County provides more diversified employment types, in both the private and public sectors, and has lower levels of unemployment than Imperial County. In 2017, education was the largest job sector (23.4 percent) followed by retail (13.9 percent), hospitality/leisure (12.9 percent), professional (9.8 percent), construction (8.0 percent), manufacturing (6.5 percent), and transportation (6.0 percent) (Southern California Association of Governments 2019b). In 2018, unemployment rates in Riverside County were 4.4 percent, which is generally reflective of the state average (U.S. Bureau of Labor Statistics 2020).

However, these metrics are not reflective of the communities in the lower Coachella Valley near the Salton Sea. As in the Imperial Valley, agriculture represents a large portion of the economy in the Coachella Valley. In 2020, crop production in the Coachella Valley occurred on 59,101 acres,

with gross domestic crop production valued at $574.9 million (Coachella Valley Water District 2021). The crops with the highest production value for 2020 included dates ($83.2 million), grapes ($73.9 million), bell peppers ($67.2 million), lemons and limes ($39.6 million), lettuce ($31.6 million), and carrots ($25.8 million) (Coachella Valley Water District 2021).

Public Health

Chronic Disease and Respiratory Illness

Poor air quality is related to adverse public health outcomes such as chronic disease and respiratory illness. Asthma is an indicator of public health related to air quality, with the caveat that many factors besides dust emissions from the Salton Sea playa (such as other sources of particulate matter, and general health) are likely contributors.

Imperial and Riverside counties have an overall asthma prevalence of approximately 15 percent (California Department of Public Health 2020a). Hospitalizations and emergency room visits caused by asthma are higher in Imperial County than in Riverside County, and are higher than statewide averages. In Imperial County, hospitalizations attributable to asthma were 5.4 per 10,000 individuals and emergency room visits were 65.7 per 10,000 individuals in 2017. In Riverside County, hospitalizations attributable to asthma were 3.7 per 10,000 individuals and emergency room visits were 43.2 per 10,000 individuals in 2017 (California Department of Public Health 2020a). However, between 2014 and 2016, Riverside County had higher death rates related to asthma than Imperial County (8.5 per 10,000 individuals versus fewer than 5 per 10,000 individuals) (California Department of Public Health 2020a).

Studies have also shown a high incidence of childhood asthma in the Imperial Valley. Based on parent-reported survey information, an overall asthma prevalence of 22.4 percent was observed in school-aged children in Imperial County, which is significantly higher than the state average of 14.5 percent in children ages 0–17 (Farzan et al. 2019). Additional respiratory symptoms such as wheezing, allergies, bronchitic symptoms, and persistent dry cough were prevalent in both asthmatic and non-asthmatic children, further suggesting that childhood asthma rates in Imperial County may be underdiagnosed (Farzan et al. 2019).

To date, the factors contributing to the high rates of adverse adult and childhood respiratory health conditions in Imperial Valley have not been studied (Farzan et al. 2019). Recent studies suggest that windborne dust in the Imperial Valley can be attributed to environmental sources associated with the exposed playa at the Salton Sea, sea spray, and the Whitewater River's alluvial fan, as well as human-caused sources related to agricultural dust, agricultural burning, vehicle emissions, and industrial production (Frie et al. 2019). The scientific community and the public have raised concerns that exposure of the Salton Sea playa will increase the amount of fugitive windborne dust containing environmental contaminants, which could have long-term health consequences (Johnston et al. 2019; Farzan et al. 2019).

Mosquito-Borne Illness

Mosquitoes are carriers (vectors) of human and animal diseases, particularly West Nile virus and Saint Louis encephalitis virus. These viruses have been reported in many regions of California, including the Coachella and Imperial valleys, although Saint Louis encephalitis has been detected more rarely since the introduction of West Nile virus in 2003 (California Department of Public Health 2020b). In 2019, a total of three human infections with West Nile virus and two infections with Saint Louis encephalitis virus were reported in Imperial County (State of California 2019). In Riverside County, no human infections of West Nile virus or Saint Louis encephalitis virus were reported in 2021 (State of California 2020).

Fish Advisories

Safe-eating guidelines have been issued for the Salton Sea and its tributaries because high levels of contaminants have been found in fish, which can have long-term health consequences, such as impaired brain development in unborn babies and children, as well as cancer (California Office of Environmental Health Hazard Assessment 2016). The California Office of Environmental Health Hazard Assessment (OEHHA) recommends consuming no more than two servings per week of fish from the Salton Sea because of selenium levels (California Office of Environmental Health Hazard Assessment 2009). The Alamo and New rivers also have advisories for carp, tilapia, and channel catfish because of contaminants such as mercury, selenium, DDT, and polychlorinated biphenyls (PCBs) (California Office of Environmental Health Hazard Assessment 2016).

Harmful Algal Blooms

HAB species can also pose a health risk to humans and domestic animals that have water contact. In 2021, the State Water Resources Control Board (State Water Board) issued an advisory as a result of a toxic algae outbreak at the Salton Sea (State Water Resources Control Board 2021). However, it is not known what types of HAB species—if any—bloom in the Salton Sea, which is too saline for freshwater filamentous/colonial toxin-producing cyanobacteria (Preece et al. 2017).

2.3 Monitoring Questions and Objectives

The MIP monitoring activities are intended to help answer key questions regarding resources, restoration, and dust suppression (Case et al. 2013). **Table 2-3** outlines monitoring goals and objectives, identifies indicators, and links them to key questions and information needs posed in the MAP (Case et al. 2013) and the 2014 State of the Salton Sea Workshop (Barnum et al. 2017) for each resource category.

TABLE 2-3
MONITORING GOALS, OBJECTIVES, INDICATORS, AND QUESTIONS

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
1. What are the existing conditions and trends in Salton Sea water quantity and quality?	1.1 Hydrology Understand the balance between inflows, evaporation, and lake water level and how this balance may evolve with continued drought and restoration initiatives.	• Measure surface water flows to the Sea. • Monitor changes in surface water flows to the Sea over time.	• Inflows • Precipitation amount	• What are the trends in inflow/outflow quantity? (MAP) • What factors affect inflow/outflow quantity? (MAP) • What are the effects of climate change on inflow/outflow? (MAP) • How does the changing hydrology affect water supply and management? (SSS) • How are irrigation practices and crop selection among farmers influencing water levels? (SSS) • How are drainage patterns changing in the watershed? (SSMP WG SC)
		• Measure water surface elevation in the Salton Sea. • Characterize evaporation rates. • Measure water temperature, salinity, and dissolved oxygen profiles over time.	• Surface water elevation • Evaporation rates • Salinity • Water temperature (profile)	• How do physical and biological factors influence the hydrodynamics in the Salton Sea? (MAP) • What is the area of sea and playa? (SSMP WG SC)
		• Characterize shallow groundwater levels, quality, and changes over time to assess its potential to interact with created habitats. • Evaluate the potential effects of the receding Sea on groundwater.	• Groundwater elevation • Groundwater quality	• How does groundwater interact with the Salton Sea and exposed playa? (MAP) • What is the salinity of groundwater? Can it be used to sustain vegetation for dust suppression? (SSMP WG SC)

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
	1.2 Water Quality Understand loading of key constituents and the processes that influence the health of the ecosystem to assess the potential effects of future management actions and evaluate the potential for created habitats to support the desired biological function.	• Characterize water quality (water column, sediments, and inflows) and document how it changes over time in the Sea and created impoundments.	• Salinity • Water temperature • Dissolved oxygen • Turbidity • pH • Chlorophyll *a* • Nutrients • Total organic carbon	• What are the trends in water quality of surface inflows and sediment (rivers, drains, creeks)? (MAP) • What are the trends in Salton Sea water and sediment quality? (MAP) • How does hydrology affect hydrogen sulfide, selenium, and anoxic lake conditions? (SSS)
	1.3 Water Quality—Contaminants Evaluate the ecological and human health risks related to selenium, other contaminants, and harmful algal blooms in the Salton Sea.	• Measure selenium concentrations in water, sediment, pathways of selenium entry into food webs, and bioaccumulation pathways for invertebrates, fish, and birds.	• Integrated and coordinated selenium concentrations in water, sediment, biota • Bird and fish deformities (special study)	• What is the risk associated with selenium in the Salton Sea? (MAP) • Does selenium in soil and water bioaccumulate and have biological effects? (SSS)
		• Characterize water quality (water column, sediments, and inflows) and document how it changes over time in the Sea and created impoundments.	• Metals (e.g., arsenic, boron) • Persistent organic pollutants (current and legacy pesticides)	• What is the risk associated with contaminants (metals, pesticides, herbicides) in the Salton Sea water and sediments? (MAP)
		• Characterize the species composition and conditions that lead to harmful algal blooms.	• Algal composition • Water quality • Location of blooms	• What species of cyanobacteria exist in the highly saline Salton Sea? (SSMP WG SC) • Do algal blooms pose a threat to biota and human health? (SSMP WG SC)
2. What are the existing conditions and trends for geographic and landscape features at the Salton Sea?	2.1 Project the amount of lakebed playa that would be exposed as a result of declines in water surface elevations.	• Characterize the sediment of the Salton Sea lakebed and playa and use model of surface elevation change to calculate growth of playa area.	• Exposed playa (orthoimagery or other remote sensing) • High-resolution LiDAR data (bathymetry, topography, surface water elevation, area) • Modeling of land surface elevation	• How much area will be exposed as the shoreline recedes? (MAP) • How will geothermal development affect the landscape? (MAP) • What geographic changes may occur as a result of climate change? (MAP)

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
	2.2 Characterize land use in the Salton Sea region to understand habitats and sources of dust emissions.	• Characterize the extent, types, and locations of various land cover and habitats and assess changes over time.	• High-resolution LiDAR data (bathymetry, topography, surface water elevation, area) • Modeling of land surface elevation • Model/orthoimagery comparisons for ground truthing • Geothermal activity and locations of hotspots	• What is the distribution of land cover and vegetation? (MAP) • What are the changes to the landscape as a result of restoration? (SSMP WG SC) • What types of land uses around the Sea could affect or benefit restoration activities? (MAP) • What are changes in agricultural uses? (MAP) • Where are snags and islands? (MAP) • What is the availability, quality, and quantity of habitat? (SSS) • How much development will occur around the Sea? (MAP) • Where is the distribution of housing and infrastructure? (MAP)
3. What are the existing conditions and trends for air quality at the Salton Sea?	3.1 Characterize air quality conditions and emissions sources in the Salton Sea region and measure changes in air quality.	• Document status and trends (location, area) of exposed playa, with consideration of emissive surfaces.	• Exposed playa (orthoimagery or other remote sensing)	• How do erosion and deposition affect shoreline and delta areas? What is the rate of erosion and sedimentation? (MAP) • What is the distribution of soils? (MAP) • What are sources of potential airborne dust and where do they originate? (MAP)
		• Characterize relationships among meteorological conditions, emissions sources, and dust to support estimates of potential emissive conditions.	• Wind speed and wind direction • Temperature, solar radiation • Precipitation • Evaporation • Relative humidity, barometric pressure	• What are the surface meteorological conditions at the Salton Sea? (MAP)
		• Characterize air quality conditions and emission sources.	• Particulate matter • Particulate matter deposition rates • Speciation of particulate matter	• What are the existing conditions and trends for air quality at the Salton Sea? (MAP) • What are sources of potential airborne dust? (Land cover) (MAP)

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
			• Sulfur dioxide, hydrogen sulfide (H_2S), ammonia	• Are the dust suppression projects working to reduce emissions? (SSMP WG SC) • What is the predicted consequence of a smaller Sea for air quality, dust, public health, plants, and agriculture? (SSS) • How emissive is the soil and how variable is the playa? Can we predict site emissivity and control emissivity? (SSS) • What can we do about hydrogen sulfide emissions? (SSS)
4. What are the status and trends of key species and guilds in the Salton Sea?	4.1 Biological Resources—Birds • Characterize the status of bird species at the Salton Sea. • Compare to historic bird status.	• Document species composition, spatial and temporal distribution, relative abundance, and habitat associations of bird species/guilds that use the Salton Sea and created freshwater and saline impoundments. • Track population trends in bird species/guilds. • Document the incidence, magnitude, and vectors of bird disease outbreaks.	• Species composition and relative abundance • Distributional patterns • Colony phenology and success • Foraging behavior • Species composition and numbers of birds affected by disease • Disease causative agents and modes of transmission	• What are the trends in bird use in the Salton Sea area? (MAP) • What are the environmental attributes and conditions that affect bird use at the Salton Sea? (MAP) • What factors contribute to the productivity of breeding birds at the Salton Sea? (MAP) • What role do immigration and emigration have on bird populations? (SSMP WG SC) • What happens to bird populations as fish decline? (SSS) • Where and how often do disease outbreaks occur and what factors contribute to outbreaks? (SSS)
	4.2 Biological Resources—Fish Characterize the status of fish populations in the Salton Sea, tributaries and drains, and created impoundments.	• Document species composition, distribution, relative abundance, and broad-scale habitat associations of fish populations in the Salton Sea. • Track population trends in fish populations at the Sea and the environmental attributes and conditions that influence them.	• Annual and seasonal catch per unit effort • Species composition and relative abundance • Distributional patterns • Size/age distribution (breeding success) • Die-off events	• What are the trends in fish populations in the Salton Sea area? (MAP) • What are the environmental attributes and conditions that affect fish populations in the Salton Sea? (MAP) • How are changes in water chemistry affecting fish populations? (SSS) • Do Salton Sea conditions exceed the physiological tolerance of tilapia? (SSMP WG SC)

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
	4.3 Biological Resources—Aquatic Food Web • Characterize the existing conditions of "food web species" in the Salton Sea and created impoundments (plankton, benthic macroinvertebrates). • Characterize the microbial community.	• Characterize the density and species composition of phytoplankton, zooplankton, and macroinvertebrates in the Salton Sea and created freshwater and saline impoundments. • Document trends in abundance and composition. • Identify ecological variables that affect abundance and diversity.	• Density (number of organisms per unit volume) • Species composition and relative abundance • Distributional patterns • Water quality and physical attributes	• What are the trends of plankton populations? (MAP) • What environmental attributes and conditions affect plankton populations? (MAP) • What are the trends in benthic and water column macroinvertebrate populations? (MAP) • What environmental attributes and conditions affect benthic and water column macroinvertebrate populations? (MAP) • Can we model the resilience and mutability of the Sea's ecosystem? (SSS) • How will water chemistry change and what impacts will that have on invertebrate populations? (SSS) • Do we expect a "tipping point" or nonlinear responses of biological systems to changing environmental features? (SSS) • What is the mechanism of ecosystem transition from a fish-driven food chain to something else? (SSS)
	4.4 Biological Resources—Special-Status Species • Understand the distribution and status of special-status wildlife species dependent on the Salton Sea, tributaries, and drains, and created freshwater and saline impoundments.	• Document the distribution and relative abundance of desert pupfish. • Identify the environmental attributes and conditions that influence pupfish use of various habitats.	• Pupfish distribution in various habitats • Pupfish abundance (annual and seasonal catch per unit effort) • Size/age distribution • Breeding condition	• What are the trends in desert pupfish populations in the Salton Sea area? (MAP) • What environmental attributes and conditions affect desert pupfish populations in the Salton Sea area? (MAP)
		• Document the relative abundance and distribution of special-status bird species dependent on the Sea or created impoundments (western snowy plover [inland], gull-billed tern, Yuma Ridgway's rail). • Document the reproductive success of threatened and endangered species, such as the Yuma Ridgway's rail.	• Abundance and distribution • Breeding-season survey	• What are the distribution and status of special-status wildlife species in the Salton Sea area? (MAP) • What are the biological impacts that we have not been considering, and threatened populations of other species (for example, desert tortoise, pileworms, desert plants, clapper rail, pupfish)? (SSS)

Guiding Questions	Monitoring Goals	Monitoring Objectives	Indicators	Monitoring Questions (source[1])
5. How have individuals and their communities experienced the effect of changes in the Salton Sea over time?	• Understand how people are tied in an economic and social capacity to the Salton Sea. • Understand the effects of management and resulting changes to the Salton Sea on communities that are within its catchment. • Understand how the public perceives the changes taking place at the Salton Sea related to where they live, work, and recreate.	• Document and track changes to socioeconomic conditions related to the health and function of the Salton Sea ecosystem. • Identify communities and socioeconomic clusters affected by the physical, biological, and cultural condition of the Salton Sea, and individuals and communities that could be affected by changes to the Sea's environment from management activities (such as building/creating habitat ponds). • Document and track perceptions of the Salton Sea from both the proximate and non-proximate public.	• Public perception of the Salton Sea and SSMP projects • Jobs created from SSMP activities and projects • Economic sectors (e.g., agriculture, tourism, recreation)	• Who is affected socially and economically by the Sea? (MAP) • What is the nature of different groups' socioeconomic relationships (agriculture, tourism, geothermal energy) to the sea? (MAP) • What are the socioeconomic drivers influencing where (geographically) these groups live and their interactions with the Sea? (MAP) • How have these individuals and their communities experienced the effect of changes in the Salton Sea over time, and how do these differ on the basis of group, social, and economic position and status? (MAP) • What are the trends in key economic indicators? (MAP) • How will management activities affect land uses? (MAP) • What will the economic effect of SSMP activities be on surrounding communities? (MAP)

NOTES:

LiDAR = light detection and ranging; Sea = Salton Sea; SSMP = Salton Sea Management Program

[1] Sources for monitoring questions: MAP = *Salton Sea Monitoring and Assessment Plan* (Case et al. 2013); SSMP WG SC = Direct input provided during MIP development by Salton Sea Management Program staff (DWR and CDFW), Working Group members, and/or SSMP Science Committee; SSS = *State of the Salton Sea* (Barnum et al. 2017)

SOURCE: Data compiled by Environmental Science Associates in 2022

CHAPTER 3
Indicator Selection and Monitoring Design

3.1 Indicator Selection

The MAP outlined a comprehensive set of data to support long-term management of the Salton Sea. However, it may not be feasible to sample all metrics with sufficient replication to make meaningful comparisons at all sites, given the cost, duration, and need for long-term data management. In some cases, this may mean not measuring highly variable metrics, and instead using resources for monitoring metrics that are less variable (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a).

To focus MIP monitoring activities, indicators were defined and prioritized using a progression of criteria (U.S. Environmental Protection Agency 2008):

(1) *Conceptual Relevance or Soundness*—Is the indicator relevant to the question and the resource at risk (Table 2-3)? Is the indicator correlated to environmental conditions and/or responses?

(2) *Feasibility of Implementation*—Are the methods practical, technically feasible, cost-effective, and efficient for use in in terms of funding, manpower, sample processing, and the complexity of analysis and data interpretation?

(3) *Response Variability*—Are human errors of measurement and natural variability over time and space sufficiently understood and documented? Is the indicator quantifiable and repeatable? Is the indicator ecologically responsive, with high signal-to-noise ratio and high discriminatory ability?

(4) *Interpretation and Utility*—Will the indicator convey information on resource conditions that is meaningful to Salton Sea managers and decision-makers? Is the indicator understandable and relevant to stakeholders? Is the indicator currently monitored or likely to be easily monitored in the future? Can monitoring efforts be coordinated among federal, State, and local entities and communities?

Proposed indicators were reviewed by experts from the working groups and assigned to one of the following priority categories:

(1) *Primary priority*—Core indicators for understanding changing conditions and their relationship to SSMP actions. These indicators have well-understood and strong linkages or correlation with the status and function of Salton Sea resources. In addition, the methods of measurement are feasible and the analysis and interpretation is meaningful and actionable.

(2) *Secondary priority*—Indicators that could improve understanding but may have an indirect linkage or weak correlation to ecosystem function, are less relevant to management decisions, and/or are less feasible to measure (e.g., are more expensive or logistically difficult).

(3) *Focused Study*—Indicators that may be considered for a distinct stand-alone study that may provide a deeper understanding of causal mechanisms, but that is not essential to track important long-term status and trends. These indicators are lower priority than the primary and secondary indicators. These could include indicators that may be conceptually relevant but lack clear methods and means of interpretation at the present time, metrics that are not strongly linked or responsive to changes in conditions at the Salton Sea, or information that is not actionable by managers.

Table 3-1 lists the indicators and their priority levels. Notes on the prioritization process and criteria for indicators are tabulated in **Appendix B, "Monitoring Indicators and Priority by Resource Category."**

TABLE 3-1
PRIORITY INDICATORS AND METRICS

Category	Indicator	Priority	Implementing Partner
Hydrology	Lake elevation	1. Primary	USGS
	Inflow—rivers and creeks	1. Primary	USGS
	Inflow—direct drains	1. Primary	IID and CVWD (some drains)
	Groundwater elevation	1. Primary	DWR
	Hydrology—stratification/mixing	1. Primary	Reclamation, DWR
	Hydrology—currents	3. Focused Study	TBD
Water Quality	Conductivity, temperature, dissolved oxygen, pH, turbidity, Chl *a*	1. Primary	Reclamation, DWR
	Total suspended solids, total dissolved solids	2. Secondary	Reclamation, DWR
	Nutrients (nitrogen, phosphorus, dissolved silica)	1. Primary	Reclamation, DWR
	Selenium (water, sediment)	1. Primary	Reclamation
	Selenium (invertebrates, fish tissue)	1. Primary (invertebrate) 2. Secondary (fish)	TBD
	Selenium (bird eggs)	3. Focused Study (project ponds)	TBD, possibly USGS
	Metals (arsenic, boron)	2. Secondary (ambient) 1. Primary (project ponds)	TBD
	Pesticides, herbicides (legacy and current use)	2. Secondary (ambient) 1. Primary (project ponds)	TBD
	Groundwater quality	1. Primary	TBD
	Harmful algal blooms	1. Primary	TBD
	Pathogens (bacteria, viruses)	3. Focused Study	TBD
Geography	Land cover (habitat, agriculture, playa)	1. Primary	SSMP, IID
	Playa area extent	1. Primary	IID

Category	Indicator	Priority	Implementing Partner
Air Quality	Meteorology/climate	1. Primary	IID, SCAQMD, ICAPCD
	Ambient air quality (particulate matter)	1. Primary (PM_{10}) 2. Secondary ($PM_{2.5}$)	SCAQMD and ICAPCD (regulatory monitors); IID and Torres Martinez Cahuilla Tribe (nonregulatory monitoring)
	Particulate matter chemistry (constituent analysis)	3. Focused Study	TBD
	Hydrogen sulfide	1. Primary	SCAQMD
Biological—Birds	General bird survey (shoreline area survey)	1. Primary	CDFW, Audubon, OBO, Point Blue
	Piscivorous-bird surveys (aerial survey)	1. Primary	CDFW, OBO
	Colonial breeding-bird surveys	1. Primary	CDFW, OBO
	Colonial roosting-bird surveys	2. Secondary	CDFW
	Marsh bird surveys	1. Primary	CDFW
	Dead- and sick-bird counts	2. Secondary	CDFW, USFWS
Biological—Fish	General fish surveys	1. Primary	CDFW
Biological—Plankton and Macro-invertebrates	Phytoplankton biomass (Chl *a*) (measured with water quality)	1. Primary	Reclamation, DWR
	Phytoplankton surveys	2. Secondary	CDFW
	Zooplankton surveys	2. Secondary	CDFW
	Macroinvertebrates (benthic) surveys	2. Secondary	CDFW, Audubon (shoreline bird)
	Harmful algal blooms	1. Primary	TBD
	Microbial loop, pathogens	3. Focused Study	TBD
Biological—Special-Status Species	Desert pupfish surveys	1. Primary	CDFW (ongoing), IID (past)
	Yuma Ridgway's rail	1. Primary	CDFW
	Southwestern willow flycatcher surveys	1. Primary	CDFW (SCH Project area), IID (ongoing)
	Western snowy plover (inland) surveys	2. Secondary	CDFW
Socioeconomics	Public participation at SSMP events	1. Primary	SSMP
	Community benefits	1. Primary	TBD
	Economic indicators	2. Secondary	TBD

NOTES: Implementing Partner = an agency or organization that is currently monitoring, has monitored in recent years (Appendix A) and/or could potentially monitor this indicator in the future. Implementing partners may or may not have a responsibility to monitor this indicator.

Audubon = Audubon California; CDFW = California Department of Fish and Wildlife; Chl *a* = chlorophyll *a*; CVWD = Coachella Valley Water District; DWR = California Department of Water Resources; ICAPCD = Imperial County Air Pollution Control District; IID = Imperial Irrigation District; PM_{10} = particulate matter 10 micrometers and smaller in aerodynamic diameter; PM_{10} = particulate matter 2.5 micrometers and smaller in aerodynamic diameter; OBO = Oasis Bird Observatory; Point Blue = Point Blue Conservation Science; Reclamation = U.S. Bureau of Reclamation; SCAQMD = South Coast Air Quality Management District; SCH = Salton Sea Species Conservation Habitat Project; SSMP = Salton Sea Management Program; TBD = to be determined; Torres Martinez = Torres Martinez Desert Cahuilla Indians; USFWS = U.S. Fish and Wildlife Service; USGS = U.S. Geological Survey

SOURCE: Data compiled by Environmental Science Associates in 2022

3.2 Monitoring Design

3.2.1 Integrated Sampling Design

Because most elements of the Salton Sea ecosystem feed into each other, data collection should be integrated to capture these linkages. The proposed sampling design integrates spatially segregated sampling locations to capture habitat variability, seasonally driven sampling to capture temporal variability, and concurrent sampling to both maximize ecological relevance and improve sampling efficiency (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a). The location and timing consider habitat type, food web relationships, and (in some cases) reproductive cycles of key species. The sampling design will also support adaptive management by considering the types of management actions that could be triggered in response to environmental observations.

This integration is most obvious in the aquatic monitoring design, which reflects important spatial and seasonal drivers in hydrodynamics and the biological responses. In the summer, the central Salton Sea is characterized by thermal stratification that results in seasonal anoxia of bottom waters and lakebed sediments. During this time, the shallower nearshore regions around the Sea provide refuge for benthic macroinvertebrates (Detwiler et al. 2002) and pelagic plankton populations (Tiffany et al. 2007). In the fall, when DO concentrations improve, nearshore regions serve to repopulate the benthic invertebrate and pelagic plankton in the central Salton Sea.

Thus, the proposed sampling design focuses on monitoring (1) the central region's hydrology and water quality to characterize the seasonal progression of thermal stratification and anoxia, and (2) the abundance of aquatic organisms in the central region compared to the nearshore. Sampling for water quality and sampling for aquatic organisms should be performed concurrently to allow researchers to find correlations between habitat conditions, species abundance, and community composition. For example, *in situ* water quality monitoring via sonde is co-located and co-occurs with discrete water and sediment grabs for enumeration of aquatic organisms. In addition, the monitoring of nearshore habitat is linked with the monitoring of waterbird populations that feed on these aquatic invertebrates and fish.

Monitoring at discrete stations (central Salton Sea, nearshore Sea, tributaries, and direct-to-Sea drains) can be complemented through mapping. An aerial photo and ground-truthing methods or other remotely sensed information, such as light detection and ranging (LiDAR) data, can characterize aspects of the Salton Sea ecosystem in its entirety. Wherever possible, the use of georeferenced surveys will facilitate the integration of hydrology, vegetation, fish, elevation, and other data at multiple scales (Roegner et al. 2008).

3.2.2 Types of Sampling

This MIP provides several approaches for obtaining samples and observations that will be used in combination:

(1) *Continuous data collection*—meteorological conditions, air quality, flow gages in streams, and vertical water quality profiling using sondes.

(2) *Periodic field surveys*—discrete grab samples of water or sediment; discrete, non-continuous water quality measurements; PM_{10} speciation (to identify individual chemical constituents); nets or traps for fish and invertebrate sampling; bird counts; and habitat assessments.

(3) *Periodic aerial surveys*—bird counts from a plane.

(4) *Remote imagery mapping*—interpretation of imagery collected by small aircraft flights or satellite.

(5) *Questionnaires and public surveys*—socioeconomic indicators and opinions from residents and stakeholders.

In situ profiling via sonde, which does not involve laboratory analyses and therefore has lower costs, will be deployed more frequently. Grab sampling, which involves sending samples to laboratories for analyses and may involve higher costs, will be coordinated and co-located with sonde profiling but will occur less frequently. Also, one type of sampling may trigger another type of sampling (see Section 3.2.3, "Triggered Metrics").

3.2.3 Triggered Metrics

Some metrics are measured only when triggered by other metrics, situations, or observations (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a). For example, the contaminant analysis may focus on locations with highly emissive playa or areas targeted for creating impoundments, or may be triggered if abnormalities are observed in fish or birds. Testing for algal toxins would be triggered only if toxic HAB species are detected visually or microscopically. Surveying of phytoplankton blooms outside the quarterly sampling could be triggered if unusually high Chl *a* concentrations are detected via sonde during the monthly water quality profiling. Dead-bird surveys would be triggered if a disease outbreak is detected.

3.2.4 Environmental Observations

Basic water quality and environmental variables should be recorded at any sampling location where aquatic organisms or water quality grab samples are collected (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017b). These variables include but are not limited to sampling metadata (time, date, location, crew, station identifier, water depth), environmental conditions (wind, air temperature, cloud cover), water quality probe measurements, turbidity, substrate, vegetation, and algal blooms.

3.2.5 Standard Operating Procedures and Quality Assurance

This MIP provides a general summary of sampling methods in Chapter 4, "Monitoring Elements," but does not include detailed standard operating procedures (SOPs). Several resources can be consulted for SOPs from other large-scale field monitoring programs (e.g., Roegner et al. 2008; Utah Department of Environmental Quality, Division of Water Quality 2014; Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a, 2017b), along with general U.S. Environmental Protection Agency (EPA) and State Water Board guidance for collection and lab analysis of water, sediment, and biota (e.g., Ode et al. 2016).

Quality assurance (QA) is a critical element of all monitoring programs (Case et al. 2013). Including a QA element helps to ensure that the type, amount, and quality of data collected are adequate to meet the study objectives. As stated in the MAP (Case et al. 2013), data collected in the monitoring program must undergo QA and quality control (QC) at all points in the process. Sampling, sample labeling, preservation, storage, transport, analysis, and data entry and compilation must all follow established and accepted guidelines. Any automated analysis must follow guidelines for calibration and standardization. State of California requirements for data management also include specific QC requirements. State and federal agencies could have specific QC and QA guidelines that need to be met.

QA plans will be developed for each monitoring element and modified and updated as necessary and as consistent with the "living document" philosophy of the MAP and MIP (Case et al. 2013).

3.3 Annual Study Plan

A study plan will be prepared annually to recommend the specific monitoring activities to be implemented in the upcoming year. The 12-month period covered by the annual study plan will be defined based on natural seasonal patterns and schedules of implementing partners. The study plan will reflect a finer scale focus for planning encompassed within the MIP. Indicators and methods will be reviewed periodically to make sure that monitoring continues to address priority science and management needs. Adjustments may be made to types of indicators and metrics, sampling frequencies, sampling locations, and/or methods. Improved technologies will be incorporated as necessary and feasible.

Sampling locations and efforts will be adjusted depending on changing conditions, scientific needs, management needs (proximity to project sites such as new habitat ponds and dust suppression), and feasibility (access, equipment requirements, staffing resources). Critical locations will be sampled more often or intensively, while other locations that are less informative or less critical for biological resources may be sampled less frequently (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a). Nearshore monitoring will consider accessibility and the locations of freshwater inflows where salinities may be lower and more amenable to the survival of aquatic organisms. Previously established monitoring stations will be incorporated where feasible to preserve and extend established data time series. Additional monitoring stations should be selected to reflect changes in the Salton Sea ecosystem, such as new wetland and riparian habitat emerging on the playa from direct-to-Sea drains.

Other considerations for implementing a field monitoring program include obtaining permission to access sites (e.g., IID or CVWD lands), securing sampling gear that must be left unattended, obtaining scientific collection permits (especially for protected species), and conducting safety planning (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a, 2017b).

CHAPTER 4
Monitoring Elements

Table 4-1 summarizes all indicators, priorities, methods, sampling regimes (timing, frequency, and locations), and implementing partners. This chapter describes general protocols for primary and secondary priority indicators: rationale, metric, existing data and monitoring, timing, location, methods, analysis, and other considerations. Methods are not outlined for those lower priority indicators that would be implemented only as focused studies. In addition, detailed procedures (SOPs) and annual study plans are not specified in this document. Responsibility for developing these before the start of monitoring ultimately rests with each implementing partner. In some instances when monitoring efforts are ongoing, MIP protocols may differ from those being implemented by partner agencies. These partner agencies may use different metrics or protocols based on previous studies or permit requirements.

4.1 Hydrology and Water Quality

Hydrology indicators include surface water (e.g., water surface elevation and inflow rates), groundwater (e.g., groundwater elevation), and circulation (e.g., stratification, mixing, and currents) (Table 4-1). Water quality indicators include temperature, conductivity, DO, pH, turbidity, and Chl *a*. These standard metrics compose the backbone of aquatic resources monitoring; therefore, sampling will be closely coordinated with aquatic biological sampling (**Figure 4-1, "Aquatic Monitoring Locations")**.

4.1.1 Surface Water Hydrology

Rationale

Inflow is a key determinant of the volume of the Salton Sea and its surface elevation. The hydrologic model developed by IID, Salton Sea Elevation Model version 2 (SALSA2), uses inflow data to predict salinity, shoreline elevation, and water depth, and to validate predicted water surface elevations (Imperial Irrigation District 2018). Inflow data and the modeling based on the data characterize the water available for potential restoration actions, which informs their design and management.

Inflows from small creeks and direct drains, though only a small contributor to the Salton Sea's total water volume, have a major influence on local conditions. The habitats surrounding the drains and rivers attract the greatest diversity of the birds currently using the Sea. Monitoring these inflows would inform potential habitat creation and air quality management. San Felipe Creek is no longer monitored by USGS, but it is located near proposed dust suppression projects and supports populations of desert pupfish (Figure 4-1**)**. Similarly, flow monitoring of direct drains can support habitat evaluation for pupfish populations.

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TABLE 4-1
SUMMARY OF MONITORING INDICATORS, METHODS, AND SAMPLING REGIME

INDICATOR					TIMING					LOCATION										PARTNER
										Aquatic				Terrestrial				Managed Areas		
Resource	Indicator	Metric	Priority	Method	Frequency	Q1	Q2	Q3	Q4	Salton Sea	Nearshore Sea	Rivers, Creeks	Drains	Shoreline, Playa	Wetlands	Halophytic Scrub	Riparian, Uplands	Dust Control Areas	Created Ponds and Wetlands	Implementing Partner
Hydrology	Surface Water	Lake elevation	1	Gaging station	Continuous	–	–	–	–	X										USGS
		Inflow—rivers and creeks	1	Gaging station	Continuous	–	–	–	–			X								USGS
		Inflow—direct drains	1	Pump rates, or field measurements	Monthly	○○○	○○○	○○○	○○○				X							IID/CVWD
	Groundwater	Groundwater elevation	1	Wells	Continuous	–	–	–	–					X				X	?	DWR, IID
	Stratification	Conductivity, DO, temperature	1	Sonde vertical profile; same profile as water quality	Monthly	○○♦	○○♦	○○♦	○○♦	X	?									Reclamation, DWR
	Currents	Velocity meter, ADCP	3	Focused study																TBD
Water Quality	Surface Water and Sediments	Conductivity, DO, temperature, pH, turbidity, Chl *a*	1	Sonde vertical profile in central Salton Sea	Monthly	○○○	○○○	○○○	○○○	X										Reclamation, DWR
			1	Sonde (handheld) in nearshore, rivers, drains	Quarterly	○	○	○	○		X	X	X							
			1	Sonde installed in impoundment	Continuous (or monthly)	–	–	–	–										X	
		TDS, TSS	2	Grab sample (water), lab analysis	Quarterly (or annually in winter)	♦	○	○	○	X	X	X	X						X	Reclamation, DWR
		Nutrients	1	Grab sample (water), lab analysis	Quarterly (or annually in winter)	♦	○	○	○	X	X	X	X						X	Reclamation, DWR
		Contaminants (pesticides, herbicides)	2	Grab sample (water and sediment), lab analysis	Quarterly (sediments annually in winter)	○	□	□	□	X	X	X	X					X	X	Reclamation, DWR
		Contaminants (metals such as arsenic, boron)	2	Grab sample (water), lab analysis	Quarterly (sediments annually in winter)	○	□	□	□	X	X			X					X	
		Harmful algal blooms	1	TBD (DNA probes)	Summer and early fall			○												
		Pathogens	3	Grab sample (water), lab analysis of pathogenic bacteria, viruses	To be determined					X	X									
	Groundwater	Conductivity, temperature, DO, pH, depth	1	Well sonde measurement	Quarterly	○	○	○	○					X						DWR
		Nutrients, TDS, TSS, contaminants	1	Well grab sample, lab analysis	Quarterly	○	○	○	○					X						TBD
	Selenium (Se)	Water and sediment	1	Grab sample (water and sediment), lab analysis	Annual (spring: April)		○												X	Reclamation, IID
		Invertebrates	1	Plankton net; dredge or cores (benthic macroinvertebrates)	Annual (spring) during bird pre-laying season		○				?								X	Reclamation, IID
		Fish	2	Fish sampling, lab analysis of selenium in fish tissue	Annual (spring) during bird pre-laying season		○				?								X	
		Bird eggs	3	Lab analysis of eggs of sensitive waterbirds (e.g., avocet)	Annual (spring) during incubation season		□				?								X	USGS
Geography	Land Cover	Land cover, habitat types	1	Aerial imagery	Every three years (triennial)		○			X	X	X	X	X	X	X	X	X	X	DWR, Audubon
	Playa	Playa extent	1	Aerial imagery	Annual									X				X		DWR
Air Quality		Meteorology/climate	1	Fixed-site meteorological stations (temporary and permanent)	Continuous	–	–	–	–									X		IID, Torres Martinez. SCAQMD, ICAPCD
		PM_{10} concentrations	1	Fixed-site air monitoring stations (temporary and permanent, nonregulatory)	Continuous	–	–	–	–					X				X		IID, Torres Martinez, SCAQMD, ICAPCD
		$PM_{2.5}$ concentrations	2	Fixed-site air monitoring stations (temporary and permanent, nonregulatory)	Continuous									X						IID, Torres Martinez, SCAQMD, ICAPCD

INDICATOR					TIMING					LOCATION										PARTNER
										Aquatic				Terrestrial				Managed Areas		
Resource	Indicator	Metric	Priority	Method	Frequency	Q1	Q2	Q3	Q4	Salton Sea	Nearshore Sea	Rivers, Creeks	Drains	Shoreline, Playa	Wetlands	Halophytic Scrub	Riparian, Uplands	Dust Control Areas	Created Ponds and Wetlands	Implementing Partner
		PM_{10} constituent analysis	3	Focused study	To be determined															TBD
		Hydrogen sulfide (H_2S) concentrations	2	Fixed-site air monitoring stations	Continuous	–	–	–	–					X				X		SCAQMD
Biological Resources	Birds	Waterbirds at sea	1	General waterbird shoreline survey (19 survey areas)	Five times annually (late winter: January–February; spring: March–May; breeding: February–October; early fall: July–August; early winter: November–December)	○♦○	♦○♦	♦○○	○○♦	X				X						CDFW, USFWS, Audubon, OBO, Point Blue
		Piscivorous birds	1	Aerial survey (26 aerial survey transect points and four aerial survey zones)	Five times annually (late winter: January–February; spring: March–May; breeding: February–October; early fall: September–November; early winter: December–January)	○♦○	♦○♦	○○♦	○○♦	X				X	X					CDFW
		Colonial breeding birds	1	Aerial survey (26 aerial survey transect points and four aerial survey zones)	Three times annually (breeding: March–May; May–June)		○○○			X				X			X		X	CDFW, OBO
		Marsh birds	1	Marsh bird survey (Wister Unit of the Imperial Wildlife Area; additional surveys, if future marshes)	Three times annually (breeding: March–May)		○♦○								X				X	CDFW, USFWS
		Colonial roosting birds	2	Aerial survey (26 aerial survey transect points and four aerial survey zones) On-the-ground surveys (Shuford et al. 2000)	Annually (winter: December–March)	○				X				X			X		X	CDFW
		Emerging-habitats birds	1	Use of satellite imagery and incidental observation during other surveys to identify emerging habitats for reconnaissance-level surveys	Semiannually during the passerine breeding season (February–October)		○		○						X		X			CDFW
		Dead and sick birds	2	Incidental observations around the Salton Sea	Incidental with other bird surveys, or triggered by reports of mass-mortality events	□	□	□	□		X			X	X				X	CDFW, USFWS, public observations
	Fish	General fish species	1	Seine or gillnet survey	Triennially in the Salton Sea, annually in constructed ponds (fall: October–November)				○		X	X							X	CDFW
	Plankton and Macro-invertebrates	Phytoplankton	2	Grab sample, microscopy	Quarterly (concurrent with water quality)	○	○	○	○	X	X									CDFW
		Zooplankton	2	Plankton net, lab sorting, microscopy	Quarterly (concurrent with water quality)	○	○	○	○	X	X									CDFW
		Benthic macroinvertebrates	2	Benthic core (optional sweep net, Ponar dredge), lab sorting	Quarterly (concurrent with water quality)	○	○	○	○		X								X	CDFW
	Special-Status Species	Desert pupfish	1	Minnow traps	Three times annually (April–October)		○	○	○			X	X						X	CDFW
		Yuma Ridgway's rail	1	Marsh bird survey (see above)																
		Southwestern willow flycatcher	2	Protocol species survey (U.S. Geological Survey 2010b)	Three times annually (May–July)		○○	○									X			CDFW, USFWS
		Western snowy plover (inland)	1	Protocol species survey (Shuford et al. 2000)	Three times annually (winter: November–January; breeding: May–June)									X						CDFW
Socio-economics	Public Engagement and Public Perception	Event participation (in-person and digital)	1	Sign-in sheets, head counts, survey responses	Incidental (concurrent with engagement events)	♦	♦	♦	♦											SSMP, DWR
		Engagement material distribution	2	Notices, newsletters, postings, surveys	Quarterly	○	○	○	○											SSMP
		Digital engagement	2	Webpage clicks, video views, social media "likes" and comments, newsletter subscribers	Quarterly	○	○	○	○											SSMP, DWR, CNRA
		Job creation	1	Annual report	Annual	♦														DWR

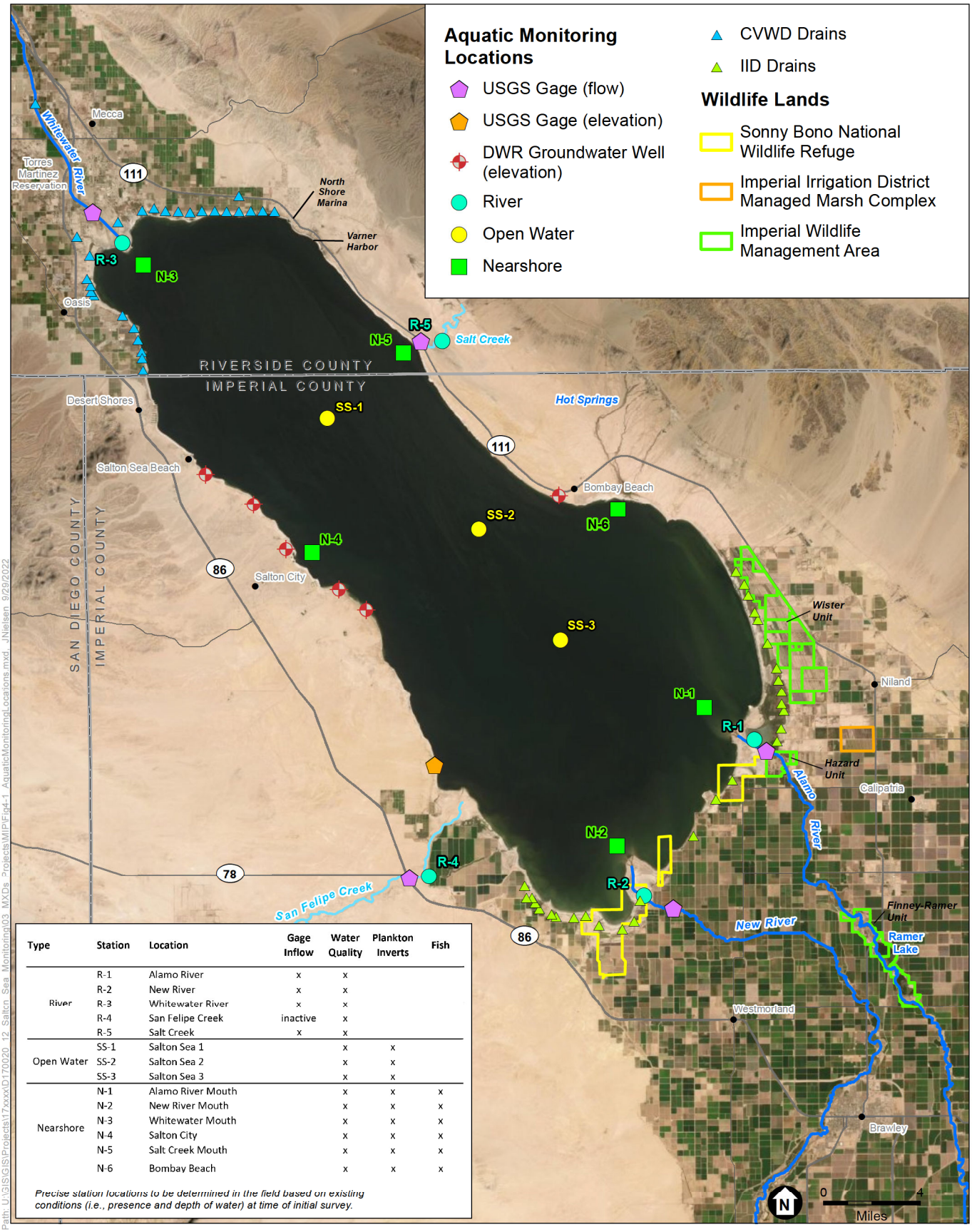
INDICATOR					TIMING					LOCATION										PARTNER
										Aquatic				Terrestrial				Managed Areas		
Resource	Indicator	Metric	Priority	Method	Frequency	Q1	Q2	Q3	Q4	Salton Sea	Nearshore Sea	Rivers, Creeks	Drains	Shoreline, Playa	Wetlands	Halophytic Scrub	Riparian, Uplands	Dust Control Areas	Created Ponds and Wetlands	Implementing Partner
	Community Benefits	Community infrastructure and amenities	2	Annual report	Annual	♦														DWR
		Education programs	1	Annual report	Annual	♦														DWR
		Grant funding	1	Annual report	Annual	♦														DWR
	Economic Indicators	Median household income	1	American Community Survey data	Biennially	♦														DWR
		Poverty	1	American Community Survey data	Biennially	♦														DWR
		Employment/ Unemployment	1	American Community Survey data	Biennially	♦														DWR
		Education	1	American Community Survey data	Biennially	♦														DWR
		Housing-Cost Burden	1	American Community Survey data	Biennially	♦														DWR
		Public Assistance (SNAP)	2	American Community Survey data	Biennially	♦														DWR

NOTES: ADCP = acoustic Doppler current profiler; Audubon = Audubon California; CDFW = California Department of Fish and Wildlife; Chl *a* = chlorophyll *a*; CNRA = California Natural Resources Agency; CVWD = Coachella Valley Water District; DO = dissolved oxygen; DWR = California Department of Water Resources; EC = electrical conductivity; ICAPCD = Imperial County Air Pollution Control District; IID = Imperial Irrigation District; PM_{10} = particulate matter 10 micrometers and smaller in aerodynamic diameter; $PM_{2.5}$ = particulate matter 2.5 micrometers and smaller; Q1, Q2, Q3, Q4 = first, second, third, or fourth quarter; Reclamation = U.S. Bureau of Reclamation; SCAQMD = South Coast Air Quality Management District; SNAP = Supplemental Nutrition Assistance Program; SSMP = Salton Sea Management Program; TBD = to be determined; TDS = total dissolved solids; Torres Martinez = Torres Martinez Desert Cahuilla Indians; TSS = total suspended solids; USFWS = U.S. Fish and Wildlife Service; USGS = U.S. Geological Survey

PRIORITY
1 Primary Indicator
2 Secondary Indicator
3 Focused Study (lower priority)

TIMING AND FREQUENCY
– Continuous sampling (instrumented)
○ Survey or sampling event (the number of symbols corresponds to a month with sampling)
♦ Priority sample event (if there is need to prioritize) (the number of symbols corresponds to a month with sampling)
□ Additional survey sampling event as resources allow
Note – each symbol represents a month when sampling occurs.

SOURCE: Data compiled by Environmental Science Associates in 2022



Type	Station	Location	Gage Inflow	Water Quality	Plankton Inverts	Fish
River	R-1	Alamo River	x	x		
	R-2	New River	x	x		
	R-3	Whitewater River	x	x		
	R-4	San Felipe Creek	inactive	x		
	R-5	Salt Creek	x	x		
Open Water	SS-1	Salton Sea 1		x	x	
	SS-2	Salton Sea 2		x	x	
	SS-3	Salton Sea 3		x	x	
Nearshore	N-1	Alamo River Mouth		x	x	x
	N-2	New River Mouth		x	x	x
	N-3	Whitewater Mouth		x	x	x
	N-4	Salton City		x	x	x
	N-5	Salt Creek Mouth		x	x	x
	N-6	Bombay Beach		x	x	x

Precise station locations to be determined in the field based on existing conditions (i.e., presence and depth of water) at time of initial survey.

Path: U:\GIS\GIS\Projects\17xxxx\D170020_12_Salton_Sea_Monitoring\03_MXDs_Projects\MIP\Fig4-1_AquaticMonitoringLocations.mxd JNielsen 9/29/2022

SOURCE: ESRI Imagery: 06/08/2021; CDFW, 2020; DWR, 2021; ESA, 2022.

Salton Sea Management Program Monitoring Implementation Plan

Figure 4-1
Aquatic Monitoring Locations

Metrics

The metrics for surface water hydrology are flow (i.e., daily discharge) of rivers and creeks, pump rate of direct drains in cubic feet per second (cfs), and water surface elevation of the Salton Sea.

Available Data Sources/Implementing Partner

USGS monitors streamflow (discharge) at gaging stations on the Whitewater River, New River, Alamo River, and Salt Creek, but has discontinued monitoring of San Felipe Creek.[6] However, the gaging station at San Felipe Creek may be reestablished. USGS also monitors the Salton Sea's water surface elevation near Westmorland[7] (Figure 4-1). IID has an existing water surface elevation monitor at Fig Tree John, but it may be relocated because of dropping elevation (Humes, pers. comm., 2022) and should be used only if the USGS gaging station becomes nonoperational.

IID and CVWD each monitor drains in their respective jurisdictions (Figure 4-1). CVWD collects flow data monthly at 27 drains, 25 of which flow directly to the Salton Sea area. Monitoring uses a Sontek flow meter or dedicated pump meter, depending on site conditions. Annual flows based on the water year (October–September) are published in the Indio Subbasin Sustainable Groundwater Management Act Annual Report (Rodriguez del Rey, pers. comm., 2021). Currently not all IID drains are monitored (Humes, pers. comm., 2022).

Locations

The monitoring locations will be the existing monitoring locations for the USGS flow and water surface monitoring (Figure 4-1). CVWD's and IID's direct drains are shown approximately on Figure 4-1, but not all drains are monitored.

Timing/Frequency

The USGS gages measure daily discharge of rivers in cfs. The timing for the potential new gage at San Felipe Creek will be determined upon its establishment. CVWD collects discharge data at direct drains monthly. IID's data collection schedule is unknown.

Method

Surface water inflows will be measured as discharge at USGS gaging stations. Water surface elevation will be measured using a pressure sensor and intermittent water-level surveys.

None of the drains have gages. The majority of drains are gravity fed and flows are measured by a manual flow meter (e.g., Sontek flow meter). Some subsurface drains are pumped into the open

6 Flow (stream discharge) measured at USGS gaging stations: 10259540 WHITEWATER R NR MECCA, 10255550 NEW R NR WESTMORLAND CA, 10254730 ALAMO R NR NILAND CA, 10254050 SALT C NR MECCA. Viewed online at: https://waterdata.usgs.gov/ca/nwis/current/?type=flow. Accessed: Dec. 23, 2021.

7 Water surface elevation measured at USGS gaging station 10254005 SALTON SEA NR WESTMORLAND CA. Data reported as NGVD 29; add 2.13 feet to convert to NAVD 88. Viewed online at: https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005. Accessed: Dec. 23, 2021.

drains because of the elevation differential; these pump meters provide the best estimates of monthly flows to the drains. Pumped flows (of direct drains) will be monitored by pump rate.

Analysis

Inflow and water surface elevation data will be used to describe inflows on a seasonal and annual basis. These data will continue to be used to compare against and refine the SALSA2 hydrologic model, which simulates the water and salt balance for the Salton Sea (Imperial Irrigation District 2018).

Other Considerations

As the Salton Sea's elevation continues to decline, the existing USGS water surface elevation gage may become inoperable. If this occurs, a new gage may be needed. Various projects such as the Salton Sea Species Conservation Habitat Project may divert water from the rivers and pump water from the Salton Sea. Water pumped from the Sea is not yet captured in the SALSA2 model. Monitoring the pumping directly from the Salton Sea (outflows), such as for specific projects, may be valuable for understanding the Sea's water balance and refining the SALSA2 model. Also, the San Felipe Creek flow monitoring gage could be reinstalled at its previous location to reestablish monitoring.

4.1.2 Groundwater Hydrology

Rationale

Understanding the depth and quality of shallow groundwater and the ways in which it changes over time at existing and potential SSMP project sites (where surface water availability is limited) will inform habitat creation and air quality management at the Salton Sea. Shallow groundwater could influence the emissivity of particles from sediments on exposed playa, and it could affect the feasibility and operations and maintenance of dust suppression projects. Both shallow and deeper groundwater also could serve as a water source and salt management tool for dust suppression.

Metrics

The metric for groundwater hydrology is groundwater elevation (NAVD 88).

Available Data Sources/Implementing Partner

No existing comprehensive groundwater monitoring effort covers the entire perimeter of the Salton Sea. Several public and private agencies or entities have collected groundwater data in the vicinity of the Sea. Some of these data are "point" data that represent a single time or event; other data are collected as part of monitoring programs. Many of these data are not available in the public domain but could be available by request. The MAP lists several studies performed that describe geologic and hydrogeologic conditions and notes that a variety of older studies or data compilations were developed by USGS and others. CVWD has not typically collected shallow groundwater levels, because of its agency focus on the deep aquifer; however, as part of new monitoring under the Coachella Valley Salt and Nutrient Management Plan, partnering agencies

will construct some shallow wells in the East Coachella Valley, some located relatively near the Salton Sea's north shore (Rodriguez del Rey, pers. comm., 2021). DWR is constructing six deep groundwater wells, five on the west side and one on the east side of the Salton Sea (Figure 4-1) that will be used as production wells to provide fresh water for dust suppression projects and marsh restoration projects (Garcia, pers. comm., 2022).

The entities that will conduct the groundwater elevation monitoring will be determined based on restoration management planning areas.

Locations

Sampling will occur in groundwater wells near potential and planned restoration management planning areas as they are constructed. Figure 4-1 indicates the locations of groundwater production wells surrounding the Salton Sea that are currently in the construction phase where monitoring of groundwater levels will be able to occur (Garcia, pers. comm., 2022).

Timing/Frequency

The frequency of sampling will be quarterly or as needed.

Methods

Groundwater elevation will be measured manually in groundwater wells. The elevation of the wells will be surveyed (in feet NAVD 88). The groundwater depth in the wells will be monitored using a well depth sounder or other typical sensor. If levels are highly variable and a more continuous record is desired, a pressure transducer and data logger may be installed, which would need to be checked and calibrated every few months.

Analysis

Groundwater elevation data will be tabulated and used to describe shallow groundwater elevations around the Salton Sea on a seasonal and annual basis. This information will provide a preliminary indication of the potential for shallow groundwater to interact with surface sediments, which could influence dust suppression activities on the exposed playa. Data collected on the quality of the groundwater, combined with elevation data, could be used to assess the potential for groundwater to interact with surface water in created habitats and to evaluate the potential effects. The water quality data also could be used to assess the suitability of shallow groundwater as a water source for establishing vegetation to control dust. The groundwater elevation data will be analyzed to better understand the sustainability of pumping rates in relation to the aquifer. The shallow groundwater monitoring activities are expected to be modified in the future based on the results of the initial monitoring.

Other Considerations

Groundwater is managed differently in various regions of the basin, so groundwater monitoring may need to be divided up by region. The east and west sides are the currently proposed locations for new wells. More investigation is needed to identify locations that have sufficient water quality

and pump rates that will be sustainable without causing negative impacts on the aquifer. Security considerations may affect where permanent monitoring equipment is installed at groundwater wells.

4.1.3 Water and Sediment Quality

Rationale

Water and sediment quality monitoring will characterize the parameters and processes that influence ecosystem function and condition at the Salton Sea (Case et al. 2013). The data will inform the siting, design, and operations (e.g., water supply) of created impoundments intended to support fish and wildlife.

Anoxia (low or absent DO) should be measured in shallow water to determine habitat suitability for fish and invertebrates. DO levels also determine the oxidation/reduction potential ("redox"), which affects the solubility of toxic metals. DO should be measured as a function of water depth to determine the extent of anoxia and stratification and to understand where sulfide will be formed.

Salinity, nutrients, sulfate, selenium (Se), and pesticides are among the constituents that threaten the health of the Salton Sea ecosystem (Schroeder et al. 2002, Case et al. 2013). Concentrations of nutrients (i.e., nitrogen and phosphorus) affect productivity and eutrophication. High sulfur concentrations (sulfate is the oxidized form) contribute to availability of toxic hydrogen sulfide. Selenium in the Salton Sea and surface inflows has the potential to reach concentrations that produce deleterious effects in fish and wildlife (Section 4.1.5, "Selenium Bioaccumulation").

Groundwater monitoring will focus on parameters (i.e., conductivity, pH, nutrients) that could determine whether groundwater could be suitable for establishing vegetation for dust control. Note that groundwater is unlikely to have sufficient yield to serve as a water supply for the constructed impoundments.

Metrics

The water quality metrics that will be measured most often and broadly include temperature, conductivity (a measure of salinity), DO, pH, turbidity, and Chl *a* (a measure of primary productivity by phytoplankton) (Table 4-1). Other water constituents to be measured include nutrients (nitrate, ammonium, phosphate, and dissolved silica), total suspended sediments, selenium speciation (total selenium, selenate, selenite), sulfate, pesticides (legacy and current use), arsenic, and boron. Sediment samples will measure nutrients (nitrate, phosphate, and ammonium), selenium speciation, sulfate, pesticides, redox potential (E_h), total organic carbon, and grain size.

Available Data Sources/Implementing Partner

Table 4-2 lists available data sources related to water quality. Reclamation conducted monitoring in the Salton Sea and influent rivers on a quarterly basis from 1999 to 2020.

TABLE 4-2
WATER QUALITY DATABASES

Database	Contributor	Notes
—	Reclamation	From 1999 to 2020, Reclamation conducted water quality monitoring of the Salton Sea (three locations in the center) and influent rivers (the Alamo, New, and Whitewater rivers) up to four times a year. Data for 2004 to 2020 are available at: https://www.usbr.gov/lc/region/programs/saltonsea.html.
CEDEN	Multiple	The CEDEN database includes data for the Salton Sea, and for the Whitewater, New, and Alamo rivers. The CEDEN database may also include some USGS river data from the NWIS. The CEDEN database does not include IID and CVWD data.[1] Note that the CEDEN database has numerous filters (e.g., programs, parent projects, projects, station names, sample agencies, lab agencies, submitting agencies, and date ranges). Consequently, searching the database requires knowing the filter names. The CEDEN database is available at: https://ceden.waterboards.ca.gov.
NWIS	USGS	The NWIS database is limited to USGS data for samples collected from the Whitewater, New, and Alamo rivers and the Salton Sea. Some of the USGS data in the NWIS database are also in the CEDEN database. The NWIS database is available at: https://waterdata.usgs.gov/nwis.

NOTES:

CEDEN = California Environmental Data Exchange Network; CVWD = Coachella Valley Water District; IID = Imperial Irrigation District; NWIS = National Water Information System; Reclamation = U.S. Bureau of Reclamation; USGS = U.S. Geological Survey

Groundwater wells are not yet installed.

1 IID and CVWD conduct sampling under programs separate from the Salton Sea Management Program.

SOURCE: Data compiled by Environmental Science Associates in 2022

IID and CVWD conduct sampling under programs separate from the SSMP. Given that the data generated by IID and CVWD are required by and provided to the RWQCB, it is assumed that the IID and CVWD data will be available to the SSMP.[8] Note that groundwater wells that could be used to establish vegetation for dust control have not yet been installed.

Locations

Sampling will occur at Salton Sea central open-water stations (SS-1, SS-2, and SS-3), Salton Sea nearshore stations (N-1, N-2, N-3, N-4, N-5, and N-6), and rivers and creeks (R-1, R-2, R-3, R-4, and R-5), and to a lesser extent at IID drains and CVWD drains (Figure 4-1). Where possible, samples from rivers will be collected near the existing flow-measurement gaging stations. Nearshore stations may need to be adjusted periodically to keep pace with shoreline recession. Contaminants such as selenium and pesticides will also be measured in water and sediment samples from the Salton Sea, rivers, and drains, because those waterbodies receive agricultural drain water. Groundwater wells will be installed in dust suppression areas where revegetation may be used for dust control. Locations will be determined based on priority areas for dust control and accessibility.

8 Note that for CVWD, a subset of drains is monitored for compliance (e.g., Irrigated Lands Regulatory Program compliance on behalf of the Coachella Valley Irrigated Lands Coalition). Because this is a regulatory program, data are submitted to the RWQCB. All other monitoring of direct drains is voluntary and not reported to the RWQCB regularly.

Timing/Frequency

Sonde measurements (vertical profiles) will occur monthly at the central open-water stations (SS-1, SS-2, and SS-3). Water grabs for lab analysis will be collected quarterly—or at minimum, annually—from the central, nearshore, and river stations.

Sediment grab samples will occur less frequently (i.e., annually) at the central and nearshore stations because temporal variability is presumably lower for sediments than for water samples. All collections of sediment grab samples will occur concurrently with sonde measurements. After the initial characterization of sediment chemistry, sampling of sediments could occur less frequently (e.g., every three years). Analyses of sediment chemistry will also occur before the construction of created impoundments, restored marshes, and dust suppression projects, as required by the permits for the respective projects. These latter analyses will complement the "in-Sea" sediment chemistry analyses.

Pairing water quality measurements with biological sampling (Section 4.4.2, "Fish," and Section 4.4.3, "Plankton and Macroinvertebrates") allows researchers to infer correlations between invertebrate fish abundance and water quality factors. At the central stations, plankton and invertebrate sampling will be coordinated to co-occur with water quality measurements and sampling. At the nearshore stations, plankton, benthic macroinvertebrate, and fish sampling will co-occur with water quality measurements.

Methods

In general, methods for water quality sampling consist of a combination of field measurements and the collection at specified intervals of grab samples that are sent to a laboratory for analysis (Case et al. 2013).

Sonde Measurements

Multi-parameter sondes with integrated depth sensors will be used to obtain vertical profiles of a standard suite of water quality parameters at the open-water stations: temperature, conductivity,[9] DO, pH, turbidity, and Chl *a*. Additional field probes and meters that measure single water quality parameters may also be used. All probes and sondes will be calibrated in accordance with manufacturer instructions and Quality Assurance Project Plan (QAPP) procedures. Depending on the location and depth of the water column, vertical profiles or spot measurements will be taken.

Groundwater monitoring will focus on the parameters that could determine whether groundwater could be suitable for establishing vegetation for dust control: temperature, conductivity, pH, DO, and nutrients. Unless nearby groundwater wells are available, groundwater wells may need to be

[9] "Electrical conductivity" (referred to in this MIP as "EC" or "conductivity") is a surrogate measure for salinity and is usually represented as "specific conductivity," which is conductivity normalized to 25 degrees Celsius (ºC) (microsiemens per centimeter [µS/cm] at 25°C). Monitoring EC provides information on salt content, which can be correlated to laboratory-derived measurements of total dissolved solids, or TDS. Precise values for water temperature should be recorded at the time that EC is measured to allow the accurate conversion of specific conductance to salinity (Amrhein et al. 2001).

installed at priority dust suppression sites where revegetation may be used for dust control. The locations of any new groundwater wells will depend on access considerations.

Grab Samples

Water grab samples from rivers, drains, and canals will be collected directly from 0.5 m below surface (to avoid localized surface variation caused by floating material, wind, waves, or the presence of the boat) by extending samplers or sample bottles into the water. Groundwater grab samples will be collected using an appropriate sampling device lowered into the monitoring well. Grab samples from the Salton Sea will be collected from boats, concurrently with water quality sonde measurements from stations SS-1, SS-2, and SS-3. The vertical resolution of the grab samples will be determined according to water column depth and layering.

Sediment grab samples will be collected using a small dredge (e.g., Eckman or Ponar) or a corer, and will occur concurrently with one of the quarterly water column samplings, such as the fall sampling. The sites for sediment grabs in the Salton Sea will be co-located with the sites for open-water sampling (Figure 4-1); three sediment grabs or cores will be collected from each site.

Samples will be collected into sample bottles provided by the analytical laboratory, stored in a cooler with ice, and transported to an accredited and preapproved laboratory within eight hours of collection (or within the appropriate hold time) under a standard chain-of-custody procedure. Samples will be processed by the laboratory using standard analytical methods.

Analytes will include all of the following:

- Nutrients such as phosphorus (total-P), orthophosphate (o-PO4), ammonia (NH3-N), nitrate and nitrite (NO3/NO2-N), total nitrogen (TN), and dissolved silica (DSi).
- Total suspended solids (TSS).
- Total dissolved solids (TDS), an indicator of dissolved salts that can be used to improve understanding of salt dynamics, including salt precipitation, resuspension, and redissolution.
- Chl a, an indicator of phytoplankton biomass.
- Sulfur speciation (certain sulfur species such as hydrogen sulfide [H2S] are toxic to aquatic life).
- Total organic carbon from sediments, an indicator of the organic enrichment and chelation/adsorption potential of the sediments.

In addition, samples of water and sediment will be analyzed for contaminants and trace elements known to have toxic effects on the environment. For the Salton Sea ecosystem, constituents of concern are selenium, arsenic, boron, pesticides, and herbicides (legacy and current use).

Analysis

The data from the laboratory analysis will be tabulated and posted to the California Environmental Data Exchange Network (CEDEN) database. An annual report will be prepared that documents the sampling events, tabulates the data, provides a trend analysis for each metric

analyzed, identifies any toxic elements that exceed levels of effect, and provides recommendations.

Other Considerations

Access to the Salton Sea sampling sites requires a boat launch. The boat launch on the Sea's southern shoreline is no longer functional, but a new boat launch ramp is planned at the Salton Sea Species Conservation Habitat Project (SCH) site on the southern shoreline, and another boat launch is currently under construction on the north shore. Continuous water quality sondes will not be installed in the Salton Sea because the high salinity is damaging to equipment, although installation of these sondes in the constructed impoundments could be considered. Depending on security considerations, permanent sampling equipment may be installed in groundwater wells.

4.1.4 Stratification and Circulation

Rationale

Hydrologic processes in the Salton Sea influence water quality via variations (over seasonal and interannual time scales) in circulation, stratification, and vertical mixing. Monitoring changes in density and wind-driven processes would improve understanding of key drivers of water quality, which in turn affect aquatic biological resources.

Density differences and stratification are principal drivers of water quality parameters, and as such, they are considered primary measurements. Measurements of the current (i.e., water velocity) were previously used to calibrate hydrologic models of the Salton Sea for mixing and circulation (Case et al. 2013). These hydrologic models formerly served the purpose of earlier restoration concepts that were aimed at reducing the size of the Sea; however, there is not currently a direct effort to alter the size of the Salton Sea. Therefore, velocity monitoring is unnecessary for calibrating models.

Metrics

Metrics of density calculations and stratification include temperature and salinity profiles. Currents and water velocities (in feet per second) can be measured directly with instruments such as current meters, including acoustic Doppler current profiler (ADCP) instruments that profile the entire water column.

Currents may be measured to provide horizontal and vertical water-velocity profiles to help characterize stratification. However, calculating vertical density from salinity and temperature profiles presumably would be an easier method for quantifying stratification, if desired. Water column stratification (from density profiles based on temperature and salinity) is a primary metric, whereas characterization of currents could be a focused study.

Available Data Sources/Implementing Partner

Table 4-2 lists available data sources.

Locations

Vertical profiles will be measured at three open-water stations in the Salton Sea (Figure 4-1).

Timing/Frequency

Vertical profiles will be measured at least quarterly, and ideally monthly.

Methods

Water quality parameters will be sampled via sonde (see Section 4.1.3, "Water and Sediment Quality").

Analysis

Stratification will be characterized by calculating the density profile of water from salinity and temperature profiles. The data will be tabulated and posted to the CEDEN database. An annual report will be prepared that documents the sampling events, tabulates the data, provides a trend analysis for each metric analyzed, and provides recommendations.

Other Considerations

The MAP (Case et al. 2013) recommends monitoring currents to better understand the hydrodynamics of the Salton Sea. However, current/velocity monitoring is costly and can be impractical, given the Sea's significant size and the number of ADCP instruments that would need to be deployed and maintained to obtain sufficient coverage.

4.1.5 Selenium Bioaccumulation

Rationale

The Salton Sea is listed as an impaired waterbody for elements leached and concentrated by agricultural irrigation, particularly selenium (Miles et al. 2009). Selenium, though essential for metabolic function, has toxic effects on aquatic organisms and birds at elevated concentrations (Ohlendorf 2003; Hamilton 2004). To facilitate management actions to protect endangered populations, including desert pupfish and birds, it is key to determine the concentrations of selenium in water, sediments, and food sources that support higher trophic levels. Monitoring selenium in aquatic biota will support the assessment of ecological and human risks associated with selenium in the Salton Sea and created habitats that could be constructed to support fish and wildlife (Miles et al. 2009; Case et al. 2013). This information will help guide the placement, design, and management of created habitats to minimize risks.

Selenium bioaccumulation in aquatic biota is a primary metric at lower trophic levels (i.e., in aquatic invertebrates) and a secondary metric in fish consumers (e.g., tilapia if present in the Salton Sea, fish in drains). USGS conducted a focused study of selenium bioaccumulation at the former USGS experimental ponds during 2006–2008 (Miles et al. 2009) and selenium in aquatic invertebrates and fish in direct drains (Saiki et al. 2010).

Bioaccumulation in birds (e.g., bird eggs) could be pursued as a focused study, but is not a current priority for ambient monitoring. Selenium measurements in bird eggs could follow the methods of Miles et al. (2009), but will not be described further in this plan.

Metrics

The metrics are selenium concentrations (total selenium, selenate, and selenite) in water and sediments (Section 4.1.3, "Water and Sediment Quality"), and total selenium concentration in biota (plankton, benthic macroinvertebrates, and water column invertebrates such as water boatmen) (Section 4.4.3, "Plankton and Macroinvertebrates").

Available Data Sources/Implementing Partner

Multiple agencies could collaborate to analyze selenium speciation in water and sediments, and in aquatic organisms. Data on concentrations and speciation of selenium in agricultural drains and in brackish water ponds surrounding the Salton Sea is available from Miles et al. (2009) and Saiki et al. (2010).

Locations

Collection of water grabs for selenium speciation would co-occur with water quality grab sampling at central Salton Sea stations SS-1, SS-2, and SS-3; at nearshore stations N-1, N-2, N-3, N-4, N-5, and N-6; at select riverine stations (R-1, R-2, R-3, R-4, R-5); and at drains. Collection of sediment grabs for analysis of selenium speciation would occur at select nearshore stations and would co-occur with sampling for benthic invertebrates. Collection of samples for analysis of selenium in plankton and invertebrates would occur at nearshore stations during sampling for plankton and benthic macroinvertebrates.

Timing/Frequency

Collection of water and sediments would occur annually in the spring. Following the initial two years of sampling for selenium speciation in water and sediments, the frequency of subsequent monitoring could be decreased to once every three years if the data suggest that concentrations are relatively stable. Collection of plankton and benthic macroinvertebrates would also occur annually in the spring.

Methods

Detailed protocols should be developed for collecting water and sediment for selenium speciation, following accepted lab methodology to prevent contamination. In brief, water sample collection will use a pre-cleaned (acid-cleaned) Niskin sampling device or similar. Water from the device will be decanted into a factory-cleaned, high-density polyethylene (HDPE) sample collection bottle. Sample bottles will be placed on ice and shipped to a laboratory for analysis using standard methods (e.g., EPA Method 200.7). Sediment collection will use a pre-cleaned spade to transfer sediments to a traceCLEAN® clean (Teflon-coated) bucket. After sediments become homogenized in the bucket, a sub-sample will be transferred using the same traceCLEAN spade to a traceCLEAN HDPE sediment sampling jar, placed on ice, and shipped to a laboratory for analysis of selenium speciation using standard methods (e.g., EPA Method 200.7). Whole

water samples should be shipped to the laboratory without acid preservation. Preserving samples is recommended only if they have been field-filtered first.

Plankton and invertebrate samples will be collected and analyzed according to Miles et al. (2009). Briefly, zooplankton samples that are collected and concentrated via net-tows (see Section 4.4.3, "Plankton and Macroinvertebrates") will be placed in traceCLEAN jars. Similarly, benthic macroinvertebrates separated from sediments using a sieve, or collected using a device such as a D-ring net, will be rinsed with filtered site water and placed in traceCLEAN jars. These jars will be filled with sterile filtered site water and set aside for 24 hours to allow the invertebrates to purge their guts. Following purging, samples will be sorted, rinsed in deionized water, blotted, and frozen in traceCLEAN jars. Samples will be shipped frozen to a laboratory for analysis.

Analysis

Laboratory analysis of plankton and invertebrate samples will be conducted according to Miles et al. (2009). Once the selenium species concentrations have been calculated, the concentrations will be compared with toxicity guidelines for water, sediments, and aquatic life.

4.2 Geography

4.2.1 Land Cover

Rationale

The purpose of land cover mapping is to measure changes in the distribution and area of natural community types as the Salton Sea recedes and projects are implemented. Tracking the rate and amount of playa exposure is an important metric for compliance with the State Water Board's stipulated order (State Water Resources Control Board 2017). Vegetation is naturally establishing and creating wetlands where direct drains and tributaries discharge onto the exposed playa (Audubon California 2020).

Metrics

The metrics for land cover are area and type of land cover (e.g., open sea, exposed playa, vegetation communities, waterways, agricultural areas, communities).

Available Data Sources/Implementing Partner

Existing National Land Cover Database (NLCD) data sets from 1992 and 2001 are available. In addition, USGS released a new generation of NLCD products named "NLCD 2019" for the conterminous United States, which provides land cover data for the years 2001, 2004, 2006, 2008, 2011, 2013, 2016, and 2019 (U.S. Geological Survey 2021b).

Locations

The study area extends between the Salton Sea shoreline and the 0.5-mile (0.8-km) buffer upslope from the 2003 shoreline, including managed wetlands and wildlife areas. This is consistent with the study area mapped by desktop analysis for the SSMP 10-Year Plan (Cardno 2021). This area will shift as the Salton Sea shrinks and more playa is exposed.

Timing/Frequency

Given the rapid changes observed on the playa, with shoreline recession and the emergence of vegetation, vegetation mapping via remote sensing should be updated annually, and no less frequently than every three years.

Methods

Ortho-rectified multispectral imagery (i.e., RGB, near-infrared, and color infrared) 10-meter-resolution satellite imagery will be collected. Mapping of new emerging vegetation should use imagery obtained during a period that is cooler and wetter and with low cloud cover, which increases the chance for assessing healthy vegetation on the playa (Audubon California 2020).

This imagery will be used to create a Normalized Difference Vegetation Index map for shoreline and nearshore areas of the Salton Sea and to calculate vegetation percent coverage through an object-based image analysis. A Normalized Difference Vegetation Index is a vegetation index that uses near-infrared imagery to determine vegetation characteristics. Vegetation data from ground surveys will be used to ground-truth the object-based image analysis to ensure object accuracy and limit false-positive classifications.

Analysis

The analysis will include tabulating the amount (acreage) of each land cover type of interest, and evaluating trends in distribution and rate of change over time, especially in areas known to have high emissive potential for particulate matter (California Natural Resources Agency et al. 2020). Areas of new and expanding vegetation will be compared with the mapped locations of irrigation drains, ephemeral washes and streams, and perennial streams and rivers. As water availability changes, agricultural practices and land uses may also shift (e.g., from flood irrigation to drip irrigation, changes in crop types, more agricultural lands fallowed), which will influence wildlife use, abundance, and distribution as habitats and resources are altered. Data can be compared to historic data available, and this information can inform siting and methods for additional monitoring, dust suppression projects, and habitat restoration (Audubon California 2020).

4.3 Air Quality

Indicators identified as priorities for air quality monitoring include particulate matter, surface meteorological conditions, and hydrogen sulfide (Table 4-1).

4.3.1 Particulate Matter

PM_{10} and $PM_{2.5}$ Concentrations

Rationale

The objectives of air quality monitoring activities are to characterize existing air quality conditions and emissions sources to provide a baseline against which to evaluate the effects of ecosystem restoration projects on regional air quality.

According to CARB (California Air Resources Board 2021a), PM_{10} and $PM_{2.5}$ often derive from different emissions sources, and they have different chemical compositions. Emissions from combustion of gasoline, oil, diesel fuel, or wood produce much of the $PM_{2.5}$ pollution found in outdoor air, as well as a portion of PM_{10} emissions. PM_{10} also includes dust from construction sites, landfills and agriculture, wildfires and brush/waste burning, industrial sources, windblown dust from open lands, pollen, and fragments of bacteria (California Air Resources Board 2021a).

PM_{10} emissions in the Salton Sea Air Basin are highly correlated to fugitive dust; therefore, PM_{10} is a primary priority metric. $PM_{2.5}$ emissions are highly correlated to combustion exhaust and are not expected to increase substantially from ecosystem restoration projects; therefore, monitoring of $PM_{2.5}$ is a secondary priority.

Metrics

The metrics for PM_{10} and $PM_{2.5}$ concentrations are ambient air concentrations of PM_{10} and $PM_{2.5}$ (micrograms per cubic meter), as well as mass rate emissions (tons of emissions per year), which can be used to estimate ambient air concentrations through dispersion modeling. PM_{10} emissions are highly correlated with fugitive dust from exposed playa and other lands.

$PM_{2.5}$ is a significant portion of particulates only in urban areas where mechanically generated and windblown dust are not significant source contributors.

Available Data Sources/Implementing Partner

The Salton Sea Air Quality Monitoring Network (SSAQMN) was developed collaboratively by IID and CARB to monitor air quality. The SSAQMN is funded by the Quantification Settlement Agreement Joint Powers Authority, made up of San Diego County Water Authority, CVWD, IID, and CDFW. IID has operated and maintained the existing shoreline PM_{10} and meteorological network since it began operation in 2010 (Imperial Irrigation District 2016). The network includes multiple air quality, meteorological, and camera stations operated to monitor and characterize emissions of windblown dust at the Salton Sea. However, note that the SSAQMN is not a regulatory network, and that any regulatory monitoring performed in the area should be conducted under the jurisdiction of SCAQMD or ICAPCD (Humes, pers. comm., 2022). CARB participated only in the design of the network, and EPA was not a party to the design and installation of the SSAQMN (Withycombe, pers. comm., 2022).

Monitoring data for the six permanent monitoring stations are available at the publicly accessible CARB Air Quality Management Information System (AQMIS) (California Air Resources Board 2020). Some data sets for monitors deployed during high-wind events at select field-scale pilot studies adjacent to the Salton Sea are available, with IID permission, at IID's SSAQMP Data Portal (Imperial Irrigation District 2022). The results of high-wind event monitoring are considered a living data set, and additional monitoring locations are expected to be added over time.

Annual reports of the SSAQMP estimate annual and maximum PM_{10} emissions from the playa and adjacent western desert areas (Imperial Irrigation District 2020, 2022). Various technical memoranda provide an overview of data collected by the SSAQMP; an annual analysis of playa exposure at the end of each year, when the Salton Sea is at the lowest point of its hydrologic cycle; and a review of meteorological and air quality data for QA/QC.

Locations

As shown in **Figure 4-2, "Air Quality Monitoring Locations,"** the SSAQMN operates six permanent monitoring stations located around the Salton Sea near existing communities, known emissions sources, or sensitive receptor areas (Case et al. 2013):

- *Naval Test Base*—Located on the west shore approximately 16.5 miles northwest of Westmorland.
- *Salton City*—Located at a Salton Community Services District wastewater evaporation facility.
- *Torres-Martinez*—Located on the Torres Martinez Tribe lands adjacent to a wetlands project being developed by the Tribe.
- *Salton Sea Park*—Located at the California Department of Parks and Recreation's Salton Sea Recreation Area headquarters facility and visitor center.
- *Bombay Beach*—Located on land owned by the U.S. government and managed by the California Department of Parks and Recreation.
- *Sonny Bono*—Located on the Sonny Bono Salton Sea National Wildlife Refuge.

Since 2011, IID has managed five of the six stations. The network also includes five portable stations around the Salton Sea and three portable stations in the desert (Figure 4-2).

DWR is conducting temporary remote site monitoring at specific locations where dust control projects are implemented to monitor the effectiveness at a local scale. Temporary remote site monitoring should continue and should include monitoring at upwind and downwind sites relative to the project location, and the dominant wind vector, to measure pollutant gradients.

Additionally, DWR is conducting temporary remote site monitoring on exposed lakebed sites along the north shore to assess sand transport, meteorological conditions, and PM_{10} concentrations to determine the need for dust control. Temporary remote site monitoring should continue at locations of low and moderate emissivity potential to continuously assess changes in emissivity.

Timing/Frequency

Measurements will be recorded continuously and year-round by automated loggers.

Methods

The permanent stations monitor hourly average mass concentrations of particulate matter and associated meteorological parameters on a continuous basis. At each permanent station, a tapered element oscillating microbalance (TEOM) instrument continuously measures particulate matter concentrations. Partisol instruments may be used to collect filter samples to provide elemental information on the chemical composition of the particles. Meteorological towers, which are about 30 feet tall and measure wind direction, wind speed, relative humidity, solar radiation, and temperature, are installed near each permanent station. The portable and field-scale pilot study meteorological towers are 6-meter stainless steel tripods with anchored guy wires. The portable monitoring stations monitor wind speed and direction at various locations and heights.

SOURCE: ESRI Imagery: 06/08/2021; MapBox, 2020; DWR, 2021; ESA, 2022.

Salton Sea Management Program Monitoring Implementation Plan

Figure 4-2
Air Quality Monitoring Locations

Nonregulatory monitors will be used in the vicinity of the Salton Sea and surrounding areas to monitor long-term trends in fugitive dust concentrations from the implementation of ecosystem restoration projects. Nonregulatory monitors are not used to determine compliance with the national or California ambient air quality standards. They also are not required to meet the Federal Reference Method, Federal Equivalent Method, or Approved Regional Method (Code of Federal Regulations [CFR] Title 40, Part 58, Appendix C), siting criteria (40 CFR Part 58, Appendix E), and QA requirements (40 CFR Part 58, Appendix A). Nonregulatory monitors must be capable of providing data suitable for laboratory analysis and should be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance documentation should be maintained for at least three years. Instruments should be operated in conformance with a QAPP developed and implemented by IID.

Analysis

Hourly PM_{10} data will continue to be loaded onto the publicly accessible CARB AQMIS system within 20 minutes after the end of each hour. After validation, these data will be used by air quality agency staff, researchers, and the general public to assess information about existing PM_{10} levels around the Salton Sea.

Continuously monitored PM_{10} concentrations should be averaged over one-hour periods and provided by IID or its approved contractor CARB for real-time posting on CARB's publicly accessible AQMIS air quality data webpage.

PM_{10} samples should also be collected on filters over 24-hour averaging periods to aid in QA checks of the continuous particulate matter monitoring data.

Secondary priority monitoring of $PM_{2.5}$ data will be continuously monitored and analyzed similarly to PM_{10} data. Additionally, filter samples will be sent to laboratories for chemical (i.e., speciation) analyses, if monitoring is undertaken as a Priority 3 focused study.

Annual reporting of the data should be incorporated into existing annual reports or as stand-alone reports using graphs, tables, and other data analytics easily understood by the general public.

Other Considerations

Environmental constraints and assumptions should be considered when evaluating the success of the monitoring plan and restoration program. For instance, median PM_{10} emissions estimated for exposed Salton Sea playa and the desert for the 2017–2018 monitoring year (Imperial Irrigation District 2020b) are intended to prioritize dust source areas for mitigation but are not approved by ICAPCD, CARB, or EPA as emissions inventories for regulatory purposes. Ecosystem restoration projects at the Salton Sea are not expected to reduce region-wide PM_{10} emissions in the Salton Sea Air Basin to below the national or California ambient air quality standards.

Placement and maintenance of monitoring equipment must also consider engineering and physical constraints. Among these constraints are accessibility by vehicles, availability of power within 100 feet of the site pad, site security in these remote areas, lack of nearby significant land-

surface disturbance (and resultant dust emissions) from human activity unrelated to ecosystem restoration projects, and cell phone reception to upload data.

Further, any management actions and efforts related to the implementation of air quality monitoring and ecosystem restoration projects will need to comply with applicable laws.

PM_{10} Deposition and Chemical Profiles

PM_{10} is not a single pollutant, but rather a complex mixture of solids and aerosols composed of small droplets of liquid, dry solid fragments, and solid cores with liquid coatings, which vary widely in size, shape, and chemical composition (California Air Resources Board 2021a). PM_{10} emissions are derived from different emissions sources, which leads to different chemical compositions.

Rationale

Studying PM_{10} deposition and its chemical profile will characterize existing PM_{10} compositions from Salton Sea playa emissions, which will support the evaluation and management of longer-term conditions and sources, and could inform PM_{10}-related health studies and the development of additional long-term monitoring.

Metrics

The metrics for PM_{10} deposition and chemical profiles are the ambient air concentration of PM_{10} and its chemical constituents (micrograms per cubic meter); mass rate emissions (tons of emissions per year), which can be used to estimate ambient air concentrations through dispersion modeling; and flux (mass of emissions per unit area per second), which can be used to identify areas with relatively higher emissivity.

Available Data Sources/Implementing Partner

IID is using multiple monitoring techniques to identify when a project site requires dust control maintenance activities (augmentation or replacement). Monitoring includes aerial LiDAR, upwind/downwind PM_{10} monitoring for high-wind events, targeted monitoring of sand motion, and visual (video camera) evidence (Imperial Irrigation District 2016, 2022).

The objectives of IID's Emissions Monitoring Program include mapping playa exposure, evaluating characteristics of the playa surface, and measuring the emissions potential of different surface types (Imperial Irrigation District 2016, 2021). IID has continued operation and maintenance of the air quality monitoring network. Annual reports summarize estimated annual and maximum PM_{10} emissions from the playa and adjacent western desert areas; present an analysis of playa exposure at the end of each year, when the Salton Sea is at the lowest point of its hydrologic cycle; and provide meteorological and air quality data for QA/QC (Imperial Irrigation District 2021).

Funding provided by EPA between 2017 and 2018 was used to purchase two stationary and eight portable monitors. The objective was to collect dust samples for constituent analysis. However, the dust samples did not capture very-high-wind events (samples were collected on days when

concentrations did not exceed 150 micrograms per cubic meter). Funding was not available to analyze all samples.

Researchers from the University of California, Riverside, analyzed playa soils, desert soils, and aerosolized PM_{10} collected at the Salton Sea (Frie et al. 2017). Aerosolized PM_{10} was collected at Bombay Beach (August 2015) and Salton City (August 2015 and February 2016) and was compared to 25 playa and 88 desert samples collected from a wide area around the Sea (August 2015 and February 2016). Note that monitoring for aerosolized PM_{10} did not occur during the high-dust season, which typically occurs in April and May. Playa soils were significantly enriched in calcium, sodium, and selenium relative to desert soils. Playa-like and desert-like sources contributed to daily averages of 8.9 percent and 45 percent of PM_{10} mass, respectively. Playa sources contributed to 38–68 percent of PM_{10} sodium. Furthermore, PM_{10} selenium concentrations showed strong seasonal variations, suggesting a seasonal cycle of selenium volatilization and recondensation (Frie et al. 2017). Selenium is a State of California–identified toxic air contaminant with chronic (annual) inhalation and oral risk assessment health values. Calcium and sodium in their elemental forms are not identified toxic air contaminants.

Another study, conducted in 2017 and 2018, analyzed deposited dust at five sites in the Salton Sea Basin for total elemental and soluble anion (a negatively charged molecule) content (Frie et al. 2019). Samples were collected approximately monthly from April 2017 to May 2018, yielding 11 sample sets from four sites and nine samples from one site. Playa emissions in the Salton Sea region were most intense during the late spring to early summer and contained high concentrations of evaporite mineral tracers, particularly magnesium, calcium, and sulfates (Frie et al. 2019). Sulfates are a State of California–identified toxic air contaminant with an acute (one-hour) inhalation risk assessment health value. Sulfates can also be a significant portion of particulate matter emissions. Magnesium and calcium in their elemental forms are not identified toxic air contaminants.

Locations

For PM_{10}, the locations of deposition and chemical profile monitoring will be determined during design of these special studies. However, the Bombay Beach and Sonny Bono stations tend to be affected by high winds off-Sea, and therefore, they are most likely to capture dust from the exposed lakebed. Specific locations of newly exposed playa may also be selected for monitoring by remote site monitors located downwind of the exposed playa.

Timing/Frequency

PM_{10} deposition samples will be collected on a Priority 3 focused study basis, on filters over 24-hour averaging periods. Sampling may be conducted either weekly or less frequently, depending on available funding. The monitoring period should capture the high-dust season (April–May) and filters should be collected during hours when wind velocities exceed local thresholds for windblown dust generation.

Methods

Deposition monitors should be used at the monitoring stations and at downwind sites remote from monitoring stations to quantify rates of particulate matter deposition near the Salton Sea shoreline.

Analysis

The deposited particulate matter should be collected from the monitors at the end of each month and sent to an appropriate laboratory to be analyzed for mass and chemical composition.

Other Considerations

Constraints and other considerations include those discussed previously. In addition, special studies are subject to funding and staffing availability, among other constraints. Partnerships with other research organizations, such as the University of California, Riverside, may be beneficial.

With respect to environmental constraints and assumptions, PM_{10} deposition will likely include a mix of playa, desert (i.e., non-playa), and potentially other particulate matter, such as particulate transported from other areas of the Salton Sea Air Basin and the South Coast Air Basin. Laboratory analysis is constrained by detection limits for various chemicals.

4.3.2 Hydrogen Sulfide

Rationale

Hydrogen sulfide (H_2S) is generated in the Salton Sea by anaerobic decomposition of organic matter. H_2S is a colorless gas with a strong odor of rotten eggs. H_2S is regulated as a nuisance based on its odor, which is detectable around 8 ppb. California's State standard for outdoor levels of hydrogen sulfide is 30 ppb (0.3 ppm) averaged over one hour (South Coast Air Quality Management District 2021). If the ambient air quality standards were based on adverse health effects, it would be set at a much higher level (California Air Resources Board 2021b).

Exposure to H_2S can induce tearing up of the eyes and symptoms related to overstimulation of the sense of smell, including headache, nausea, or vomiting; additional health effects of eye irritation have been reported only with exposures greater than 50 ppm, which is considerably higher than the odor threshold (California Air Resources Board 2021b).

Monitoring for H_2S will allow the public to be notified when an H_2S emission event is occurring. In addition, it will improve understanding of hydrologic and water quality dynamics, including upwelling of H_2S to the surface, oxidation of H_2S to sulfur dioxide, concurrent depletions of DO, and subsequent die-offs of plankton and invertebrates.

Metrics

The metric for hydrogen sulfide is the atmospheric concentration of H_2S (in ppm or ppb).

Available Data Sources/Implementing Partner

In 2013, SCAQMD began monitoring H_2S concentrations at two locations north of the Salton Sea (in Mecca and at IID's Salton Sea Near-Shore station at Torres-Martinez) to notify the public of odor events in the eastern Coachella Valley (South Coast Air Quality Management District 2022c). The SCAQMD *2022 Draft Air Quality Management Plan* shows the annual total number of days with at least one hour that exceeded the one-hour state H_2S standard at the Torres-Martinez and Mecca stations from 2014 to 2020. During this period, H_2S concentrations at the Torres-Martinez station exceeded the one-hour state standard on an average of 38.3 days per year, with a range of 22–68 days, and with most exceedances occurring during the summer months (June–September). During this period, H_2S concentrations at the Mecca station exceeded the one-hour state standard on an average of 6.6 days per year, with a range of two to 14 days; nearly all exceedances occurred during the summer months, most frequently in August or September (South Coast Air Quality Management District 2022a: 7-19 to 7-21).

Locations

Monitors for H_2S could be added to one or more of the six SSAQMN stations around the Salton Sea (Figure 4-2).

Timing/Frequency

H_2S is monitored continuously (hourly).

Methods

Nonregulatory monitors will be used. Nonregulatory monitors are not used to determine compliance with the national or California ambient air quality standards. They also are not required to meet the Federal Reference Method, Federal Equivalent Method, or Approved Regional Method (40 CFR Part 58, Appendix C), siting criteria (40 CFR Part 58, Appendix E), and QA requirements (40 CFR Part 58 Appendix A). Nonregulatory monitors should be capable of providing data suitable for laboratory analysis and should be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance documentation should be maintained for at least three years. Instruments should be operated in conformance with a QAPP developed and implemented by ICAPCD.

Analysis

Should monitoring be warranted, continuously monitored H_2S concentrations will be averaged over one-hour periods and forwarded to SCAQMD for initial QA review and then to CARB.

Hourly H_2S data will be loaded onto the publicly accessible CARB AQMIS system within 20 minutes after the end of each hour. After validation, these data will be used by air quality agency staff, researchers, and the general public to assess information on existing H_2S levels around the Salton Sea. SCAQMD sends public alerts when H_2S levels exceed the one-hour California ambient air quality standard of 0.03 ppm.

Other Considerations

Constraints and other considerations include those discussed previously. In addition, ecosystem restoration projects at the Salton Sea are not expected to significantly contribute to region-wide H_2S emissions in the Salton Sea Air Basin.

4.3.3 Surface Meteorological Data

Rationale

In conjunction with monitoring of ambient air pollutant concentrations, surface meteorological monitoring will allow for evaluations of pollutant transport to support the siting, design, and management of SSMP projects.

Metrics

The metrics for surface meteorological data are as follows:

- Wind direction (U and V vectors at the 10-meter height on each meteorological tower).
- Wind speed:
  - Two- and three-dimensional measurements at the 10-meter height on each meteorological tower, using a cup anemometer.
- Temperature:
  - At the 3-meter inlet to each TEOM instrument.
  - At the 10-meter height on each meteorological tower.
  - At the 2-meter height on each meteorological tower.
- Relative humidity (at the 3-meter inlet to each TEOM sampler and at the 2-meter height on each meteorological tower).
- Barometric pressure (at the 3-meter inlet to each TEOM sampler).
- Solar radiation (at the 1-meter height on each meteorological tower).

Instruments to measure precipitation and evaporation rates will also be installed if these data are needed to support focused investigations.

From the monitoring data, the following meteorological parameters should be calculated by each station data logger and stored:

- Wind direction (scalar and vector at the 10-meter height on each meteorological tower).
- Wind speed (two-dimensional scalar and vector at the 10-meter height on each meteorological tower).
- Sigma theta (standard deviation of two-dimensional wind directions at the 10-meter height on each meteorological tower).
- Delta-T (temperature difference between the 2-meter and 10-meter heights on each meteorological tower).

Available Data Sources/Implementing Partner

Implementing partners include IID in cooperation with ICAPCD (Imperial Irrigation District 2021). Surface meteorological data are currently collected at IID's SSAQMN locations. Meteorological data are also currently collected at monitors deployed during high-wind events at select field-scale pilot studies adjacent to the Salton Sea.

Wind speed scalars at the 1-meter, 2-meter, and 10-meter heights on each meteorological tower were recorded from 2010 through 2017, using cup anemometers. These data were used for the quantification of the roughness height of surfaces surrounding each station, which is needed for plume dispersion modeling if conducted. Because surface roughness does not change substantially over time, the data recorded from 2010 through 2017 are sufficient for surface roughness and no additional data for surface roughness are needed.

Locations

Localized meteorological data should be collected at all permanent and temporary particulate monitoring locations, and should consider collecting data at the North Shore lakebed sites and the Clubhouse sites. Surface meteorological data will be collected at the SSAQMN locations and at monitors deployed during high-wind events at select field-scale pilot studies adjacent to the Salton Sea (see "Locations" in Section 4.3.1, "Particulate Matter," under "PM_{10} and $PM_{2.5}$ Concentrations," for a description of the locations). DWR has recently been installing monitors that continuously record wind speed, wind direction, and temperature at its dust control projects (North Shore and Clubhouse projects, and soon at Bombay Beach and Tule Wash) (Withycombe, pers. comm., 2022).

Timing/Frequency

Surface meteorological monitoring will occur continuously.

Methods

Surface meteorological instruments will be operated in accordance with EPA Appendix IV or in conformance with a QAPP developed and implemented by IID.

Analysis

One-hour-average values should be computed by the data logger at each monitoring station and reported to the publicly accessible CARB AQMIS system within 20 minutes after the end of each clock hour of monitoring. These data should be available for any researcher upon request. Data sets for monitors deployed during high-wind events at select field-scale pilot studies adjacent to the Salton Sea are available for download at the publicly accessible SSAQMP Data Portal.

Other Considerations

Constraints and other considerations include those discussed previously for air quality monitoring.

4.4 Biological Resources

Biological monitoring is focused on birds, fish, and their food sources within the lower trophic levels, including plankton and macroinvertebrates, as well as special-status species that occur in the study area (Table 4-1). Monitoring will characterize the current status of biological resources at the Salton Sea, which can be used to identify trends, guide future management actions, and serve as a basis for comparison to evaluate restoration projects. The seasonal monitoring schedule is summarized in Table 4-1.

To complement monitoring of species and guilds, comprehensive vegetation mapping will be conducted. Although qualitative habitat information will be recorded during species-specific and guild-specific monitoring, updating vegetation mapping via remote sensing (Section 4.2.1, "Land Cover") is recommended annually for the first five years, then every one to three years, as feasible.

4.4.1 Birds

Bird monitoring includes general waterbird surveys along the shoreline; surveys for piscivorous, colonial breeding, marsh, and colonial roosting birds; and surveys for dead and sick birds.

Rationale

As the Salton Sea ecosystem and its functions change, monitoring the abundance and distribution of the bird community will provide insight into important evolving habitats with a predictable sustainability over time. Such monitoring will inform the need for either adaptive management or construction of different habitat types by the SSMP, and will provide a basis of comparison for evaluating the program's effectiveness at benefiting the over-wintering, migratory, and breeding birds that depend most directly on the Salton Sea.

Waterbird Shoreline Survey

Metrics

The metric for the waterbird shoreline survey is abundance (number of birds) by species by season and location. Waterbirds include those species characterized in the Shuford et al. (2000) comprehensive waterbird surveys, which included all shorebirds and other waterbirds except eared grebes, American white pelicans, brown pelicans, double-crested cormorants, American coots, and waterfowl, which were counted in separate aerial surveys.

Available Data Sources/Implementing Partner

CDFW, USFWS, and the Natural History Museum of Los Angeles County performed surveys of waterbirds along the shoreline from 2000 to 2015 by airboat. CDFW focuses on the northern portions of the Salton Sea, while USFWS focuses on the southern portions. Oasis Bird Observatory has conducted weekly bird surveys of the north and central shore since 2014 (Orr et al. 2018). Since 2016, with the loss of boat access, surveys have been conducted on foot and using all-terrain vehicles (Audubon California 2019). Audubon California is conducting monthly surveys, and Point Blue (formerly Point Reyes Bird Observatory) is conducting an annual survey

on one day between November 15 and December 15, covering the Salton Sea shoreline, the impoundments of Sonny Bono Salton Sea National Wildlife Refuge, and the Imperial Wildlife Area–Wister Unit (Przeklasa, pers. comm., 2021).

Responsible entities will be CDFW and USFWS. CDFW and USFWS can work in collaboration with other partners, such as Audubon, Oasis Bird Observatory, or Point Blue, to conduct surveys or supplement data.

Locations

Survey locations should be stratified among geographic areas (i.e., north and south) and habitat zones with consideration of future SSMP projects to provide baseline and/or reference data. Locations correspond with the 19 survey areas used by Point Blue, Audubon, Oasis Bird Observatory, CDFW, and USFWS (**Figure 4-3, "Bird Shoreline Survey Areas"**). As the Salton Sea's shoreline recedes and existing survey areas currently along the shoreline are no longer near the water, these survey areas should be adjusted seaward at a right angle to the shore toward the receding shoreline. Any adjustments in sampling locations should be recorded using a Global Positioning System (GPS) unit.

More locations can be incorporated to capture future SSMP project areas and/or representative habitat areas not already encompassed that could provide additional important information on the composition, abundance, and distribution of avian species and their general use of habitat.

Timing/Frequency

Audubon's current shoreline surveys are conducted monthly. However, should staffing and budget constraints be limiting factors, this frequency could be reduced to five times annually to capture the seasonality of composition, abundance, and distribution during the late winter (January to February), spring migration (March to May), breeding season (February to October), early fall (July to August), and early winter (November to December) to assess variability during each season (Case et al. 2013; Przeklasa, pers. comm., 2021).

Methods

Avian surveys along the shoreline will be based on the methodology presented in *Area-Search Protocol for Surveying Shorebirds along Transects* (Point Blue Conservation Science 2014) for area search transects. For each diurnal survey, surveyors will estimate the number of birds using the shoreline areas (within a 0.1-mile [160-m] buffer). Surveys will be conducted with the aid of binoculars and spotting scopes. In addition, it may be feasible to conduct surveys from the water (kayak) during calm morning conditions at accessible locations along the northeast and northwest shorelines.

SOURCE: ESRI Imagery: 6/8/2021; CDFW, 2020; DWR, 2021; ESA, 2022.

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Figure 4-3
Bird Shoreline Survey Areas

Because boat access has been lost as a result of the declining water surface elevation, surveys are conducted mainly from the shore, with surveyors traveling by vehicle or on foot depending on the area's accessibility (Audubon California 2019). Whether surveys are conducted by vehicle or on foot, care should be taken to avoid disturbing snowy plover nests, as this species and its nests are very cryptic. The location of each surveyed area will be recorded using GPS. All birds observed will be identified to the species level (or the lowest taxon possible) and enumerated. In addition, approximate locations where bird use is concentrated will be identified and recorded to the extent practical using GPS, a combination of GPS and compass bearings (and distance determined using a precision rangefinder) from known locations, or other reliable means.

When feasible, it will also be useful to note the location of birds' actual usage of habitat and the birds' distance to the shore (e.g., within open water, foraging along shoreline, within upland). Qualitative habitat information should be collected and permanent photo points established to detect long-term changes in habitat quality. Important microhabitat characteristics (e.g., deep water, water/shoreline interface, upslope) should also be recorded. During the surveys, prominent habitat features (e.g., islands, isolated snags, levees, pilings and platforms, exposed rocky reefs, exposed sandbars, and shoreline pools) and other environmental attributes (e.g., substrate or vegetation type) that are thought to be important for bird use will be identified and noted and their locations will be recorded. Weather conditions—ambient temperature, wind speed, wind direction, and sky condition—will be recorded at the time of the surveys. The presence of predators (e.g., raptors that may have a direct influence on bird use and their abundance) will be recorded.

Analysis

Survey data will be used to describe bird use (species composition, abundance, and distribution) at the Salton Sea on a seasonal and annual basis, and to assess status and trends over time. Before the sampling, the environmental attributes most likely to influence birds' use of shoreline areas should be identified, and detailed monitoring notes should describe the selected attributes and their correspondence to survey locations to help establish correlates of bird use and other ecological variables. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether the frequency and season of sampling should be refined further. Data collected for areas of concentrated bird use and data for associated environmental attributes (e.g., water depth, roosting locations, preferred substrates) will be used to guide management at the Salton Sea, such as the construction and adaptive management of habitats beneficial to birds.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Aerial Surveys (Piscivorous Birds)

Metrics

The metric for aerial surveys of piscivorous birds is the abundance (number) of piscivorous birds (such as American white pelican, brown pelican, and double-crested cormorant) by species, observation date, and location (transect and survey zone).

Available Data Sources/Implementing Partner

CDFW has performed aerial counts for select waterbirds and waterfowl that may supplement this monitoring activity, but surveys ceased during 2019–2021 (Przeklasa, pers. comm., 2021). Ongoing CDFW aerial surveys have concentrated on enumerating cormorants and pelicans that use open-water areas. Aerial waterfowl surveys performed by USFWS have not included offshore areas (Case et al. 2013).

The responsible entity will be CDFW. CDFW can collaborate with other partners, such as USFWS, Audubon, Oasis Bird Observatory, or Point Blue, to conduct surveys or supplement data.

Locations

Piscivorous-bird surveys will use existing aerial transect locations, which include 26 aerial survey station transect points around the perimeter of the Salton Sea, and four aerial survey zones in the north, south (Finney and Ramer lakes), and east (the Wister Unit of Imperial Wildlife Area) (**Figure 4-4, "Bird Aerial Survey"**). These existing survey points were selected to take advantage of the data collected during previous surveys and can be used as a basis for comparison with future data. As the shoreline recedes, if some of the existing aerial survey station transect points and aerial survey zones are no longer near the water, these point locations and aerial survey zones can be adjusted seaward at a right angle to the shore toward the receding shoreline. Any adjustments in sampling locations should be recorded using GPS.

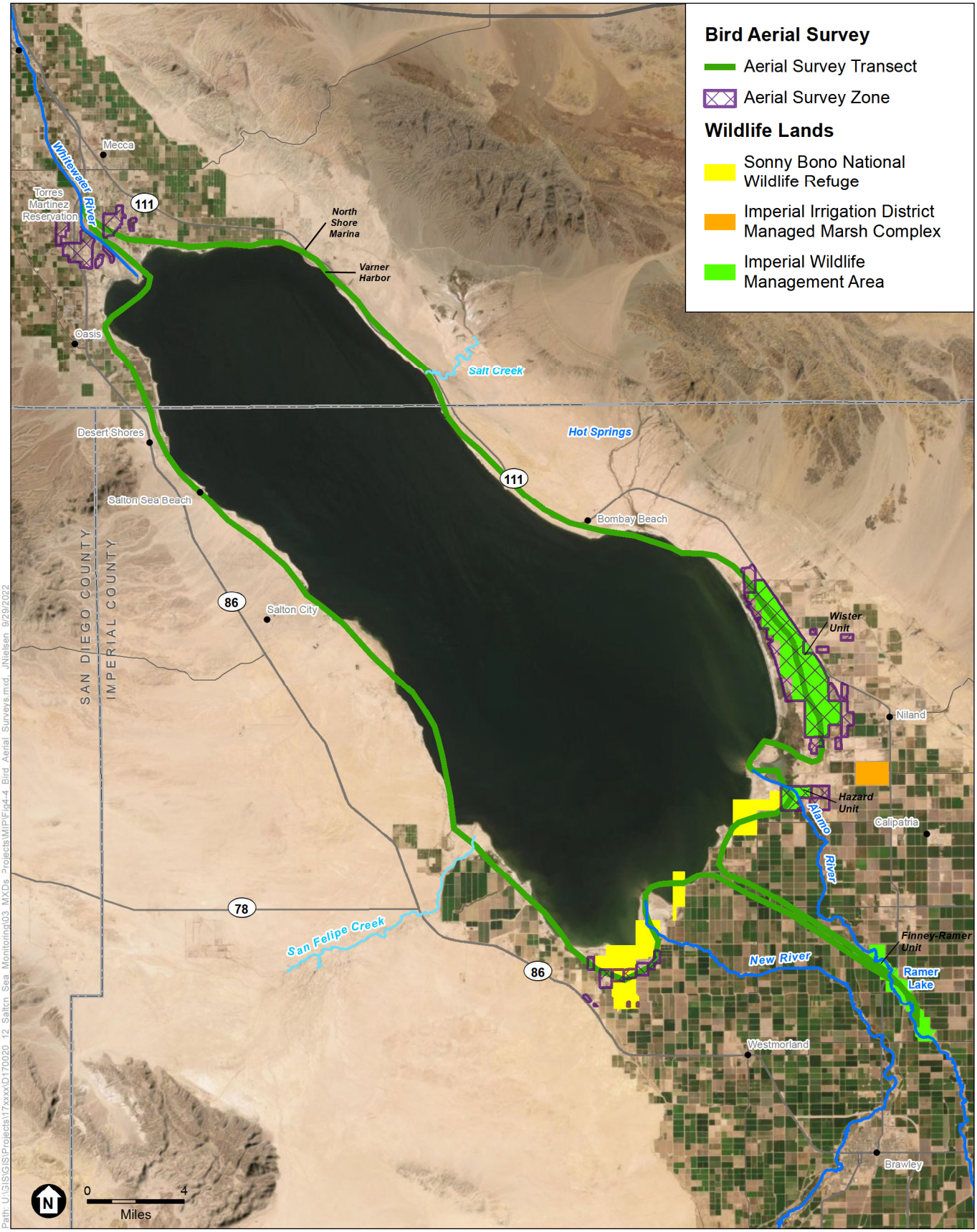
Timing/Frequency

Piscivorous-bird surveys should be conducted five times annually, to capture composition, abundance, and distribution during the late winter (January to February), spring migration (March to May), breeding season (February to October), early fall (September to November), and early winter (December to January), and to assess variability during each season (Case et al. 2013; Przeklasa, pers. comm., 2021).

Methods

Piscivorous-bird surveys will be conducted aerially. Historically, human observers have made observations using binoculars from fixed-wing aircraft (plane). However, if planes or pilots are unavailable, then aerial surveys may be performed by an unmanned aerial vehicle UAV).

From the airport, the plane or UAV will meander across the aerial survey zones along the northern part of the Salton Sea, then continue counterclockwise around the Sea's perimeter along the shoreline to each aerial survey station transect point. The plane or UAV will also meander across the aerial survey zones along the south and east.



SOURCE: ESRI Imagery: 06/08/2021; CDFW, 2020; DWR, 2021; ESA, 2022.

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Figure 4-4
Bird Aerial Survey

For each aerial survey by plane, at least two observers (one counting on each side of the plane) will estimate the number of piscivorous birds observed within a band approximately 300 m on each side of the survey transects (Case et al. 2013). Surveys will be conducted with the aid of binoculars. For aerial surveys by UAV may be performed by an unmanned aerial vehicle (UAV) that records imagery at high resolution with a wide-angle lens. Bird counts would be performed from recorded imagery.

All birds observed will be identified to the lowest taxon possible and enumerated. Transects will be followed using GPS, and the approximate locations of concentrated bird use will be identified to the extent practical using GPS or other reliable means.

In addition to the observations of bird use (species, numbers, and spatial distribution), qualitative habitat information should be collected during the aerial surveys, to the extent feasible. This qualitative information should include important microhabitat characteristics where bird use is observed. It should also include any prominent habitat features (e.g., islands, isolated snags, levees, pilings and platforms, exposed rocky reefs, exposed sandbars, and shoreline pools) and other environmental attributes (e.g., general substrate or vegetation type). Photo points of standardized photographs should also be taken at each aerial survey station transect point and aerial survey zone to detect long-term changes in habitat quality. Weather conditions—ambient temperature, wind speed, wind direction, and sky condition—will be recorded at the time of the surveys.

Analysis

Survey data will be used to describe piscivorous bird use (abundance and distribution) at the Salton Sea on a seasonal and annual basis, and to assess status and trends over time. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether the frequency and season of sampling should be refined further. Data collected for areas of concentrated bird use and associated environmental attributes will be used to guide management, such as the design and creation of habitats beneficial to birds.

It is possible for individual birds to be counted in more than one stratum during coordinated monitoring activities. Thus, the analysis should consider reconciling these counts, or using data from various surveys to supplement each other (without overestimating abundance through duplicative counts), to develop the best estimate of overall bird abundance at the Salton Sea.

Other Considerations

During aerial surveys, there can be challenges in identifying birds to the species level and discriminating birds from other floating objects.

Colonial Breeding-Bird Surveys

Metrics

The metric for colonial breeding-bird surveys is the abundance (number) of colonial breeding birds by species, observation date, and location (transect and survey zone).

Available Data Sources/Implementing Partner

Breeding herons, egrets, ibises, and cormorants were monitored annually by USFWS (Sonny Bono Salton Sea National Wildlife Refuge) between 1986 and 1999 (Molina and Sturm 2004). The Natural History Museum of Los Angeles County has performed long-term annual monitoring of breeding larids (gulls and terns) at the Salton Sea since 1992 (Molina 2004). Monitoring should be coordinated with other efforts carried out by CDFW, USFWS, and Point Blue.

CDFW will be the responsible entity and can collaborate with other partners, such as USFWS, the Natural History Museum of Los Angeles County, Audubon, or Point Blue, to conduct surveys or supplement data.

Locations

Colonial breeding-bird surveys will use the existing aerial transect locations, which include 26 aerial survey station transect points around the perimeter of the Salton Sea, and four aerial survey zones in the north, south, and east (Figure 4-4). In particular, the surveys should focus on habitat with snags or vegetation over water, which may change over time as the water level drops. These existing survey points were selected to take advantage of the data collected during previous surveys, which can be used as a basis for comparison with future data. As the shoreline recedes, if some of the existing aerial survey station transect points and aerial survey zones are no longer near the water, these point locations and aerial survey zones can be adjusted seaward at a right angle to the shore toward the receding shoreline. Any adjustments in sampling locations should be recorded using GPS.

Timing/Frequency

Colonial breeding-bird surveys will be conducted three times annually during the peak of breeding season (February to September), and can be conducted concurrently with piscivorous-bird surveys as timing requirements allow. Surveys performed from February to March target arboreal nesting colonies of great blue herons and double-crested cormorants; surveys in May target herons and egrets, which nest later (Case et al. 2013); and surveys in late May to mid-June capture colonial ground nesters, such as terns and skimmers (Roberts 2022). Conducting multiple counts of a breeding colony during the breeding season is recommended to estimate peak abundance and variability, especially where birds nest in vegetation that may hinder detectability (Pacific Flyway Council 2013).

Methods

Colonial breeding-bird surveys should minimize disturbance of breeding colonies. Because of the extreme conditions at the Salton Sea, disturbance of the colonies by investigators could subject eggs and chicks to exposure and extreme heat, and under these conditions, even relatively short periods away from the nest by adult birds can result in mortality. Thus, the reproductive success of colonial breeding birds should be cautiously weighed against the benefits of the surveys and the potential for increased investigator disturbance of the colonies (Case et al. 2013; Pacific Flyway Council 2013).

Adult birds should not be off a nest more than 10 minutes, the plane should gain altitude if adults flush, and the birds' behavior should be monitored to determine whether a closer approach is

appropriate. Surveyors should exercise caution in the following conditions (U.S. Fish and Wildlife Service 2008):

- Wind-chill temperature is less than 65 degrees Fahrenheit (ºF).
- Conditions are sunny and air temperature is greater than 80ºF.
- Conditions are cloudy and air temperature is greater than 90ºF.
- It is raining or there is a high probability of rain.
- Egg or chick predators are present and appear able to approach exposed nests.
- The majority of the colony is in the nest-building or early-incubation stage.

Colonial breeding-bird surveys to locate nesting colonies will be conducted aerially using fixed-wing aircraft along shoreline and habitat areas, following the existing protocol from *A Monitoring Strategy for the Western Population of Double-crested Cormorants within the Pacific Flyway* (Pacific Flyway Council 2013). As described above for the piscivorous-bird surveys, the plane will travel from the airport and meander across the aerial survey zones along the northern part of the Salton Sea, then continue counterclockwise around the Sea's perimeter along the shoreline to each aerial survey station transect point. The plane will also meander across the aerial survey zones along the south and east. Flight altitudes may range between approximately 150 and 400 m above the colony; however, altitudes may need to be adjusted to comply with local regulations or if flights cause disturbance to the colony (Pacific Flyway Council 2013). For each aerial survey, an observer in the plane will locate nesting colonies. Surveys will be conducted with the aid of binoculars. If fixed-wing aircraft or pilots are unavailable, then aerial surveys may be performed by an UAV that records the imagery at high resolution with a wide angle lens. Data would be recorded and nesting colonies located from recorded imagery. Transects will be followed using GPS, and the approximate locations of concentrated bird use will be identified to the extent practical using GPS or other reliable means. Once a nesting colony is located, high-resolution photos or videos should be taken during aerial surveys for subsequent analysis to estimate the number of breeding pairs, as direct aerial counts can be unreliable. Aerial photographs can consist of a single photo of an entire island or nesting colony (usually using a 50 mm lens) or overlapping, close-up photos of colonies (using a 200 mm or 300 mm lens) (Pacific Flyway Council 2013). The aerial surveys can also be followed by aerial photography surveys via manned (fixed-wing) or unmanned (drone) flights or by ground or boat-based surveys (Pacific Flyway Council 2013, 2018). Qualitative habitat information should be collected, and any prominent habitat features (e.g., islands, isolated snags, levees, pilings and platforms, exposed rocky reefs, exposed sandbars, and shoreline pools) and other environmental attributes (e.g., general substrate or vegetation type) present in areas of concentrated use should be recorded. Photo points should also be taken at each aerial survey station transect point and aerial survey zone to detect long-term changes in nesting habitat quality. Weather conditions—ambient temperature, wind speed, wind direction, and sky condition—will be recorded at the time of the surveys.

When enumerating nests from photographs, two or more independent counts of the image should be conducted. All observed nests will be identified to the lowest taxon possible. If the breeding status cannot be determined from aerial photographs, the location should be visited, if possible, to verify breeding status (Pacific Flyway Council 2013).

Analysis

Survey data will be used to describe use by colonial breeding birds (species composition, abundance, and distribution) at the Salton Sea on an annual basis, and to assess status and trends over time. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether the frequency and season of sampling should be refined further. Data collected for areas of concentrated bird use and data for associated environmental attributes will be used to guide management at the Salton Sea, such as the construction and management of habitats beneficial to birds.

It is possible for individual birds to be counted in more than one stratum during coordinated monitoring activities. Thus, the analysis should consider reconciling these counts, or using data from various surveys to supplement each other (without overestimating abundance through duplicative counts), to develop the best estimate of overall bird abundance at the Salton Sea.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Marsh Bird Surveys

Metrics

The metrics for marsh bird surveys are species composition, abundance, and distribution of marsh birds (such as Yuma Ridgway's rail and California black rail) by habitat type, location, and date.

Available Data Sources/Implementing Partner

The Imperial Wildlife Area is managed by CDFW and consists of three separate management units: the Wister Unit (5,243 acres), Hazard Unit (639 acres), and Finney-Ramer Unit (2,047 acres). Approximately 4,000 acres of the Imperial Wildlife Area are managed as ponds that are seasonally flooded (October through late March or April) to support waterfowl. At the Wister Unit, 700–1,500 acres of permanently flooded impoundments are managed for rails (Case et al. 2013).

The Sonny Bono Salton Sea National Wildlife Refuge is managed by USFWS. About 900 acres of the Refuge are managed as a mosaic of emergent freshwater vegetation and open water. The Refuge has an established program to manage about 200 acres of its freshwater marsh area for Yuma Ridgway's rail (and to a lesser extent, California black rail). About 75 acres are managed as brackish water ponds near the Salton Sea shoreline (called Pond D) for use by gull-billed terns and black skimmers. However, Pond D is fed by irrigation tailwater, which has freshened considerably over the years and has developed considerable growth of cattails and other vegetation on the once-bare islands, making it less attractive for nesting terns and skimmers unless vegetation is removed and the pond is managed as open water (Roberts 2022).

The Refuge also has a pond that will be managed for desert pupfish, which were introduced in 2021. The remaining acreage of freshwater marsh is managed as seasonal marsh for use by waterfowl. This area remains flooded from September through March or April, and for approximately six weeks in the summer to promote vegetation growth to provide forage for waterfowl during the fall (Case et al. 2013).

The responsible entities will be CDFW and USFWS. CDFW and USFWS can collaborate with other partners, such as IID, SCH, Audubon, or Point Blue, to conduct surveys or supplement data.

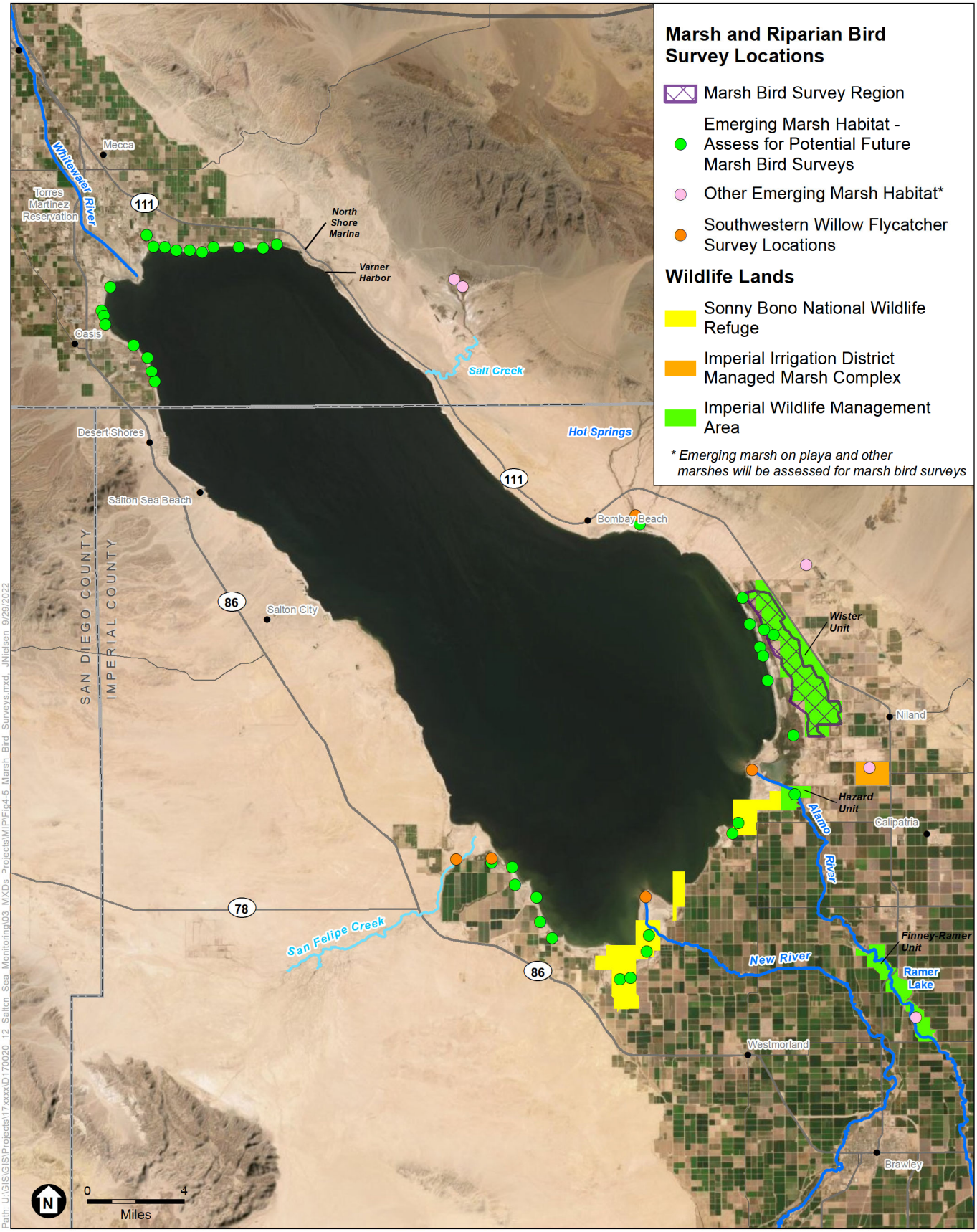
Locations

The proposed marsh bird survey region will include representative survey points of the approximately 80 existing survey points located within the Wister Unit of the Imperial Wildlife Area (**Figure 4-5, "Marsh and Riparian Bird Survey Locations"**), as well as new marsh areas as they are identified and mapped. This existing survey region was selected to take advantage of the data collected during previous surveys and can be used as a basis for comparison with future data. These locations may be selectively thinned out to align with the spacing outlined in the methods below (i.e., 400-meter spacing to minimize the chance of double-counting individuals), and to help distribute marsh bird survey efforts throughout other marsh bird habitat areas that have established surrounding the Salton Sea. As the shoreline recedes, if some of the existing survey points are no longer marsh habitat, these point locations can be adjusted seaward at a right angle to the shore to encompass new areas of marsh habitat that may become established over time. Any adjustments in sampling locations should be recorded using GPS.

Other marsh habitat areas were identified and mapped by CDFW, including managed marshes within wildlife refuges and created habitat (e.g., Imperial Wildlife Area–Wister Unit, Sonny Bono Salton Sea National Wildlife Refuge, IID managed marsh, SCH) and unmanaged marshes at the perimeter of the Salton Sea. Unmanaged marsh areas could be ground-truthed to determine habitat suitability for marsh bird species. Additional survey locations can be used to capture future SSMP project areas and/or representative habitat areas not already encompassed, to provide additional important information on the composition, abundance, and distribution of marsh bird species and their general use of habitat. Based on the locations where other areas of marsh habitat may exist or establish, any additional future marsh bird surveys should be conducted at a randomly selected subset of sampling points along marsh/upland interfaces and marsh/open water interfaces (placed 400 m apart to minimize the chance of double-counting individuals), and where feasible, near SSMP projects.

Timing/Frequency

Marsh bird surveys should be conducted annually during peak breeding season (i.e., March to May). Survey timing should be in accordance with the *Standardized North American Marsh Bird Monitoring Protocols* (Conway 2011). Three replicate surveys should occur, each consisting of a 10-day window, because completing three replicates per season provides data on temporal variation in numbers counted. Each 10-day window should be separated by at least seven days. The first survey should be conducted when migratory passage is over, but before breeding. To estimate trends over time in the number of breeding adults, all three annual surveys should be completed before the initiation of juvenile vocalizations.



SOURCE: ESRI Imagery: 6/8/2021; CDFW, 2020; DWR, 2021; ESA, 2022.

Salton Sea Management Program Monitoring Implementation Plan

Figure 4-5
Marsh and Riparian Bird Survey Locations

The probability of vocalization is typically highest in the hour surrounding sunrise and the hour surrounding sunset. Survey routes can be either morning or evening survey routes, as long as each route is consistently surveyed during the same period (morning or evening) every year. Morning surveys begin 30 minutes before sunrise (at first light) and must be completed within two hours of sunrise, while evening surveys begin two hours before sunset and must be completed by dark.

Methods

Marsh bird surveys should follow the methodology of the *Standardized North American Marsh Bird Monitoring Protocols* (Conway 2011), using broadcast calls to elicit vocalizations, because many marsh birds are secretive, are seldom observed, and vocalize infrequently. Birds observed during a passive period before the broadcasting of calls will also be recorded.

Once the survey area is selected, the surveyor should choose the initial survey point randomly based on all possible locations of marsh/upland interfaces and marsh/open water interfaces, and subsequent survey points should be at regular intervals of 400 m. Some marshes may be more effectively surveyed by boat (with survey points on the open water/emergent interface), others on foot (with survey points on the upland/emergent interface). Surveys conducted on foot typically minimize travel time between adjacent points, reduce trampling of vegetation within the marsh, and may increase the distance at which observers can hear vocalizing birds, given the increased elevation relative to the marsh vegetation.

At each survey point, the surveyor will record all primary species (rails, bitterns, and pied-billed grebe) detected during both a one-minute passive period before broadcasting of recorded calls, and a period in which pre-recorded vocalizations are broadcast into the marsh. The broadcast includes calls of the primary marsh bird species that are expected breeders in that area. The surveyor should record when each individual is detected during any of the initial one-minute passive segments, and/or during any of the one-minute call-broadcast periods. The surveyor should also estimate the distance from each individual bird to the survey point (using the location when it is first detected that birds will approach the call broadcast) to use distance sampling to estimate density for each species in each habitat type. The distance between adjacent survey points should be 400 m or greater to avoid the risk of double-counting individual birds and to increase the total area covered by monitoring efforts in a local area. The use of passive recorders may also be effective to detect marsh birds.

Qualitative habitat information should be collected, and the surveyor should visually estimate the proportion of each major habitat type within a 50 m radius circle around each survey point. Important microhabitat characteristics where bird use is observed (e.g., in water, tules) should also be recorded. Aerial photographs will be used to periodically determine the amount of each major habitat type to detect long-term changes in habitat quality. Weather conditions—ambient temperature, wind speed, wind direction, and sky condition—will be recorded at the time of the surveys.

Analysis

Survey data will be used to describe marsh bird use (species composition, abundance, and distribution) at the Salton Sea on an annual basis, and to assess status and trends over time. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether the frequency and season of sampling should be refined further. Data collected for areas of concentrated bird use will be used to guide management at the Salton Sea, such as the construction and management of habitats beneficial to birds.

It is possible for individual birds to be counted in more than one stratum during coordinated monitoring activities. Thus, the analysis should consider reconciling these counts, or using data from various surveys to supplement each other (without overestimating abundance through duplicative counts), to develop the best estimate of overall bird abundance at the Salton Sea.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Colonial Roosting-Bird Surveys

Metrics

The metric for colonial roosting-bird surveys is the number of colonial roosting birds by species, location, and year.

Available Data Sources/Implementing Partner

USFWS currently completes annual roost surveys for sandhill cranes (Case et al. 2013).

The responsible entity will be CDFW. CDFW can collaborate with other partners, such as USFWS, to conduct surveys or supplement data.

Locations

Monitoring locations for colonial roosting-bird surveys will follow the locations outlined for piscivorous-bird surveys and colonial breeding-bird surveys, and will also be based on the results of past surveys and local information on roosting site locations. Sites can be added if other roosting areas are discovered or changes in roosting behavior are identified. Roosting sites could be located in the shoreline, halophytic scrub, agricultural land, main canals and drains, or created freshwater impoundment geographic strata (Case et al. 2013). Any adjustments in sampling locations should be recorded using GPS.

Timing/Frequency

Colonial roosting-bird surveys will be conducted annually during the wintering season (December to March).

Methods

Colonial roosting-bird surveys will follow the methods outlined for piscivorous-bird surveys and colonial breeding-bird surveys. Once located from aerial surveys, on-the-ground surveys for colonial roosting birds will be conducted based on the methodology of the *Avifauna of the Salton Sea: Abundance, Distribution, and Annual Phenology* (Shuford et al. 2000) for the Comprehensive Shoreline Survey at the Salton Sea to provide an estimate of the number of waterbirds roosting in areas near the Sea on the days of the survey. Bird counts will be taken simultaneously at three to six sites on each survey. At least two observers will be in place 1.5 hours before dusk to count the number of great blue herons, egrets, white-faced ibises, and sandhill cranes that arrive or depart from each site before nightfall. The survey will end either when birds stop arriving or once it becomes too dark to make observations. To calculate the net total use of the roost site while reducing the likelihood of double-counting birds that leave sites before dark to eventually roost at another site, the departures will be subtracted from the total sum of those birds present at the onset of the count and those birds that arrived during the survey.

All roosting birds observed will be identified to the species level (or the lowest taxon possible) and enumerated to estimate the number of roosting birds at individual roost sites. The habitat characteristics of the roost sites and important microhabitat characteristics in locations where bird use is observed will also be recorded at the time of the survey.

Analysis

Survey data will be used to describe use by colonial roosting birds (species composition, abundance, and distribution) at the Salton Sea, and to assess status and trends over time. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether the frequency and season of sampling should be refined further. Data collected for areas of concentrated bird use and data for associated environmental attributes may be used to help identify attributes that support successful roosting, which could inform restoration projects or habitat creation. As water availability changes, agricultural practices and land uses may also shift (e.g., from flood irrigation to drip irrigation, changes in crop types, more agricultural lands fallowed), which will influence wildlife use, abundance, and distribution as habitats and resources are altered. Note that the survey results provide a “snapshot” of bird use on the day of each survey and do not provide precise quantitative estimates of comprehensive bird use at roost sites around the Salton Sea.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Emerging-Habitats Bird Surveys

Rationale

New areas of wetland and riparian vegetation are emerging where water from agricultural drains, ephemeral washes and intermittent streams flow and pool on the recently exposed playa (Audubon 2020). These emerging habitats could augment existing shoreline habitat and support different bird species. Emerging habitats fed by agricultural drains likely receive selenium that is imported in Colorado River irrigation water (Case et al. 2013). The areas around Bombay Beach are of particular interest because the Hot Springs drainage, which is fed by natural hot springs and aquaculture operations upstream, does not carry selenium (Audubon 2020). Monitoring of emerging habitats should be integrated with waterbird surveys along the nearby shoreline. Depending on the growth and succession of the wetlands and aquatic habitat, these sites may merit additional monitoring such as surveys for marsh birds, southwestern willow flycatcher and/or desert pupfish.

Metrics

The specific metrics for emerging-habitats bird surveys include bird abundance by species, season, and location, and habitat characteristics (vegetation composition and structure, extent and character of aquatic habitat features) at each sampling location.

Available Data Sources/Implementing Partner

Audubon has monitored the establishment of these wetland and riparian habitats (Audubon 2020) and waterbird distribution surveyed bimonthly over three years (Audubon 2019, 2020). CDFW has also been mapping general locations of new emergent marsh habitat (Figure 4-5), but these areas need further ground-truthing (Przeklasa 2021). Information about selenium in irrigation drains may be available from CVWD and IID.

CDFW will collaborate with partners such as Audubon, USFWS (southern Salton Sea) and OBO (northern Salton Sea) to conduct surveys or supplement data.

Locations

Monitoring locations (approximately 5-10) will be identified at hotspots of emerging vegetation on the exposed playa, based on remote sensing and land cover mapping that should be updated every 1-3 years (Section 4.2.1 Land Cover). Habitats of interest include temporary ponds, emergent marsh vegetation and riparian scrub vegetation. The emerging habitats around Hot Springs drainage are a priority location. As new patches of robust vegetation are identified, additional sites can be added. Sampling locations will be recorded using GPS.

Timing/Frequency

Vegetation mapping via remote sensing should be updated annually and no less frequently than every three years. Bird surveys will be conducted at least bimonthly and up to monthly during the passerine bird breeding season (February–October). Vegetation surveys will be conducted annually during the first bird survey of the year.

Methods

Emerging vegetation on exposed playa will be mapped via remote sensing (Section 4.2.1 Land Cover). Reconnaissance-level ground surveys will be conducted to characterize these emerging habitats and inventory avian species. Habitat data collection will include presence of water, dominant vegetation species and relative cover, and habitat features and environmental attributes where bird use is observed. All birds observed will be identified to the species level (or the lowest taxon possible) and counted. Photo points will be established via GPS coordinates and photos taken at cardinal compass points to document trends in habitat conditions.

Analysis

Trends in size and location of the emerging wetland habitats, bird diversity and bird relative abundance will be tracked over time. Evaluation of habitat quality will determine whether additional focused surveys are warranted. Locations with more extensive or high quality habitat may then be incorporated into other surveys such as waterbird shoreline surveys, marsh bird surveys, desert pupfish surveys, and/or southwestern willow flycatcher surveys. In addition, the results of these surveys could inform siting, design and management of restoration projects.

Other Considerations

Landowner permission and possibly encroachment permits (on IID lands) may be required for access. Some locations may also be physically inaccessible by vehicle or on foot given the presence of sands, mud, and muck.

Dead- and Sick-Bird Counts

Rationale

Outbreaks of avian cholera, avian botulism, and other diseases once caused massive mortality events, most notably in the late 1990s through the early 2000s.

Metrics

Mortalities will be documented as part of other bird surveys. The specific metrics include the composition, abundance, and distribution of dead and sick bird species to detect outbreaks of disease. This is considered a secondary priority for monitoring.

Available Data Sources/Implementing Partner

CDFW and USFWS currently track bird mortality events at the Salton Sea (Case et al. 2013). The responsible entity will be CDFW. CDFW can collaborate with other partners, such as USFWS, to continue ongoing efforts or supplement data. Mortalities can also be reported by the public via CDFW's Mortality Reporting online form (California Department of Fish and Wildlife 2022).

Locations

Disease outbreaks can occur anywhere in the Salton Sea area and within any of the geographic strata. However, most sick and dead birds have been observed near the river mouths and other freshwater areas around the Salton Sea (Riesz, pers. comm., 2011). Detection of these outbreaks is most likely in the Sea's visible open-water and shoreline areas (Case et al. 2013). Once dead or

sick birds are detected, monitoring will be conducted in the locations where the disease outbreak occurred. Any locations where dead or sick birds are found should be recorded using GPS.

Timing/Frequency

Surveys will be conducted incidentally with other surveys performed to detect disease outbreaks, or will be triggered by any mass-mortality event or reports of multiple mortalities (e.g., by Refuge staff, birders, hunters, or the general public) that may warrant further studies. Once a disease outbreak is detected, the frequency of sampling can be increased as necessary where significant mortality has been detected.

Methods

Incidental observations during aerial surveys would be most efficient and effective way to detect mass-mortality events, given the large area that can be covered in a short amount of time. To the extent feasible, dead and sick birds will be collected, identified to the species level (or the lowest taxon possible), and enumerated. Samples from diseased birds will be retained and analyzed to determine the causal agent and mode of transmission. Access and methodology to retrieve dead or sick birds will depend on location, but will likely be either on foot or via airboat; however, other collection methods can be used as appropriate. Habitat and microhabitat characteristics will also be recorded at the time of the survey.

Analysis

Data from counts of dead and sick birds will be used on an annual basis to describe and assess changes in the incidence of avian disease outbreaks (timing, magnitude, and species affected). These data can be used in combination with data collected from other surveys, such as other environmental attributes that may influence avian health, abundance, and distribution, to identify factors that affect the incidence of avian disease outbreaks at the Salton Sea. Additionally, historic data should be analyzed to determine long-term status and trends over time, and to determine whether sampling frequency should be refined further. This information could be used to guide management activities at the Salton Sea and possibly the construction and management of created habitats.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck. Public reporting of mortalities should also be encouraged via CDFW's Mortality Reporting online form (California Department of Fish and Wildlife 2022).

4.4.2 Fish

General Fish Surveys

At one time, the Salton Sea supported a robust marine sport fishery that included orangemouth corvina, Gulf croaker, and sargo (Hurlbert et al. 2007; U.S. Bureau of Reclamation 2016). Increasing salinity eliminated the marine fishery, leaving only the euryhaline tilapia. Tilapia numbers in the Salton Sea have declined greatly in recent years, as salinity levels exceed 60 grams per liter (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017).

Rationale

Increasing salinity has altered fish community composition and abundance, which in turn has affected several species of piscivorous birds that depend on fisheries resources in the Salton Sea. Information about the spatial distribution, abundance, and size distribution of fishes and the environmental factors that support them would be useful in the design and evaluation of habitat ponds.

Metrics

The metric for general fish surveys is standardized (per unit effort) abundance (number) by species, length, date, and location.

Available Data Sources/Implementing Partner

CDFW performed seasonal gillnet sampling at the Salton Sea until boat launching access deteriorated in 2008 (California Department of Fish and Game 2008). In 2017, CDFW and USFWS conducted gillnet sampling to determine whether the tilapia population was still viable (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017).

CDFW will be the responsible entity, collaborating with other partners to conduct surveys or supplement data.

Location

Six nearshore sampling stations, four of which are at the mouths of rivers, are priority stations (Figure 4-1) (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017). These locations were prioritized from the original set of sampling locations (California Department of Fish and Game 2008; California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017; Keeney, pers. comm., 2021). These stations were selected based on several criteria: the most productive sampling locations, most efficient use of resources and effort, and potential constraints and limitations (e.g., accessibility issues caused by limited boat launch sites, adequacy of boats/equipment, staffing, and/or budget). Additional locations can be added for future constructed habitat ponds (e.g., saline impoundments).

To the extent feasible, sampling locations should be similar in depths and substrates to the locations previously sampled by CDFW during its quarterly gillnet sampling (California Department of Fish and Game 2008). However, this may not be feasible if gear is switched to seines. Sampling locations may be adjusted seaward at a right angle to the shore as necessary to

successfully deploy the nets. Any adjustments in sampling locations should be recorded using GPS.

Timing/Frequency

Each year, biologists should assess the feasibility of fish monitoring at each of the Salton Sea nearshore stations, based on salinity levels. Fish surveys are recommended at least once every three years (triennially) at nearshore stations that have suitable salinity conditions (mainly near inflow streams), and annually in constructed impoundments. Fish surveys should be conducted during the fall (October and November) for better conditions for fish, as summer temperatures may negatively influence fish survey results and the ability to perform surveys.

Methods

Two methods are proposed to provide operational flexibility: beach seining, which may minimize the risk of take for desert pupfish, and gillnetting, which is the traditional method for Salton Sea fish surveys (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017).

Sampling should be conducted by seines deployed from shore or using a small boat. Depending on the length of the seine net and site conditions, two different methods may be used. Nearshore sampling will use a beach seine (e.g., a 3-foot by 10-foot seine with 1/8-inch [3-millimeter] mesh, or similar). Two biologists will each hold a pole attached to one end of the seine net, with the float line on top and the lead-weighted line on the bottom. One biologist will stand near the water's edge while the other biologist will walk perpendicular from the shore into shallow water (no deeper than 3 feet). Both biologists will then walk parallel to the shoreline. At the end of a seine haul (approximately 30 feet depending on site conditions), the nearshore biologist will stop and the offshore biologist will pivot and drag the net toward shore. When the shoreline is reached, both biologists will push the net bottom up onto shore while keeping the float line elevated so captured fish will not escape under or over the net back into the water. For each seine haul, the area sampled will be quantified.

Although beach seining is very effective for nearshore small fishes, it is not as effective for larger, faster fish that tend to use deeper/pelagic water. Thus, a longer bag seine net (e.g., up to 100 feet by 6 feet) deployed via a small boat may be used to sample deeper water and enclose larger areas. This would be an effective method for capturing multiple size classes of bottom-oriented, mid-water, and nearshore species. Additionally, this method (i.e., deployment of a bag seine net via a small boat) may be used if sampling of the nearshore environment is impractical on foot because of substrate conditions such as deep mud.

Alternatively, sampling may follow the previous methodology using gillnets (California Department of Fish and Wildlife and U.S. Fish and Wildlife Service 2017). Sampling by gillnets should be conducted in areas of deeper water only by deploying multi-panel monofilament gillnets (e.g., 6-foot by 30-foot panels) of 2-, 3-, and 4-inch mesh. Because of the potential for desert pupfish to occur in the Salton Sea and its tributaries, mesh size smaller than 2 inches should not be used, to avoid any potential for incidental take of this federally listed and State-listed endangered species. Two nets should be set at all stations at the water's surface, spaced far enough apart to allow a boat to maneuver to set and retrieve the nets (e.g., approximately 100–

200 m). Nets at nearshore stations should be set in 2.5 to 4.5 m of water, typically 200–300 m from the shore. Nets should be set at one or two stations in the morning, then hauled in after approximately 24 hours. The exact number of hours each net is set should be recorded to the nearest quarter-hour.

When the nets are retrieved the following day, fish should be removed. For population surveys, fish will be kept alive in aerated containers of ambient water, measured, and released. For fish caught for selenium accumulation, the fish will be caught and immediately stored on ice to be preserved for tissue analysis. Data for fish, including species and number, should be recorded immediately (i.e., on the day of capture). If any tilapia are caught, the following data should also be recorded: length (fork length), sex, physical condition, and reproductive status. Lengths of fish less than 50 cm should be recorded to the nearest millimeter, and lengths of fish more than 50 cm should be recorded to the nearest centimeter.

At the time of each sampling event or gillnet set and retrieval, data should be recorded for water depth, water temperature, conductivity, salinity, and DO. Qualitative habitat information should be collected. Important microhabitat characteristics in locations where fish use is observed should be noted, and any prominent habitat features (e.g., river mouths, islands, levees) and other environmental attributes (e.g., general substrate or vegetation type) present in areas of concentrated use should be recorded. Photo points should also be taken to detect long-term changes in habitat quality.

Analysis

Catch-per-unit-effort calculated from the catch-and-effort data, or other indices of abundance of fish at the Salton Sea, will be used to assess status and trends in fish populations on an annual basis. Data collected from the fish surveys can be used in combination with other information, such as other environmental attributes and data collected during other surveys, to guide management activities at the Salton Sea. Such management activities may include the design and management of saline waterbodies to conserve fish and wildlife, and the potential inoculation of created ponds with larger fish from the Salton Sea (e.g., tilapia, mollies) that could be a food source for terms and other piscivorous birds.

Other Considerations

Access may be difficult in some locations because of limitations related to boat launching sites. Sampling locations will likely depend on accessibility to the Salton Sea. The timing of fish surveys (summer period, July–August) could be adjusted to be concurrent with other aquatic sampling of plankton, invertebrates, and water quality in the Sea.

4.4.3 Plankton and Macroinvertebrates

Rationale

Phytoplankton form the base of the aquatic food chain and fuel higher trophic levels such as zooplankton and macroinvertebrates. Both the biomass and the composition of the phytoplankton community affect the transfer of carbon to higher trophic levels. If HABs species are present at the Salton Sea, and if they dominate the phytoplankton community, the transfer of carbon to

zooplankton may be interrupted and may instead enter the microbial food web (Rohrlack et al. 1999, 2003).

A goal of the monitoring is to characterize the dominant species and seasonal progression of the phytoplankton community, to understand how well it supports higher trophic levels such as zooplankton and macroinvertebrates, which in turn support the fishes and birds of the Salton Sea (Case et al. 2013). The aquatic community will continue to change in response to increasing salinity, in terms of both species composition and abundance (such as the decline of pileworms and increase in more saline-tolerant species such as brine flies and brine shrimp) and trophic relationships (such as loss of fish predators, change in invertebrate grazers and predators, and effects on phytoplankton community composition and density).

Phytoplankton

Metrics

The metric for phytoplankton is identification and enumeration of taxonomic groups/species via microscopy and biomass via Chl *a* concentration. *In vivo* Chl *a* will be measured fluorometrically via probe (i.e., using a multi-parameter sonde), and *in vitro* Chl *a* will be measured by extracting Chl *a* from filtered samples using standard methods. Sampling for phytoplankton productivity, commonly accomplished using radioactive tracers (i.e. ^{14}C-bicarbonate) to measure carbon uptake, is not recommended under this MIP.

Available Data Sources/Implementing Partner

Previously, Chl *a* was measured by Reclamation using a multi-parameter sonde as part of its water quality sampling, conducted from 2004 to 2020 (Reclamation 2020). Phytoplankton community composition was studied in 1997–1999 by researchers at San Diego State University (Tiffany et al. 2007). No monitoring activities for phytoplankton community composition or biomass are currently underway at the Salton Sea.

Under this MIP, sampling to determine biomass (Chl *a* concentration) and phytoplankton community may be accomplished as part of both water quality measurements and aquatic resources sampling through collaboration among agencies, and with other partners conducting supplemental surveys or special studies.

Locations

Phytoplankton sampling from the Salton Sea will be conducted at the same central stations (SS-1, SS-2, and SS-3) as the water quality sampling. Sampling will be via vessel and will be coordinated with—and occur simultaneously with—the monthly water quality sampling. Vertical profiles of temperature, conductivity, DO, turbidity, and Chl *a* will guide the selection of depths from which discrete grab samples will be collected for extracted Chl *a* analysis and phytoplankton enumeration. Alternatively, set depth strata—0–3 m, 3–6 m, and 6–9 m—can be sampled (i.e., Tiffany et al. 2007).

Additional sampling will occur at the five nearshore sampling stations around the perimeter of the Salton Sea and locations may be selected with consideration of physical accessibility. Nearshore sampling stations will be evenly spaced around the Sea (N-1, N-2, N-3, N-4, N-5, and N-6). As shown in Figure 4-1, there are four nearshore stations where rivers discharge into the Sea, and two nearshore stations are located in the vicinity of Salton City and Bombay Beach. Sampling for phytoplankton from these stations will be co-located with and will co-occur with sampling for zooplankton, macroinvertebrates, and fish when those surveys occur. Sample stations will be identified in the field using GPS.

Timing/Frequency

Sampling will occur quarterly (or less frequently) to capture the seasonal succession of phytoplankton (Hill et al. 2016). High, or atypical, Chl *a* concentrations detected via the monthly water quality monitoring may trigger the collection of additional samples for phytoplankton identification and enumeration during the summer season. These additional samples would be collected as part of the monthly water quality monitoring effort.

Methods

The standard index of phytoplankton biomass is Chl *a* concentration. Chl *a* can be determined fluorometrically *in vivo* via a probe and *in vitro* following the extraction of Chl *a* from filtered samples. Biomass of individual phytoplankton species can also be determined microscopically by enumerating a preserved sample, sizing the phytoplankton, and converting individual species volumes to carbon biomass. Most commonly, microscopic identification and enumeration of phytoplankton is used to determine the composition of the phytoplankton community.

Here, it is recommended that Chl *a* concentrations be measured fluorometrically using a sonde as part of standard water quality profiling, and on discrete samples concomitantly with collection of samples for phytoplankton identification and enumeration. Unusually high Chl *a* concentrations in summer, such as levels indicative of blooms, could trigger additional sampling for phytoplankton identification and enumeration.

As described above, phytoplankton samples will be collected at the open-water stations (SS-1, SS-2, and SS-3) from targeted depths depending on the Chl *a* profile and subsurface maximum, using a Van Dorn/Niskin bottle or similar. Alternatively, water samples can be collected from pre-set depth strata (i.e., 0–3 m, 3–6 m, 6–9 m as described in Tiffany et al. [2007]). Samples for both Chl *a* extraction and phytoplankton identification and enumeration will be collected in duplicate. Samples for Chl *a* extraction will be field-filtered. Filters will be placed into aluminum foil–covered containers (plastic envelope or mini–petri dish) and flash-frozen on dry ice. Filters will be stored frozen until analysis by standard methods (EPA 446.0 or Standard Method 10200 H). Whole water samples for phytoplankton identification and enumeration will be collected in darkened amber glass or HDPE bottles and preserved with Lugol's iodine solution and stored refrigerated for later microscopic analysis (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017b). Samples for Chl *a* concentrations collected from open-water stations can be used to ground-truth and complement remotely sensed Chl *a*.

Samples for Chl *a* and phytoplankton identification and enumeration may also be collected from nearshore stations around the perimeter of the Salton Sea. These stations will most likely be collected from only a single depth. These stations are shallow, potentially well-mixed, and adequately mixed to provide a good estimate of average conditions throughout the water column. Nearshore stations will be sampled using a Van Dorn (or similar) water-collection device from the middle of the water column. Samples will be processed as described above for the pelagic stations. At nearshore stations, additional water quality parameters—temperature, EC, DO, and turbidity—will be collected using handheld sondes. Prominent habitat features and other environmental attributes will also be recorded.

Analysis

Phytoplankton species composition and density will be used to assess status and trends over time. Replicate samples will be used to assess sample variability to compare changes in phytoplankton density over time. The monitoring data collected, in combination with other surveys, will help researchers to identify important ecological variables that affect phytoplankton populations at the Salton Sea and guide management activities, such as the construction and management of created saline impoundments. Educational institutions may participate in taxonomic identification and/or perform analyses of data collected.

Other Considerations

Access may be difficult in some locations because of limitations related to boat launching sites.

If samples for phytoplankton community composition (collected as part of regular quarterly or triggered summer sampling) indicate the presence of high concentrations of toxin-producing HAB species, then samples for algal toxins should also be collected and analyzed (Section 2.2.1, “Hydrology and Water Quality”). If the presence of algal toxins appears to be a persistent occurrence in the Salton Sea, then antibody or DNA techniques could be developed to allow the detection of toxin-producing species from water grab samples.

Zooplankton

Metrics

The metrics for zooplankton are composition, biomass, and density of taxonomic groups by location and date.

Available Data Sources/Implementing Partner

Zooplankton studies were conducted in 1997–1999 in the pelagic Salton Sea at lower salinities (43,000 mg/L) and in 2004 at the USGS/Reclamation saline impoundments (Miles et al. 2009), but no similar monitoring is currently underway. CDFW will be the responsible entity and may collaborate with other partners to conduct surveys or supplement data.

Locations

For sampling efficiency and comparison with phytoplankton biomass and community composition, pelagic zooplankton sampling will be conducted at the same central open-water stations (SS-1, SS-2, SS-3) as the water quality and phytoplankton sampling. In addition,

zooplankton will be sampled at the same nearshore stations as phytoplankton (Figure 4-1). These nearshore stations will be the same as those used for the fish surveys, around the Salton Sea's perimeter. The locations at the nearshore stations will be at depths of 2 m and will include representative sampling stations with consideration of physical accessibility. Sample locations will be identified in the field using GPS.

Timing/Frequency

Sampling will occur quarterly (or less frequently) to capture variations in biota (Hill et al. 2016).

Methods

In pelagic areas, zooplankton can be sampled by performing vertical tows from near the bottom to the Sea's surface using a standard, 80-micrometer mesh zooplankton net or a Schindler-Patalas trap (or other suitable collection device with a known volume) at specific intervals in the water column (Tiffany et al. 2002). A flow meter will be installed in the net to estimate the sampled volume.

In nearshore areas, samples can be collected using a suitable collection device with a known volume (for example, a Schindler-Patalas trap) to collect zooplankton from the middle of the water column; however, an alternative sampling device, capable of sampling the entire water column, could be necessary. Alternatively, samples could be collected by pulling a handheld net through the water at a constant speed for 20 seconds (Miles et al. 2009).

Replicate samples will be collected and analyzed at each station, and all organisms will be identified to the lowest taxonomic level practical. Some species that are difficult to identify could be analyzed as a group. Samples will be preserved for later analysis. An adequate number of replicates will be collected to provide an estimate of sample variability.

At each sampling location, environmental attributes will be recorded, consisting of water depth, conductivity, temperature, DO, and turbidity. Prominent habitat features and other environmental attributes will also be recorded. Water grab samples will be collected near the surface for analysis of phytoplankton and nutrients.

Analysis

Zooplankton community composition and density will be used to assess status and trends over time. Replicate samples will be used to assess sample variability to compare changes in zooplankton density over time. The monitoring data collected, in combination with other surveys, will help researchers to identify important ecological variables that affect zooplankton populations at the Salton Sea and guide management activities, such as the construction and management of created saline impoundments. Educational institutions may participate in taxonomic identification and/or perform analyses of data collected.

Other Considerations

Access may be difficult in some locations because of limitations related to boat launching sites.

Benthic Macroinvertebrates

Metrics

The metrics for benthic macroinvertebrates are species composition, biomass, and abundance of benthic macroinvertebrates by location, substrate, and date.

Available Data Sources/Implementing Partner

Benthic macroinvertebrates were previously studied during the late 1990s by researchers at San Diego State University (e.g., Detwiler et al. 2002; Tiffany et al. 2002). In recent years, Audubon has collected macroinvertebrate data as part of its shoreline bird monitoring.

The responsible entity will be CDFW. CDFW may collaborate with other partners to conduct surveys or supplement data.

Locations

It is unlikely that benthic invertebrates are thriving at the Salton Sea's central pelagic stations because the bottom waters overlying the sediments, and the sediment surface, are anoxic most of the year. Therefore, benthic macroinvertebrate samples will be collected from the nearshore stations (N-1, N-2, N-3, N-4, N-5, and N-6), the same stations as those used for phytoplankton and zooplankton samplings (Figure 4-1). Samples from the nearshore stations will be taken at depths of 2 m, and will be representative with consideration of physical accessibility; the stations will be identified in the field using GPS. In years when fish surveys occur, sediment grabs for enumeration of benthic macroinvertebrates will be collected concurrently at the same nearshore stations for comparison across the aquatic community.

Timing/Frequency

Sampling will occur up to quarterly—and at minimum, annually—to capture variations in biota (Hill et al. 2016; Detwiler et al. 2002).

Methods

Benthic macroinvertebrate samples taken will be collected from soft substrates using a mini-Ponar or Ekman dredge in deeper waters, or a steel corer for very shallow depths (Detwiler et al. 2002). Samples will be taken from the top 10–20 cm of sediment over a known surface area. Samples will be sieved in the field with a 0.5-millimeter mesh sieve and collected for analysis. Hard substrates will be sampled with a scraper (Detwiler et al. 2002) or other suitable collection device, and samples from barnacle shell substrates will be collected using a suitable coring device. Three replicate samples will be collected at each station, to provide an estimate of sample variability. Samples will be preserved in the field with a solution of buffered 3.4 percent formaldehyde with rose bengal added (Detwiler et al. 2002). If specimens are collected only for immediate identification, then 95 percent ethanol may be used. For long-term voucher specimens, a change in solution may be required.

At each sampling location, environmental attributes will be recorded, consisting of water depth, conductivity, temperature, DO, and turbidity. Prominent habitat features and other environmental attributes will also be recorded. Water grab samples will be collected for analysis of phytoplankton and nutrients.

In the laboratory, each sample will be subsampled and organisms sorted from associated debris. Biomass will be estimated. Sediment properties such as particle size, nutrients, and organic carbon will be measured. All organisms will be identified to the lowest taxonomic level practical, and species that are difficult to identify can be analyzed as a group. If necessary for time and cost effectiveness, a smaller number of representative samples could be used for the taxonomy.

Analysis

The composition, abundance, biomass, and distribution of the benthic macroinvertebrate community will be used to assess status and trends over time, as well as any associations with environmental conditions at the time of collection (water quality, sediment, and plankton). Replicate samples will be used to assess sample variability over time and among stations. Monitoring data will help to identify ecological variables that affect populations of benthic macroinvertebrates, which can inform the siting and design of created impoundments. Educational institutions may participate in taxonomic identification and/or perform analyses of data collected.

Other Considerations

Access may be difficult in some locations because of limitations related to boat launching sites.

Harmful Algal Bloom Detection

Rationale

HAB species have the potential to adversely affect the aquatic ecosystem. A toxin-producing HAB species could dominate the phytoplankton community and interrupt the transfer of carbon from primary producers (phytoplankton) to higher trophic levels (invertebrates and fish). In addition, decaying cyanoHAB cells could release toxins into the water, which could harm aquatic life and affect other beneficial uses (Berg and Sutula 2015). The type of HAB species (cyanobacteria, diatoms, dinoflagellates) that may bloom in the Salton Sea is unknown. Identifying the presence, source, and type of HAB species in the Salton Sea is key to developing a strategy for detecting the onset of a bloom and mitigating their occurrence. Mitigating cyanoHABs that originate in the rivers may require different strategies than mitigating HABs that originate in the central Salton Sea.

Metrics

Cyanobacteria contain phycocyanin, which has a unique pigment signature that can be used to detect them via *in vivo* fluorometry (Goldman et al. 2013; Garrido et al. 2019) using an instrument such as the FluoroProbe® (Garrido et al. 2019), and also via ocean color (https://oceancolor.gsfc.nasa.gov/projects/cyan/). Diatom and dinoflagellate HABs are frequently detected via microscopy, and via DNA probes (e.g., Bowers et al. 2000).

Phase 1 will involve a microscopic characterization and confirmation of the types of HAB species present, followed by toxicity analyses if HAB species are successfully identified.

Phase 2 will involve the continued use of microscopy to identify bloom organisms and the development of tools to rapidly detect the presence of HAB species, including *in vivo* fluorometry for cyanoHABs and molecular tools such as DNA probes for dinoflagellate HABs.

Available Data Sources/Implementing Partner

Multiple agencies could collaborate to characterize the type of HABs affecting the Salton Sea and the development of specific tools for rapid detection tailored to the HAB species responsible for the blooms.

Locations

Monitoring for cyanoHAB events will occur in the rivers and at the nearshore. Monitoring for eukaryotic HAB events will occur at the central Salton Sea stations.

Timing/Frequency

Monitoring of HABs will be triggered by visual observation and/or detection of unusually high Chl *a* values (during water quality monitoring) that follow the elevated growth of phytoplankton biomass. There will be no regular monitoring of HABs.

Methods

Monitoring of HAB occurrences should proceed in two phases. The first phase is to identify the species that cause the HABs (i.e., cyanoHAB or eukaryotic HAB) and the toxins they produce. Once that information has been identified, a strategy for the rapid detection of HABs can be implemented. Detection of either type of HAB can proceed using visual, microscopic, fluorescence, or molecular techniques, or a combination of several techniques.

Phase I will involve identifying high-phytoplankton-biomass events, either visually or via Chl *a* measurements, or both. (For example, the water may look like pea soup with strongly reduced transparency, or thick, mat-like accumulations of scum may be present at the shoreline and on the surface.) Samples should be collected for microscopy and toxin analyses directly from the bloom; if samples are at the nearshore and at the mouths of rivers, samples should be collected from the rivers as well.

During Phase II, once the most common type of HAB species has been identified, techniques to rapidly detect their presence in the water should be implemented. For eukaryotic HABs, this could include the development of DNA probes specifically designed to hybridize with portions of the large subunit rDNA sequences of individual HAB species (e.g., Bowers et al. 2000; Goodwin et al. 2005; Diaz et al. 2010).

Analysis

The analysis will involve enumerating and sizing phytoplankton species, and calculating HAB species' dominance as percent composition of the phytoplankton community biomass.

4.4.4 Special-Status Species

Special-status species documented in the Salton Sea area include desert pupfish and numerous birds and reptiles. Monitoring of birds and fish in general is described in Section 4.4.1, "Birds," and Section 4.4.2, "Fish." Additionally, the following special-status birds would be encompassed in the monitoring surveys described in Section 4.4.1, including those for Yuma Ridgway's rail and California black rail (see "Marsh Bird Surveys"), American white pelican and California brown pelican (see "Aerial Surveys [Piscivorous Birds]" and "Colonial Breeding-Bird Surveys"), and gull-billed tern (see "Waterbird Shoreline Survey" and "Colonial Breeding-Bird Surveys").

This section also describes monitoring for desert pupfish and two special-status birds: the southwestern willow flycatcher and the inland western snowy plover. Ongoing ecosystem change coupled with management actions such as playa dust control and restoration projects will likely affect the availability and quality of habitat for these three species. Monitoring species distribution and abundance will reduce impacts by identifying existing populations and habitats, informing project designs, and monitoring the program's effectiveness at benefiting these species.

The construction and management of restoration projects could also affect other special-status species found in the vicinity of the Salton Sea (e.g., Colorado Desert fringe-toed lizard, flat-tailed horned lizard, and burrowing owl). These other species are not dependent on the Sea's aquatic and shoreline habitats. However, data collected via incidental observations during monitoring surveys could help document their distribution and support their conservation, by informing the avoidance and minimization of impacts during management of existing habitats and construction of restoration projects. Before restoration projects are implemented, habitat assessments and appropriate surveys for special-status species with potential to occur (e.g., protocol surveys, preconstruction surveys) will be conducted as needed for project-specific areas.

Desert Pupfish Surveys

The desert pupfish is a federally listed and State-listed endangered species. This fish inhabits limited portions of the Salton Sea near freshwater flows, marinas, freshwater ponds, small tributaries, and irrigation drains, and shoreline pools at the end of the tributaries and agricultural drains (Saiki et al. 2010). Desert pupfish populations in and near the Salton Sea are influenced by changes in water quality, the Sea's water surface elevation, and interactions with non-native fauna species. Water quantity affects populations of this species as well, as habitat desiccation is occurring at scattered locations throughout the Salton Basin as a result of invasive vegetation, climate change, seismic activity, canal lining, and lowering of the groundwater table. Habitat creation associated with restoration may also be affecting populations of desert pupfish.

Metrics

The metrics for desert pupfish surveys are abundance (presence and number) and size distribution of pupfish by survey location within the tributaries and shoreline of the Salton Sea.

Available Data Sources

From 2014 to 2019, CDFW conducted desert pupfish sampling on an annual, biannual, monthly, and more frequent basis (depending on habitat) in several locations. Sampling occurred at

selected drains at the north and south ends of the Salton Sea, the marina and other nearshore areas, washes near Hot Mineral Springs, San Felipe Creek, Salt Creek (lower and upper), and refuge (artificial) habitats (Keeney 2009; Idrisi 2019). Additionally, USGS has performed desert pupfish sampling in drains, ponds, creeks, and created saline impoundments in the Imperial Valley and Coachella Valley (Martin and Saiki 2005, 2009; Saiki 1990; Saiki et al. 2008, 2011).

Implementing Partner

The responsible entity will be CDFW. CDFW can collaborate with other partners, such as USFWS, to conduct surveys or supplement data.

Locations

Desert pupfish sampling stations can be co-located with general sampling stations for fish monitoring near the mouths of the Whitewater River, New River, Alamo River, North Shore Marina, and Salt Creek. Sampling should also include additional locations at San Felipe Creek, Varner Harbor, and Hot Mineral Springs, and numerous drainages along the northern and southern perimeters of the Salton Sea (e.g., CVWD and IID drains) (Figure 4-1). Particular emphasis should be placed on monitoring at emerging wetland habitats where tributaries and drains cross the playa, such as the new interceptor ditch at the south end of the Salton Sea, which has been colonized by desert pupfish (California Department of Water Resources 2017).

Timing/Frequency

Pupfish monitoring will occur three times a year (April through October):

- Spring sampling should occur from April to May and will provide an index of abundance after over-wintering mortality.
- Summer sampling should occur from June to August. This sampling should consider high temperatures, stress from being trapped, and site-specific conditions. (For example, desiccation occurs during the mid to late summer at Salt Creek, so pupfish cannot be sampled at this location at this time.) Summer sampling should be adjusted as appropriate.
- Early-fall sampling should occur from September to October and will provide an assessment of reproductive success and recruitment.

Methods

Desert pupfish surveys will be conducted by qualified biologists approved by CDFW and USFWS. These surveys will be conducted in selected tributaries, irrigation drains, refuges (constructed impoundments), nearshore pools/ponds, and possibly nearshore areas of the Salton Sea. Gillnets typically are lethal to captured fishes and therefore will not be used for desert pupfish surveys. Seining should also be avoided because it is less effective, more stressful to juveniles, and potentially destructive to eggs and habitat (Keeney, pers. comms., 2016).

The preferred capture method is baited non-collapsible minnow traps, specifically Gee's minnow traps (9 inches by 17.5 inches, with 1/8-inch-square mesh and double funnel-mouth entrances) of galvanized steel wire. To enable the capture of juvenile and adult desert pupfish, the mesh size should be no larger than 1/8 inch. Gee's minnow traps are baited with perforated plastic bags

filled with canned cat food. The traps are typically deployed in water at least 9 inches deep, sufficient to cover the entire trap.

Traps are set only during the day for a minimum of two hours, or less if water quality conditions deteriorate (e.g., very low DO, high water temperature). Spacing can be variable given the differences in habitats surveyed, but in the drains, traps should generally be spaced 25–50 feet apart.

Dip netting can also be used, especially in isolated small areas. The fish will be captured carefully to minimize handling stress and exposure to heat, low DO, and crowding. Biologists will maintain the captured fish in water as much as possible during trapping/netting, handling, and transfer for release. The individuals handling fish will ensure that their hands are free of harmful products, such as sunscreen and insect repellent.

The captured fish will be placed in lidded coolers, buckets, or holding tanks that are fitted with aerators to provide well-oxygenated water. Small coolers that are light-colored, lidded, and fitted with a portable aerator are preferred over buckets. Containers should be well-rinsed and free of any chemicals or detergent residues. Biologists will ensure that water quality conditions in the containers used to hold captured fish are adequate, will frequently monitor conditions in the holding containers, and will adjust operations appropriately to minimize fish stress. Containers should be placed in the shade, if possible, to prevent increases in water temperature (California Department of Water Resources 2017).

The surveying biologist will record the specific locations of capture and release, the date and time the trap was set and pulled, water depth, water temperature, DO, salinity (conductivity), turbidity, the species and number of fish captured, and observations of substrate type and vegetation.

Qualitative habitat information should be collected. Important microhabitat characteristics in locations where fish use is observed should be noted. Any prominent habitat features (e.g., river mouths, islands, levees) and other environmental attributes (e.g., general substrate or vegetation type) present in areas of concentrated use should be recorded. Surveys should also specifically assess and document connectivity (or lack of connectivity) to other pupfish habitat. They should also identify whether the habitat is occupied by pupfish, is unoccupied but has the potential to support pupfish, or could have potential with the restoration or enhancement of specific habitat features. Photo points should also be taken to detect long-term changes in habitat quality. Incidental observations of the presence and abundance of non-native fishes and crayfishes should be recorded.

Analysis

Catch data can be used to evaluate the abundance and distribution of desert pupfish in the Salton Sea and its tributaries to assess annual population status and trends. When possible, information on trap efficiency will be developed and used to estimate population sizes in selected habitats.

Data collected from the desert pupfish surveys can be used to guide management activities as the design and management of created habitats. Water quality data, such as selenium in agricultural

drainage, should be integrated into the analysis of environmental attributes that may affect desert pupfish populations.

Other Considerations

Access may be difficult in some locations because of limitations related to boat launching sites and landowners that will not allow access for surveys. Land access to drains will need to be coordinated with landowners (e.g., IID, CVWD).

Southwestern Willow Flycatcher Surveys

The southwestern willow flycatcher is a federally listed and State-listed endangered species. This species inhabits riparian woodland habitat near the Salton Sea.

Metrics

The metric for southwestern willow flycatcher surveys is abundance (presence/number of birds) by survey location and year.

Available Data Sources/Implementing Partner

In 2017, IID conducted surveys for southwestern willow flycatcher in nine locations around the southern portion of the Salton Sea and within potentially suitable habitat south along the New and Alamo rivers (Imperial Irrigation District 2017). Only five locations were within 5 km of the Salton Sea.

The responsible entities will be CDFW and USFWS. CDFW and USFWS can collaborate with other partners to conduct surveys or supplement data.

Locations

Southwestern willow flycatcher surveys will be based on five existing IID survey locations around the southern portion of the Salton Sea (Imperial Irrigation District 2017) (Figure 4-5). Adding future survey locations may be considered, based on habitat mapping of riparian woodland areas at the Sea and surrounding vicinity (Section 4.2.1, “Land Cover”), or as noted during other survey efforts in the Salton Sea area.

Timing/Frequency

Surveys for southwestern willow flycatcher will be conducted each year. At least one survey will be conducted within each of three survey periods (U.S. Geological Survey 2010b):

- *Survey Period 1, May 15 through May 31*—when newly arrived males exhibit high singing rates.
- *Survey Period 2, June 25 through July 17*—when the earliest arriving males may already be paired and are singing less, but later-arriving males are still singing strongly.
- *Survey Period 3, June 1 through June 24*—when migrant willow flycatchers should no longer be passing through the Southwest, and thus, any willow flycatchers detected are likely to be either territorial or non-breeding floaters.

Methods

Southwestern willow flycatcher surveys will be conducted in accordance with the protocol detailed in *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher* (U.S. Geological Survey 2010b). A biologist who holds a permit to survey for southwestern willow flycatcher will begin surveys at first light (e.g., about one hour before sunrise) and end by about 9 to 10:30 a.m. The surveyor will broadcast a series of call-playback recordings, which will generally elicit a response from any nearby territorial willow flycatchers, increasing their detectability. Surveys should be conducted from within suitable riparian woodland habitat (i.e., not from the perimeter unless habitat is inaccessible), while minimizing damage to habitat and vegetation or disturbing any nests.

Qualitative habitat information should be collected. Important microhabitat characteristics in locations where bird use is observed should be noted, and any prominent habitat features and other environmental attributes present in areas of concentrated use should be recorded. Photo points should also be taken to detect long-term changes in habitat quality.

Analysis

Survey data will be used to describe southwestern willow flycatcher use (presence, abundance, and distribution) within riparian woodland habitat at the Salton Sea on an annual basis, and to assess status and trends over time. Data collected for areas of concentrated bird use will be used to guide management at the Sea, such as the construction and management of habitats beneficial to birds.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible given the limited availability of boat launch sites for access by water, and shorelines that cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Western Snowy Plover Surveys

The western snowy plover is federally listed as threatened and is a State species of special concern. However, the “federally threatened” designation applies only to the coastal population of this species, as the inland population (including the Salton Sea population) is not considered listed. The Pacific Coast distinct population segment of the western snowy plover is defined as those individuals nesting adjacent to tidal waters within 50 miles (80 km) of the Pacific Ocean, including all nesting birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries, and coastal rivers (U.S. Fish and Wildlife Service 2011). This species inhabits sandy beaches, salt pond levees, and shores of large alkali lakes, and nests in shallow depressions in sandy, gravelly, or friable soils (California Department of Fish and Wildlife 2014, 2021b). Western snowy plovers feed on insects, such as brine flies, and although many populations of this species migrate, western snowy plovers may remain at the Salton Sea year-round (California Department of Fish and Wildlife 2014), particularly in the north and central regions.

Metrics

The metric for western snowy plover surveys is the abundance (presence and number) of snowy plovers by date and survey location.

Available Data Sources/Implementing Partner

Snowy plover surveys were conducted by Point Blue in 1999 (Shuford et al. 2000).

The responsible entity will be CDFW. CDFW can collaborate with other partners, such as USFWS, Audubon, Oasis Bird Observatory, or Point Blue, to conduct surveys or supplement data.

Locations

Surveys for western snowy plover will be conducted based on potential locations identified during the general bird surveys along the shoreline of the Salton Sea, particularly adjacent to drainages. Locations of particular importance are located along the shoreline around the perimeter of the Salton Sea, including from Iberia Wash south through the northern portion of the Salton Sea Test Base and San Felipe Creek Delta and the shoreline; breached impoundments; and the sand spit paralleling Davis Road and the Wister Unit of Imperial Wildlife Area (Shuford et al. 2000).

Timing/Frequency

Western snowy plover surveys will follow the timing and frequency outlined in the *Avifauna of the Salton Sea: Abundance, Distribution, and Annual Phenology* (Shuford et al. 2000) for snowy plover surveys at the Salton Sea. Surveys of the shoreline should be conducted in winter—specifically, January and November—when plovers are flocking and easiest to detect (and these surveys can be conducted concurrently with the waterbird shoreline survey). The shoreline snowy plover surveys should be conducted again in breeding season, May to June.

Methods

Western snowy plover surveys will be conducted based on the methodology described in the *Avifauna of the Salton Sea: Abundance, Distribution, and Annual Phenology* (Shuford et al. 2000) for snowy plover surveys at the Salton Sea, and in "Using Decision Science for Monitoring Threatened Western Snowy Plovers to Inform Recovery" (Marcot et al. 2021). The coordinates of any nest locations found during breeding season will be recorded using GPS.

Qualitative habitat information should be collected. Important microhabitat characteristics in locations where bird use is observed should be noted (e.g., presence and abundance of wrack for foraging on insects), and any prominent habitat features and other environmental attributes present in areas of concentrated use should be recorded. Photo points should also be taken to detect long-term changes in habitat quality.

Analysis

Survey data will be used to describe western snowy plover use (abundance and distribution) at the Salton Sea on an annual basis, and to assess status and trends over time. Data collected for areas

of concentrated bird use will be used to guide management at the Salton Sea, such as the construction and management of habitats beneficial to birds.

Other Considerations

Landowner access may be difficult in some locations: Permission to access private lands may be required, and even some public lands, such as IID lands, may require encroachment permits for access. Some locations may also be physically inaccessible because areas cannot be traversed by vehicle or on foot given the presence of sands, mud, and muck.

Emerging-Habitats Bird Surveys

Rationale

New areas of wetland and riparian vegetation are emerging where waters from agricultural drains, ephemeral washes, and intermittent streams flow and pool on the recently exposed playa (Audubon 2020). These emerging habitats could augment existing shoreline habitat and support different bird species. Emerging habitats fed by agricultural drains likely receive selenium that is imported in Colorado River irrigation water (Case et al. 2013). The areas around Bombay Beach are of particular interest because the Hot Springs drainage, which is fed by natural hot springs and aquaculture operations upstream, does not carry selenium (Audubon 2020). Monitoring of emerging habitats should be integrated with waterbird surveys along the nearby shoreline. Depending on the growth and succession of the wetlands and aquatic habitat, these sites may merit additional monitoring such as surveys for marsh birds, southwestern willow flycatcher, or desert pupfish.

Metrics

The specific metrics for emerging-habitats bird surveys include bird abundance by species, season, and location, and habitat characteristics (vegetation composition and structure, extent and character of aquatic habitat features) at each sampling location.

Available Data Sources/Implementing Partner

Audubon has monitored the establishment of these wetland and riparian habitats (Audubon 2020) and waterbird distribution, surveyed bimonthly over three years (Audubon 2019, 2020). CDFW has also been mapping the general locations of new emergent marsh habitat (Figure 4-5), but these areas need further ground-truthing (Przeklasa 2021). Information about selenium in irrigation drains may be available from CVWD and IID.

CDFW will collaborate with partners such as Audubon, USFWS (southern Salton Sea), and OBO (northern Salton Sea) to conduct surveys or supplement data.

Locations

Monitoring locations (approximately five to 10) will be identified at hotspots of emerging vegetation on the exposed playa, based on remote sensing and land cover mapping that should be updated every one to three years (Section 4.2.1, “Land Cover”). Habitats of interest include temporary ponds, emergent marsh vegetation, and riparian scrub vegetation. The emerging

habitats around the Hot Springs drainage are a priority location. Sites can be added as new patches of robust vegetation are identified. Sampling locations will be recorded using GPS.

Timing/Frequency

Vegetation mapping via remote sensing should be updated annually, and no less frequently than every three years. Bird surveys will be conducted at least bimonthly, and up to monthly, during the passerine bird breeding season (February–October). Vegetation surveys will be conducted annually during the first bird survey of the year.

Methods

Emerging vegetation on exposed playa will be mapped via remote sensing (Section 4.2.1, "Land Cover"). Reconnaissance-level ground surveys will be conducted to characterize these emerging habitats and inventory avian species. Habitat data collected will include the presence of water, dominant vegetation species and relative cover, and habitat features and environmental attributes where bird use is observed. All birds observed will be identified to the species level (or the lowest taxon possible) and counted. Photo points will be established via GPS coordinates and photos taken at cardinal compass points to document trends in habitat conditions.

Analysis

Trends in the size and location of emerging wetland habitats, bird diversity, and bird relative abundance will be tracked over time. The evaluation of habitat quality will determine whether additional focused surveys are warranted. Locations with more extensive or high-quality habitat may then be incorporated into other surveys such as waterbird shoreline surveys, marsh bird surveys, desert pupfish surveys, and/or southwestern willow flycatcher surveys. The results of these surveys could also inform the siting, design, and management of restoration projects.

Other Considerations

Landowner permission and possibly encroachment permits (on IID lands) may be required for access. Some locations may also be physically inaccessible by vehicle or on foot given the presence of sands, mud, and muck.

4.5 Socioeconomics

The objectives of socioeconomic monitoring (Table 4-1) are as follows:

- Evaluate the effectiveness of public engagement in terms of its accessibility, transparency, and ability to inform the public of the purpose and progress of the SSMP program and projects.
- Track the extent to which SSMP projects provide recreational, educational, transportation, or other community infrastructure and amenities to surrounding communities.
- Track economic conditions in the communities around the Salton Sea to inform the prioritization of management actions.

4.5.1 Public Engagement and Public Perception

Rationale

Evaluating the effectiveness of public engagement—including the degree to which it is accessible and follows a public engagement plan—is important, as such an evaluation may inform further refinements of the public engagement plan. Better public engagement will elicit input that will contribute to the prioritization and refinement of management actions. Monitoring public engagement over time will allow for an evaluation of whether engagement efforts are meeting the intended outcomes. Through tracking of the levels of engagement with different forms of public outreach, outreach and engagement efforts can be adjusted to focus on the techniques that reach the most diverse group of community members. Qualitatively reflecting on public engagement as projects go through design and implementation will allow for an evaluation of whether community input is being incorporated into the design and implementation of projects and how responsive agencies are to public input.

Additionally, it is important to monitor public perception and understanding of the SSMP to measure how well the program is communicated to the public and identify the degree to which the public understands its potential participation in the process. Tracking public values and preferences for the program can help program managers implement project elements that better satisfy stakeholder needs.

Metrics

Specific metrics for evaluating public engagement and perception include assessment of the level (quantity and quality) of participation and a qualitative assessment of public stakeholders' understanding of the program and associated projects.

Available Data Sources/Implementing Partner

No similar comprehensive monitoring activities of public engagement are currently underway at the Salton Sea. The responsible entity for most of these monitoring efforts will be the SSMP Public Outreach Committee. Digital participation activities will be monitored by DWR and the CNRA newsletter host, and shared with the SSMP Public Outreach Committee.

Locations

Digital participation metrics will not be monitored in specific communities; rather, monitoring will occur online through the program website and newsletters as well as Facebook, Instagram, and YouTube.

Timing/Frequency

Participation will be monitored at all meetings and events, the results of which will be included in an annual summary report. Digital participation will be monitored quarterly. Non-digital participation will be monitored as it occurs. Surveys designed to monitor public understanding of the program and projects will be conducted as outreach occurs. The results will be included in an annual summary. Focus groups will be conducted annually.

Methods

The level of public participation will be measured at meetings and events by providing sign-in sheets, conducting head counts, and having staff at meetings or events fill out a standardized questionnaire to characterize participation. The questionnaire may include topics such as the apparent diversity of participants, language translation needs, and ways in which the meeting/event format did or did not facilitate questions and discussion. This information will help to indicate levels of engagement with at-risk and vulnerable populations.

Additionally, engagement with outreach materials should be recorded quarterly. Engagement should be measured by tracking the number of website clicks and visits and the number of clicks on emailed newsletters. Engagement with social media posts can be tracked by briefly reviewing and reporting about the degree of participation and the nature of comments. One community in particular has expressed interest in YouTube videos; if such content is created, the number of views and any comments should be tracked to assess how many people these videos are in fact reaching. Consideration should be given to using non-digital forms of engagement, such as posting printed notices, newsletters, or other communications at community centers, and determining how to track engagement with these formats (e.g., providing a logbook to collect comments or distributing postage-paid comment cards).

To track the public's understanding of the program and associated projects, brief and accessible surveys should be distributed at public engagement events, in newsletters, and on the website. Surveys should be distributed on an as-needed basis as outreach occurs and should be designed to encourage a broad response by asking few or single questions at one time and providing respondents with simple, engaging methods for response (e.g., a slider bar to express agreement or disagreement with a single statement [web-based], the use of physical tools such as Feedback Frames[10]).

Analysis

Data gathered monthly and quarterly (or on a per-event basis) to track participation levels and understanding of the program and associated projects will be presented in an annual report. The annual report will track trends in public participation and analyze the public's understanding of the program and projects. Changes in levels of public participation and the extent to which outreach materials are transparent and assist the public's understanding of the SSMP and associated projects will be analyzed. Feedback collected from the public throughout the various engagement efforts can identify areas of misunderstanding or the need for better outreach and education. Information from the meeting questionnaires will be used to inform outreach and the format of future meetings/events. The report will identify whether clicks/website visits increase after meetings, newsletter blasts, and other outreach efforts to determine whether these efforts drive individual engagement and research online.

An annual summary of survey findings will be developed to track changes in public perception throughout the year. Summaries can qualitatively discuss the level of participation and the nature

[10] https://feedbackframes.com/

of survey responses. The annual report will include recommendations to refine the public outreach strategy based on the findings of public engagement and perception monitoring.

Other Considerations

If needed and if funding allows, focus groups can be recruited from among the Salton Sea communities to assess specific questions regarding public perception and stakeholder priorities. The annual report should identify any needs for this method of data gathering. For instance, longer lead times may be necessary to convene a focus group than for other methods. Other creative methods for assessing public perception and the effectiveness of public education may include sponsoring community and/or school art contests related to interpretations of the Salton Sea's relationship to the community, or teaming with existing organizations to tap into community relationships to gather feedback.

4.5.2 Community Benefits

Rationale

Monitoring of community benefits related to the SSMP and associated projects will document the extent to which community stakeholders are informing project design and projects are addressing diverse community needs and interests. This information will be used to guide community outreach and engagement in the siting, design, and management of future SSMP projects.

Metrics

Monitoring community benefits experienced by the communities around the Salton Sea will involve tracking the direct and indirect community benefits and amenities that these communities experience as a result of the SSMP. This element should track the extent to which projects directly and indirectly create jobs (e.g., number of jobs per project, local hires, job training programs) and include components to increase the following:

- Recreation (e.g., number of parks and amenities, miles of trails).
- Access (e.g., number of physical access points or miles of sidewalk created, populations within one-half mile or a 10-minute walk of amenities).
- Digital access (e.g., number of households provided with high-speed internet).
- Education (e.g., number of wildlife viewing opportunities created, community participation numbers).
- Other community infrastructure that enhances interaction with the Salton Sea and its associated resources.

Other metrics to include are the number of grants pursued and awarded that benefit disadvantaged communities, and the percentage of funding that goes toward disadvantaged communities.

Over time as more data are collected, specific metrics for community benefits may be identified to track annually, such as miles of trails created or number of physical access points created. At this time, predicting which indicators will be the most appropriate to track on a continual basis is premature.

Available Data Sources/Implementing Partner

No similar comprehensive monitoring activities of community benefits are currently underway at the Salton Sea. Monitoring of community benefits will be conducted by DWR.

Locations

Community benefits will be monitored as projects are completed and will occur in local communities around the Salton Sea. The communities included will depend on the size and location of each project.

Timing/Frequency

Monitoring of community benefits will occur at the completion of each project and will be summarized in an annual report.

Methods

Community benefits will be monitored by tracking the local jobs created, number of local hires, and job training opportunities provided by SSMP projects, as well as indirect and induced job creation (as reported by contractors, estimated using IMPLAN multipliers, and checked against data from the California Employment Development Department). This category will also track whether any recreational, educational, transportation, or other community infrastructure and amenities are added or improved by SSMP projects, or by outside funding identified and facilitated by DWR. Infrastructure projects created by SSMP projects or facilitated by DWR will be tracked using DWR project reporting. The metrics used to track project benefits will depend on the community benefits that result from SSMP projects. However, metrics could include number of parks created, number of trees added, number of recreation programs offered and participation levels, miles of trails created, number of educational opportunities created, and number of households provided with high-speed internet. The number of jobs created and the recreational and community infrastructure created by SSMP projects should be evaluated and reported at the completion of each SSMP project. Changes in the use of recreational and community infrastructure created by SSMP projects and/or facilitated by DWR with non-SSMP funding will also be evaluated and reported over time (e.g., annually).

Funding and investments in communities should also be monitored, with annual reporting of grants pursued and awarded, funding received, and funding invested in disadvantaged communities for the benefit of at-risk and vulnerable populations. These data can help monitor statewide goals for investment and capacity-building in disadvantaged communities.

Analysis

The community benefits provided by SSMP projects and/or by outside funding facilitated by DWR should be analyzed to determine whether the SSMP projects and DWR are increasing recreational access and other community benefits and infrastructure. This annual report should consider whether public engagement efforts are informing project design and the inclusion of community benefits in the project design.

Other Considerations

DWR may be able to leverage/connect with non-SSMP funding opportunities to create and monitor recreation and community access benefits even if bond funding for SSMP projects cannot be used for recreation or public access projects.

4.5.3 Economic Indicators

Rationale

Gathering data on economic indicators will allow the SSMP to establish existing economic data for the communities around the Salton Sea and track economic indicators. Near-term implementation of management actions to control dust and restore habitat is not expected to directly and measurably affect these parameters; however, information about general economic conditions will provide better context for understanding the economic needs and overall socioeconomic health of the communities surrounding the Salton Sea. This context will inform the prioritization and implementation of management actions. This is especially relevant because economic status, particularly low-income conditions, and exposure to greater pollution levels are correlated with higher mortality rates (California Office of Environmental Health Hazard Assessment 2021).

Metrics

Metrics used to track economic conditions in the communities around the Salton Sea include median income, poverty, employment, and use of public assistance (Supplemental Nutrition Assistance Program [SNAP]).

Available Data Sources/Implementing Partner

No similar comprehensive monitoring activities for economic indicators are currently underway at the Salton Sea. Monitoring of select economic indicators will be conducted by DWR. The data source used for economic indicator monitoring will be the American Community Survey five-year estimates produced by the U.S. Census Bureau.

Locations

Monitoring will occur at the census tract level in communities around the Salton Sea.

Timing/Frequencies

Economic indicators will be tracked biennially, as the indicator data will not change quickly and the American Community Survey five-year estimates will include some overlap.

Methods

Data from the U.S. Census Bureau's American Community Survey five-year estimates will be used to determine all of the following:

- Median household income.
- The percentage of people with family incomes below the poverty thresholds.

- The percentage of people with family incomes below 200 percent of poverty thresholds (a common economic indicator for high-cost-of-living states such as California).
- Housing-burdened low-income households, who earn less than 80 percent of area median family income by county and pay greater than 50 percent of their income to housing costs.
- Homeownership and renters, as homeownership provides opportunities for building wealth and financial stability.
- Education level, as the potential for financial stability and access to opportunities is greater for individuals with higher education levels.
- Percentage of unemployment.
- Percentage of families using public assistance (SNAP).

Analysis

A report will identify changes in economic indicators and make recommendations regarding whether the observed changes should inform the prioritization of management actions.

CHAPTER 5
Data Management

5.1 Data Management Purpose and Approach

The data from monitoring activities will range widely in complexity, format, and size: from geospatial databases containing large volumes of longitudinal data, to tabular data with both quantitative and qualitative measures, to written reports, maps, photos, and other types of documents and images. The purpose of the data management guidance and recommendations in this chapter is to ensure that these large, diverse data are stored and maintained accurately and sustainably over time, using consistent collection methods and QA protocols, common data standards, and interoperable data structures and storage formats.

SSMP leaders and researchers will need to integrate data collected by a range of public agencies and partner organizations, and it is important to maintain the historical continuity of much of the data. Therefore, the program will be best served by establishing a cloud-based data hub that provides centralized access to all data while maintaining distributed ownership of many individual data sets. Common data standards must be put in place at the start for use throughout the data collection, dissemination, and archiving processes. A single authoritative system of record (see Section 5.3.2, "Data Sets from New Monitoring Activities") must be identified for the data associated with each indicator and metric. In addition, unique identifiers and other key relational fields (e.g., location information, collection dates, units of measure), along with standard documentation requirements, must be established and included consistently across all data sets. Such systems and standards will facilitate user access to the full range of indicator data, integrated data analysis, and transferability across data management platforms.

To carry out this work, the SSMP will need to invest in personnel for ongoing data stewardship and interagency coordination, and in technology to build and maintain a central data hub.

5.2 Data Management System Requirements and Best Practices

5.2.1 Open-Data Requirements

The California Open Data Policy and the Open and Transparent Water Data Act (Assembly Bill [AB] 1755) set forth requirements and guidelines for making State data publicly available through centralized online data portals. AB 1755 provides additional guidance specific to water-related data. These open-data requirements include protocols for data sharing, documentation, and QC. They also include protocols for developing open-source platforms that allow users to search quickly through hundreds of data sets based on keywords, view simple

descriptive information, and visualize and download data. To meet open-data requirements, the State operates the California Open Data Portal (https://data.ca.gov/), which includes the CNRA Open Data platform (https://data.cnra.ca.gov) to hold data managed by CDFW, DWR, and other CNRA subsidiary agencies. Most data collected as part of the MIP will be subject to California open-data requirements.

5.2.2 Systems of Record

A "system of record" is the database or data management system that houses and serves as the authoritative source for a given data set. The purpose of establishing a system of record is to maintain and update data accurately and consistently to ensure a "single source of truth" for data used by multiple different entities.

As detailed in Section 5.3.1, "Existing Data Sets and Repositories," the system of record for many MIP indicators is already established as a State or federal agency database. In those cases, it will be important to maintain data continuity using the agency's existing data standards, structures, and formats as the starting point for the MIP metrics, then make enhancements as needed to support SSMP data integration. If there is not a preexisting system of record for a MIP indicator, one should be established.

Each system of record should have a designated staff person who serves as data steward responsible for QA and maintenance of the data sets housed in that system. Further, documentation for each indicator of standards and practices for data collection, QA, and management should be stored together with the data in the designated repository for that indicator. The SSMP should maintain a master list of systems of record for each indicator with data steward contact information.

5.2.3 Data Standards and Metadata

Data standards describe how a data element is defined, measured, and organized; its units, data structure, field naming conventions, and formats; and other features that assure all users will have a common understanding of what the data represent and how to maintain the data element accurately over time. A well-functioning SSMP data management system will require establishing data standards for each indicator and metric, and for key data fields, metadata documentation and QA practices that will be implemented systemwide to support data integration and interoperability.

As referenced above, some MIP indicators are continuations of existing data collection efforts for which data standards are fully developed, while standards need to be created for other indicators. In addition, a systemwide data dictionary should be created to provide standards for metrics and fields that are common across data sets. Unique identifier fields will need to be added to data sets so they can be cross-referenced and joined based on geographic areas, projects, and other key relational elements (**Table 5-1**). Where standards for the same data elements are not aligned across systems of record, a single SSMP standard should be developed and incorporated into system-of-record data structures to support SSMP data integration.

TABLE 5-1
EXAMPLES OF SYSTEMWIDE STANDARD DATA FIELDS

Monitoring Element	Collection Location (lat/long)	Publication Date
Indicator type	Collection date and time	System of record
Metric name	Update frequency	Database location
Project name/code	Datum and projection (for spatial data)	Data steward contact information
Unit of measure	Collected by (name, organization)	Data confidentiality/access restrictions (if any)

NOTE: lat/long = latitude/longitude

SOURCE: Data compiled by Environmental Science Associates in 2022

Standards that are updated or newly developed for each indicator and metric should conform with State and national data standard guidelines, such as those described by the Federal Geographic Data Committee and State agencies (e.g., CDFW Biogeographic Information and Observation System [BIOS] Metadata Guidelines, DWR Spatial Data Standards).

5.2.4 Quality Assurance Practices

This MIP describes detailed methods and protocols for data collection specific to each monitoring metric: measurement procedures and equipment, prescribed locations and frequency of observations, and data assessments/statistical tests to identify possible errors or biases in the data. These data quality standards and protocols should be documented in a consistent format and stored with the data and should be summarized in metadata for each metric. Any preferred reporting formats and data visualizations should also be included in this documentation.

In addition to QA/QC procedures applied during the data collection process for each metric (e.g., calibration of equipment), general QA checks should be applied by system-of-record data stewards before and after the data are transferred into authoritative data repositories. Such checks include confirming that fields follow standard naming conventions and formats, all data have valid values/codes, geographic locations (and projections for spatial data) are correct, etc. This QA process should be followed by a final QC check before the data are linked or uploaded to the SSMP's central data hub, particularly to ensure that key unique identifier relational fields are included and the data are in permitted compatible formats. Initially, the SSMP master data steward may need to run these QC checks manually, but the SSMP should work toward the development of automated QC tools that can be run within the data hub.

5.3 Data Types and User Needs

5.3.1 Existing Data Sets and Repositories

The SSMP data hub will need to be able to manage common file formats containing geospatial and tabular databases, text documents, maps, photos, and other graphics. As shown in **Table 5-2**, much of the monitoring activity to be conducted is a continuation of activity already underway by State and federal agencies with established data standards, structures, and storage repositories. For example, CDFW operates BIOS, a data warehouse that holds authoritative data sets on

special-status species and many other environmental and biological resources in California; and USGS operates the National Water Information System, which collects and distributes real-time streamflow information and other authoritative water data. Some of these data sources are already set up with web services or other application programming interfaces (APIs) that provide open access to pull the data into other systems. Others have more limited data exchange capabilities and will require API development or the use of manual procedures to be uploaded and refreshed in their respective systems of record.

TABLE 5-2
MONITORING INDICATORS BY LEAD IMPLEMENTING PARTNERS

Implementing Partner Currently Monitoring	Resource Category	Indicators
U.S. Geological Survey	Hydrology	Inflow—rivers
		Lake elevation
U.S. Bureau of Reclamation	Water Quality—Surface Water	Dissolved oxygen
		Nutrients (nitrogen, phosphorus)
		pH
		Salinity
		Selenium
		Temperature
		Total suspended solids
		Total dissolved solids
		Turbidity
California Department of Fish and Wildlife	Biological Resources—Fish	General fish species composition, abundance, and distribution
	Biological Resources—Special-Status Species	American white pelican, brown pelican
		Burrowing owl
		Desert pupfish
		Gull-billed tern
		Yuma Ridgway's rail, California black rail
	Biological Resources—Birds	Colonial nesting birds
		Dead and sick birds
		General bird species composition, abundance, and distribution—shoreline area survey
		Marsh bird surveys
California Department of Water Resources (with Desert Research Institute)	Air Quality—Dust Control	PM_{10}, sand transport, and meteorology
Imperial Irrigation District	Hydrology	Groundwater levels
	Water Quality—Surface Water	Dissolved oxygen
		pH
		Salinity
		Selenium
		Temperature
		Turbidity
	Geography	Land cover
		Playa area extent
		Playa emissivity potential
		Surface characteristics

Implementing Partner Currently Monitoring	Resource Category	Indicators
	Air Quality	Ambient air quality (particulate matter) Meteorology/climate
	Biological Resources—Special-Status Species	Southwestern willow flycatcher
South Coast Air Quality Management District	Air Quality	PM_{10}, $PM_{2.5}$, hydrogen sulfide (odor), meteorology
Imperial County Air Pollution Control District	Air Quality	PM_{10}, $PM_{2.5}$, meteorology
Audubon California	Biological Resources—Birds	General bird species composition, abundance, and distribution—shoreline area survey
Oasis Bird Observatory	Biological Resources—Birds	General bird species composition, abundance, and distribution—shoreline area surveys and offsite fish farms/duck clubs within 5 kilometers of the Salton Sea
Unspecified	Hydrology	Hydrodynamics Inflow—direct drains Inflow—small tributaries (San Felipe Creek, Salt Creek)
	Water Quality—Surface Water	Groundwater quality Other contaminants (not selenium)
	Biological Resources—Plankton and Macroinvertebrates	Macroinvertebrates (benthic) Microbial loop Phytoplankton Primary productivity (chlorophyll *a*) Zooplankton
	Biological Resources—Special-Status Species	Flat-tailed horned lizard Western snowy plover (inland)
	Biological Resources—Birds	Colonial roosting Piscivorous-bird species composition, abundance, and distribution—aerial survey
	Socioeconomics	Community benefits Economic indicators Public participation at SSMP events

NOTES: $PM_{2.5}$ = particulate matter 2.5 micrometers and smaller in aerodynamic diameter; PM_{10} = particulate matter 10 micrometers and smaller in aerodynamic diameter; SSMP = Salton Sea Management Program

SOURCE: Data compiled by Environmental Science Associates in 2022

5.3.2 Data Sets from New Monitoring Activities

For newer monitoring efforts lacking established lead agencies and data management systems, the SSMP should determine whether these data are appropriate for CDFW, DWR, or other existing State or federal systems to store and manage in the long run as authoritative data. A key question is whether there will be data sets that will not have an authoritative owner beyond the SSMP, and then what data repository the SSMP will use for such data. For all new (and preexisting) data sets, the SSMP should take the lead to ensure that a standard data structure is developed for each

metric, including standard fields and unique identifiers to support cross-referencing and data integration, and that data formats and metadata comply with California open-data requirements.

5.3.3 Data User Needs

MIP data users include scientists carrying out and analyzing the findings of monitoring activities, as well as SSMP staff, State and local public officials, environmental and community organizations, local residents, and other stakeholders working to protect regional health and ecology. These users will have many potential data management needs over time.

The most immediate, fundamental need is for a well-organized data repository that provides ample storage and easy access to individual data sets that have undergone QA and are well documented, with varying user access levels available. Users should be able to view and download data held in all systems of record for MIP indicators, primarily via connections to web services or other APIs that pull data from those systems. Users should be able to search data by standard search keys (e.g., indicator type, location, agency) and to do custom searches. The system should also have functions for system-of-record data stewards and other registered users to upload new data, with protocols for the SSMP master data steward to quality-check and approve the data before they are published for broader use. A key outstanding question is whether some of the MIP indicator data will require the SSMP to have its own independent data repository, or whether all data will have a designated system of record within an existing authoritative system, such as CDFW BIOS.

Once common standards and a data repository are established to ensure the coordination of the most immediate data collection activities, the SSMP should undertake a user needs assessment to determine additional priority user needs and create a longer-term strategy for custom system development. Additional functionalities envisioned for a complete SSMP data management system include automated tools for quality assessment, visualization, and reporting, including for longitudinal and integrated data analysis; display of real-time monitoring data (e.g., air quality sensor data related to performance of the planned dust suppression projects); and public-facing report dashboards.

5.4 Development of a Central Data Hub

5.4.1 Cloud-Based Data Portal

A centralized SSMP data hub should be cloud-based, with API integration capabilities to provide direct access for all stakeholders to access all data sets (with secure access restrictions as appropriate). Although further assessment is merited to determine whether it can deliver all SSMP-critical functions at this stage, ArcGIS Hub by ESRI appears offers the core capabilities needed for an initial SSMP data repository. Further, ArcGIS Hub is aligned with the systems already used to operate State of California open-data portals, and it could be launched quickly by leveraging existing CNRA, CDFW, or DWR hosting capabilities and building on technical protocols already established by those agencies.

5.4.2 Dedicated Data Stewards

Dedicating staffing resources to data management—preferably with a full-time position within the SSMP leadership team to serve as the master data steward—is essential to building a successful data management system in a timely manner. A master data steward is needed to convene partners, then develop and manage implementation of an action plan to create a central data hub, including documenting and disseminating systemwide policies and standards. The master data steward is also needed to coordinate the entry of data into the central hub, ensure that QA/QC procedures are followed, and manage technology system maintenance and updates over time. In addition, each system of record must identify a data steward responsible for QA/QC and maintenance of the data for each indicator and the services and workflows that feed data to the central hub.

5.4.3 Technical Workgroup

Building a central SSMP data hub requires significant technical coordination up front to develop the common data management policies and standards and the data sharing agreements needed to operate consistently across multiple organizational entities. The immediate establishment of a technical workgroup is recommended, to bring together representatives from State and federal agencies and other data collection and research partner organizations, with the charge to do all of the following:

- Confirm or identify the system of record for each critical data set.
- Examine existing data standards for MIP indicators and recommend SSMP common data standards needed to harmonize and cross-reference information across different data types and repositories.
- Assess the suitability of ArcGIS Hub and develop an implementation action plan with CDFW (or another host agency).
- Work with data stewards of each system of record to update data structures, develop APIs, and create data sharing agreements as needed to support access through the centralized data hub.
- Develop and disseminate QA/QC standards and practices.
- Oversee a user needs assessment to determine requirements for building additional data management system capabilities to support visualization, analysis, progress tracking, and reporting.
- Provide ongoing technical guidance and interagency coordination to support the SSMP master data steward.

5.4.4 Data System Maintenance and Reporting

The SSMP data management system should be reviewed annually to confirm that standards are being applied consistently, data sets have been updated with their expected frequency, and appropriate technology updates have been installed. Annual reviews can also provide an opportunity to identify and plan for any changes, additions, or retirement of existing metrics and data sets. A summary of the findings of the annual review should be published in an annual data management progress report.

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CHAPTER 6
Assessment, Reporting and Adaptive Management

6.1 Monitoring and Adaptive Management

Adaptive management is an iterative and flexible decision-making process for ongoing knowledge acquisition and evaluation leading to continuous improvements in planning, implementation and monitoring of projects to achieve objectives. Adaptive management entails obtaining feedback between management practices and monitoring of responses in the ecosystem, to measure the success of management actions and fine-tune future actions accordingly (Case et al. 2013). In practice, science is used to design the actions, and then monitoring results are provided to the managers overseeing restoration so that adjustments can be made if needed. This feedback works best when restoration actions are designed, with input from scientists, as experiments whose outcomes can be predicted and then measured.

The MIP provides a framework to measure status and trends of key components of the rapidly changing Salton Sea ecosystem. The MIP also provides guidance for project-specific monitoring plans to use standardized methods that facilitate comparisons across projects for larger-scale analysis, synthesis, and evaluation efforts. Employing comparable approaches to monitoring allows for a more integrative assessment of the system-wide effects of management and restoration. Information from system-wide monitoring (outlined in the MIP) as well as project-specific monitoring (to be developed for individual projects) will inform adaptive management actions at project sites, plans for future projects, system-wide goals, and updates to the conceptual models that guide management and restoration in the system.

6.2 Salton Sea Science Program

The SSSP is recommended as a science entity to coordinate collection, analysis, assessment and integration of relevant and timely ecological information for management of the Salton Sea ecosystem. The SSSP will address high priority management and policy science needs to meet the purposes of, and fulfill responsibilities under, State and Federal regulatory requirements. The establishment, responsibilities, and activities of such a program would be determined subject to the availability of funding.

This proposed work will be accomplished through collaborative, scientifically sound monitoring (as outlined here in the MIP), focused studies, modeling, and data synthesis within an adaptive management framework. The SSSP will foster sharing of data, information, equipment, expertise and resources with the Salton Sea science community and implementing partners. This will allow

for gains in efficiency, resource availability and expertise. This includes reviews of current studies and programs to improve methods, the value of data collected, and the contextual setting of Salton Sea environmental monitoring.

The SSSP will rely upon multidisciplinary teams of agency, academic, non-governmental organizations (NGO), and other scientists to accomplish its mission. The SSSP can build off previous collaborative science efforts at the Salton Sea, such as the comprehensive studies conducted in the early 2000's and the USGS Salton Sea Science Office, the State of the Salton Sea conference (Barnum et al. 2017) and recent Salton Sea Summits[11]. The Bay-Delta Interagency Ecological Program (Interagency Ecological Program 2015) can also serve as a model for planning and governance.

The SSSP may include, but would not be required to include, the following roles:

- Serve as the interagency core of a collaborative science network with a focus on the Salton Sea ecosystem but coordinated within the full Salton Sea watershed.
- Provide a scientific foundation for planning and management decisions through best available science and strong partnerships with other agency, university, and stakeholder science programs.
- Engage decision makers to help them identify high priority science needs and collaborate on science initiatives responding to high priority management needs.
- Identify, track, and explain Salton Sea science status and needs simply and cogently.
- Inspire, engage and foster objective leadership.
- Sponsor independent peer review of key management issues including identification and strategies to address scientific uncertainty.
- Collaborate with other agencies and programs to maximize the effective and efficient application of funds, equipment, personnel and expertise to meet scientific information needs for regulatory compliance, management and planning.
- Help SSMP agencies to adaptively manage and integrate monitoring and studies to meet compliance, planning, and management needs, and to reduce uncertainties.
- Periodically review the SSMP Science Program and program elements to ensure focus and direction remain relevant.
- Adaptively manage long-term monitoring programs and be alert to new events and trends.
- Incorporate and implement adjustments to the long-term monitoring program as needed.
- Involve stakeholders and seek robust, constructive engagement and collaboration.
- Seek balanced and inclusive funding partnerships, including private entities.
- Share and learn from peer and independent scientific review of SSMP projects.

[11] Salton Sea Summits 2018, 2019 and 2022. https://www.saltonseasummit.org/

6.3 Data Assessment and Synthesis

Data collected under the MIP will be analyzed to foster the integration, consolidation, and review of data, and to provide updates to the conceptual models, answers to key questions, reporting, and management recommendations within an adaptive management framework (Case et al. 2013). The assessment should be conducted in cooperation with technical and management staff, and with input from stakeholder groups (Case et al. 2013).

The type of analysis will depend on the monitoring question or hypothesis (Table 2-4) and the sampling design (Section 3.2, "Monitoring Design"). Types of analyses can include comparisons through time on a site, comparisons across or among sites (including "reference" sites), or comparisons with a target condition (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a). The first step is to explore the data and their distribution (exploratory statistics) (Zuur et al. 2010). If the data meet the assumptions of other statistical tests, then questions can be evaluated using inference (traditional hypothesis testing) or Bayesian statistics (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017a).

6.4 Annual Report

If the SSSP is funded, program managers will coordinate preparation of an annual report covering activities of a previous 12-month period. The report timing is to be determined, in consideration of resource availability, and other year-end responsibilities for SSMP agencies (CDFW and DWR).

The annual report will summarize the data collected by surveys conducted by the SSSMP agencies (CDFW and DWR) and will update prior data in a cumulative fashion. The annual report will also summarize surveys conducted by other implementing partners, where known. The annual report should include the following:

- Geographic information system (GIS) maps showing locations of monitoring sites for each monitoring element.
- A summary of data collected during each year and cumulatively:
  - *Hydrology*—Average daily and monthly flow (discharge), average annual discharge, and peak instantaneous flow for stations with continuous recorders; average monthly flow for stations with field measurements; monthly elevations of Salton Sea surface water and groundwater stations; and water quality field measurements and results of laboratory analysis for constituent concentrations.
  - *Land Cover* —maps depicting the location and extent of exposed playa and natural community types (especially vegetation emerging on the playa) and tables quantifying acreage of playa, natural vegetation and agricultural production (e.g., Coachella Valley Water District 2021, Imperial County 2020)
  - *Air Quality*—meteorological conditions and pollutant concentrations at local monitoring sites.
  - *Biological Resources*—species composition, distributional patterns and relative abundance among locations and habitat types, and ambient environmental conditions during sampling events.
  - *Socioeconomics*—summary of survey findings, economic data, and other data collected.

- Graphic presentation of trends (monthly, seasonal, and annual) in hydrologic, air quality, land cover, and biological indicators.
- Sample variability based on replicate samples. Confidence intervals around all estimates, where appropriate, and methods used to generate estimates of variance.
- Recommendations for any adjustment and improvement of survey locations and sampling protocol.

6.5 Annual Study Plan

If the SSSP is funded, program managers will coordinate preparation of an annual study plan (described in Section 3.3). The study plan will recommend the planned monitoring activities to be conducted in the upcoming year (12-month period) by SSMP agencies (DWR and CDFW) and implementing partners as part of collaborative science within the Salton Sea ecosystem. The exact time span is to be determined, in consideration of natural seasonal patterns, resource availability, and other year-end responsibilities. SSMP agencies will collaborate on development of the work plan which will be subject to CDFW, USFWS, and other SSMP agency approval.

The SSSP will promote coordination and information sharing among all entities conducting monitoring and research. The annual study plan, however, may not necessarily reflect all monitoring, studies, research, and synthesis work occurring in the Salton Sea region.

6.6 Learn and Adapt

Learning and adaptation is the final step in the adaptive management cycle. The MIP is a living document and will need to remain flexible to respond effectively to unanticipated events. Monitoring will be refined as understanding increases or new issues emerge. Examples of potential next steps could include consulting with decision makers and stakeholders, redefining the problem statement, amending goals and objectives, updating the conceptual model, or modifying actions (including monitoring and/or management). The initial monitoring protocols identified in the MIP could change as new and improved techniques and assessment methods are developed. Small adjustments would be reflected in the annual study plans.

Additionally, the SSSP will coordinate review of the MIP every five years and will revise the MIP as needed in response to evolving information needs, sampling technologies, and assessment methods. Types of metrics, sampling frequencies, and sampling intensities may be adjusted as information gaps are filled, uncertainties are resolved, or new questions emerge. Protocols could change as new and improved techniques are identified. Updates could be focused on specific resource areas or could be applied to the entire plan.

The SSSP will document and adaptively manage all revisions to the MIP and study plans in a transparent and collaborative manner, with the goal of improving monitoring and learning based on cumulative data and experiences.

CHAPTER 7
Contributors

7.1 Preparers and Working Groups

Preparation of the MIP was led by ESA, with oversight by SSMP managers (**Table 7-1**). Working groups were formed to provide input and review of early drafts of the MIP. Invited members included key Salton Sea experts and stakeholders in several resource areas (Table 7-1): hydrology and water quality, air quality and geography (land cover), biological resources, socioeconomics, and data management. Three workshops were held to solicit input and written comments were invited on drafts. Not all working group members attended each workshop.

TABLE 7-1
SALTON SEA MONITORING IMPLEMENTATION PLAN PREPARERS AND WORKING GROUPS

Resource Area	MIP Preparers (SSMP and ESA)	MIP Working Group Members[2]
MIP Leadership Team	Arturo Delgado (CNRA) Vivien Maisonneuve (DWR) Tonya Marshall (CDFW) Ramona Swenson, Ph.D. (ESA)	
Hydrology, Groundwater, Water Quality	Mine Berg, Ph.D. (ESA) Elizabeth Schalo (ESA) Nick Garrity (ESA) Michael Burns (ESA)	Yuanwen Lin (DWR) Steven Garcia (DWR) Emma McCorkle (RWQCB) Genevieve Johnson (Reclamation) Tina Shields (IID) Jessica Humes (IID) Eli Petrofsky (IID) Dylan Mohamed (IID) Steve Charlton (IID) Joanna Hoff (IID) Zoe Rodriguez del Rey (Coachella Valley Water District) Michael Cohen (Pacific Institute) Bill Brownlie (TetraTech) Sujoy Roy (TetraTech)
Air Quality, Geology (playa)	Alan Sako (ESA) Michael Stewart (ESA)	Jacob Kollen (DWR) Earl Withycombe (CARB) Leah Mathews (CARB) Alicia Adams (CARB) Jack Gillies (Desert Research Institute) Monica Soucier (ICAPCD) Curtis Blondell (ICAPCD) Ismael Garcia (ICAPCD)

Resource Area	MIP Preparers (SSMP and ESA)	MIP Working Group Members[2]
		Kevin Durkee (SCAQMD) Payam Pakbin (SCAQMD) Andrea Polidori (SCAQMD) Tina Shields (IID) Jessica Humes (IID) Eli Petrofsky (IID)
Biological Resources	Ramona Swenson, Ph.D. (ESA) Maile Tanaka (ESA) Sonya Vargas (ESA)	Samantha Przeklasa (CDFW, avian) Charley Land (CDFW, aquatic, fish) Sharon Keeney (CDFW, pupfish, fish) Felicia Sirchia (USFWS) Melinda Dorin (DWR) Jessica Humes (IID) Eli Petrofsky (IID) Andrea Jones (Audubon) Frank Ruiz (Audubon) Andrew Trouette (Reclamation) Ramona Swenson, Ph.D. (ESA) Maile Tanaka (ESA)
Socioeconomics	Al Thompson (ESA) Jessie O'Dell (ESA) Stephanie Cadena (ESA)	Evon Willhoff (DWR) Miguel Hernandez (Comite Civico del Valle) Matthew Maldonado (Comite Civico del Valle) Luis Olmedo (Comite Civico del Valle) Michelle Flores (Comite Civico del Valle) Sahara Huazano (Alianza Coachella Valley) G. Patrick O'Dowd (Salton Sea Authority) Lisa Bravata (Salton Sea Authority) Dylan Mohamed (IID) Steve Charlton (IID)
Data Management and Reporting	Suzanne Goldstein (ESA)	Samantha Przeklasa (CDFW) Steve Goldman (CDFW) Sandra Hill (CDFW) Michal Koller (DWR) Steven Garcia (DWR)

NOTES: Audubon = Audubon California; CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CNRA = California Natural Resources Agency; DWR = California Department of Water Resources; ESA = Environmental Science Associates; ICAPCD = Imperial County Air Pollution Control District; IID = Imperial Irrigation District; MIP = Monitoring Implementation Plan; Reclamation = U.S. Bureau of Reclamation; RWQCB = Regional Water Quality Control Board; SCAQMD = South Coast Air Quality Management District; SSMP = Salton Sea Management Program

SOURCE: Data compiled by Environmental Science Associates in 2022

7.2 Salton Sea Management Program Science Committee

Table 7-2 identifies the members of the 2022 SSMP Science Committee, headed by Carol Roberts of USFWS.

TABLE 7-2
2022 SSMP SCIENCE COMMITTEE

Name	Affiliation	Expertise
Carol Roberts, M.S.	USFWS	Chair; Selenium and Other Contaminants
Marilyn Fogel, Ph.D.	UC Riverside	Water Quality
Geoff Schladow, Ph.D.	UC Davis	Hydrology and Water Quality; Engineering
Amato Evan, Ph.D.	Scripps Institution of Oceanography, UC San Diego	Air Quality
Paolo D'Odorico, Ph.D.	UC Berkeley	Air Quality
Jason Low, Ph.D.	SCAQMD	Air Quality
Tim Bradley, Ph.D.	UC Irvine	Biology—Physiological Ecology, Conservation Biology of Salt Lakes
Tom Anderson, M.S.	USFWS	Biology—Avian, Selenium
Robert McKernan	Oasis Bird Observatory	Biology—Avian
Kathy Molina	Natural History Museum of Los Angeles County	Biology—Avian
Mike Chotkowski, Ph.D.	USGS	Biology—Aquatic, Large-Scale Science Programs
Susan de la Cruz, Ph.D.	USGS	Biology—Aquatic Biology
Isa Woo, Ph.D.	USGS	Biology—Aquatic Biology
Andrea Jones, M.S.	Audubon California	Biology—Avian
Courtney Conway, Ph.D.	USGS/University of Idaho	Biology—Avian and Selenium
Blake Barbaree	Point Blue Conservation Science	Biology—Avian
Kurt Leuschner, M.S.	College of the Desert	Biology—Wildlife
Ryan Sinclair, Ph.D.	Loma Linda University	Public Health

NOTES: SCAQMD = South Coast Air Quality Management District; UC = University of California; USFWS = U.S. Fish and Wildlife Service; USGS = U.S. Geological Survey

SOURCE: Data compiled by Environmental Science Associates in 2022

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CHAPTER 8
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Appendix A

Inventory of Salton Sea Monitoring Efforts and Studies

TABLE A-1
INVENTORY OF SALTON SEA MONITORING EFFORTS AND STUDIES

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Hydrology								
Water Surface Elevation	Measure water surface elevation of the Salton Sea	Status & Trends	Gauge USGS National Water Information System	Water surface elevation	Salton Sea near Westmorland (10254005)	Continuous, year-round	2017–2019 Ongoing	USGS NWIS (U.S. Geological Survey, National Water Information System 2022)
Stream Inflow	Measure discharge (volume) and water elevation (gauge height) in three main tributaries flowing into the Salton Sea	Status & Trends	Stream gauge USGS National Water Information System	Discharge (flow cfs) Gauge height	Three stations on rivers: • Whitewater River near Mecca (10259540) • Alamo River near Niland (10254730) • New River near Westmorland (10255550)	Continuous, year-round	1988–present Ongoing	USGS NWIS (U.S. Geological Survey, National Water Information System 2022)
Drain and Canal Streamflow (spill dilution monitoring)	Monitor flow rates in drains and canals	Status & Trends	Performed as part of IID's Selenium Provision Work Plan. Continuous hydrologic data are collected upstream of where canal spill enters the drain and downstream of where canal and drain water have sufficiently mixed for the drain and canal sites, with the exception of Poe Road Drain, which has no spill and is sampled directly at the drain.	Velocity (ft/s) Flow (cfs)	Drains: • Vail 3 Drain • Vail 4 Drain • Trifolium 23 • Poe Road Drain Canal: • Trifolium Extension (at Poe Road)	Continuous, year-round	2018	IID (Imperial Irrigation District 2018a)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Water Quality								
Salton Sea & Tributaries Water Quality	Monitor salinity, selenium, nitrogen, phosphorus, and other water quality parameters' status in water quality in the Salton Sea and main inflow tributaries	Status & Trends	Handheld sonde for in-situ measurements of physical parameters, with a vertical profile in the Sea (temperature, DO, EC, pH, turbidity) Water samples for lab analysis of general chemistry (TDS, TSS, ions), nutrients (organophosphate, total phosphorous, nitrate [NO_3], nitrite [NO_2], total nitrogen, Total Kjeldahl Nitrogen [TKN]), selenium (total Se, total dissolved Se, dissolved selenite, total Se sediment)	Physical parameters Salinity (EC and mg/L TDS, parts per thousand) Ions Nutrients Selenium (water, sediment) Chlorophyll *a*	Water quality monitoring stations: • Salton Sea (3) • Alamo River • New River • Whitewater (Coachella Valley Stormwater Canal) • Brawley Wetlands	Quarterly (some quarters missed in some years)	1999; 2004–2020	Reclamation (U.S. Bureau of Reclamation 2020)
Salton Sea Salinity	Monitor changes in salinity in the Salton Sea over time	Status & Trends	Unknown	Salinity (mg/L TDS)	Unknown location(s) in the Salton Sea	End of year; appears annually since 2003	1950–2002	IID and Reclamation (Imperial Irrigation District 2018b)
Selenium in Agricultural Drains	Assess selenium in water, sediment, and biota in IID's drains	Compliance	Measure selenium in water and sediments (29 drains), and biota (detritus, invertebrates, fish in seven drains)	Selenium (water, sediment) Selenium in biota	29 drains	Biannual (April, October)	2005–2009	USGS and IID (May et al. 2007; Saiki et al. 2010)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Drain and Canal Water Quality (spill dilution monitoring)	Monitor ambient water quality parameters in drains and canals	Status & Trends	Performed as part of IID's Selenium Provision Work Plan. Water sampling for total and dissolved Se and monitoring of ambient water quality parameters using a hydroprobe. Continuous conductivity data are collected upstream of where canal spill enters the drain and downstream of where canal and drain water have sufficiently mixed for the drain and canal sites, with the exception of Poe Road Drain, which has no spill and is sampled directly at the drain.	Total and dissolved selenium Water temperature Dissolved oxygen Conductivity pH Turbidity Oxidation reduction potential	2018 locations: Drains: • Vail 3 Drain • Vail 4 Drain • Trifolium 23 • Poe Road Drain Canal: • Trifolium Extension (at Poe Road)	Twice monthly, except continuous for conductivity	2018	IID (Imperial Irrigation District 2019a)
Managed Marsh Water Quality and Selenium	Monitor selenium concentrations in created marsh habitat	Effectiveness	Requirement of IID's California Endangered Species Act permit. Protocols have varied historically. In 2017, IID sampled water and sediments and sent to a laboratory for selenium analysis. Past surveys have also included tissue analysis. Revised annual sampling protocols were anticipated to be implemented in 2018.	Total selenium	Managed Marsh complex (variable locations)	Varies—proposed annually	2012, 2015, 2017	IID (Imperial Irrigation District 2018a)
Geography & Geology								
Land Cover	Satellite imagery, mapping	Status & Trends	National Land Cover Database Landsat-based 30 m resolution land cover classification and change patterns from 2001 to 2019.	Land cover (15 classes)	Contiguous United States	Every two to three years	2001, 2004, 2006, 2008, 2011, 2013, 2016, 2019	USGS NLCD (U.S. Geological Survey 2021)
Land-Surface elevation	LiDAR	Status & Trends						
Land Cover	Regional land cover of the Imperial Valley	Status & Trends	Imperial Valley satellite imagery (Landsat), showing vegetation and cities at low-resolution scale.	Land cover	Imperial Valley on the border of California and Mexico	Occasional years, June–July	1973, 1992, 2011, 2019	USGS Earthshots (U.S. Geological Survey 2021)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Playa Exposure	Map playa exposure	Status & Trends	Analysis of satellite imagery, USGS gauge elevation data and high-resolution bathymetric data to map the playa into three sub-classes: bare playa, open water, and vegetation (Imperial Irrigation District 2016).	Acres of exposed playa	Entire Salton Sea playa	Annually, end of year when the Sea is at its lowest level	2002–2017	IID (Imperial Irrigation District 2018a, 2019b)
Air Quality & Meteorology								
Ambient Air Quality	Measure ambient air conditions/ particulate matter	Status & Trends	IID's air quality monitoring program. Collect five-minute and one-hour ambient air concentrations of PM_{10} and $PM_{2.5}$. PM_{COARSE} is calculated by subtracting $PM_{2.5}$ from PM_{10} concentration.	PM_{10}, $PM_{2.5}$, PM_{COARSE}	Six locations: Torres-Martinez, Salton Sea Park, Bombay Beach, Refuge, Naval Test Station, Salton City	Continuous, year-round	2010-present Ongoing	IID (Imperial Irrigation District 2016)
Annual Dust Emission Inventory Model	Estimate annual dust emissions from the playa.	Status & Trends	IID's air quality monitoring program. Modeling incorporated playa exposure extent, surface characteristics, vegetation, PI-SWERL sampling results, and hourly meteorological variables (wind speed, direction, friction velocity) using the Weather Research and Forecasting Model (WRF).	PM_{10} (total annual tons, tons per day, and maximum-day playa dust emissions)	Salton Sea playa	Annual	2017 Ongoing	IID (Imperial Irrigation District 2018a)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Playa Surface Types Emission Potential	Measure the emissions potential of different playa surface types and characteristics.	Focused Study	IID's air quality monitoring program. The emissions potential of specific playa surface characteristics was assessed along transects (from high elevation to low elevation/sea shoreline) at seven locations, monthly from November 2016 through May 2017 using the PI-SWERL. In addition, PI-SWERL samples were collected within and outside of dust source areas after high-wind events to aid in the quantification of erosional areas throughout the season.	PM_{10}	Salton Sea playa (seven locations)	Unknown	2017	IID (Imperial Irrigation District IID 2018a)
Playa Surface Characteristics (modeling)	Evaluate playa surface characteristics.	Focused Study	Part of IID's air quality monitoring program. Includes evaluation of salt crust surface and soil characteristics at 832 exposed playa locations. Ground-based surface evaluations included detailed characterization of surface properties related to erosion (e.g., crust type, loose surface sand, surface soil moisture). These data sets were used as calibration data to spatially map playa surface types using satellite-based imagery.	Surface types (acres)	Exposed Salton Sea playa (832 locations)	Unknown	2003–2017	IID (Imperial Irrigation District 2018a)
Annual Off-Sea Dust Emission Inventory (model)	Estimate annual dust emissions from the desert areas around the Salton Sea and quantify any impacts on the Salton Sea playa.	Focused Study	Performed as part of IID's air quality monitoring program. Modeling incorporated desert geomorphic surface characteristics, vegetation, PI-SWERL sampling results, and hourly meteorological variables (e.g., wind speed, direction, friction velocity) using WRF.	PM_{10} (total annual tons, tons per day, and maximum-day playa dust emissions)	Desert area	Unknown	2017	IID (Imperial Irrigation District 2018c)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Particulate Matter Sources	Aerosol and soil chemistry	Focused Study	Sources of dust characterized according to chemical composition.	Air quality Dust chemistry	Two locations: Bombay Beach and Salton City	August 2015, February 2016	2015–2016	Frie et al. 2017
Particulate Matter Sources	Dust chemistry	Focused Study	Dust deposition at five sites around the Salton Sea analyzed for composition and source.	Dust deposition Dust chemistry	Five locations: Refuge, Wister, Dos Palmas, Palm Desert, Boyd Deep	Cumulative monthly	April 2017–May 2018	Frie et al. 2019
Particulate Matter Sources	Dust emission modeling	Focused Study	Weather Research Forecast model (WRF-Chem) used to estimate changes in dust aerosol emission and distribution in the Salton Sea region from 2000 to 2030.	PM_{10}	Not applicable	Unknown	Unknown	Parajuli and Zender 2018
Climate	Local meteorological conditions	Status & Trends	Performed as part of IID's air quality monitoring program. Collected via meteorological instruments mounted on 10-meter-tall meteorological towers.	Three-dimensional wind speed and direction, horizontal wind speed, ambient temperature, relative humidity, net radiation	Unknown	Daily	Unknown	IID (Imperial Irrigation District 2016)
Climate	Local meteorological conditions	Status & Trends	Meteorological data from stations located at airports in the Salton Sea basin	Air temperature, precipitation, possibly wind	Jacqueline Cochran Regional Airport (Thermal, Riverside County) Imperial County Airport (Imperial County) Naval Air Facility (El Centro, Imperial County)	Daily	Pre-2000–present Ongoing	NOAA (National Oceanic and Atmospheric Administration, National Centers for Environmental Information n.d.)
Climate—California Irrigation Management Information System	CIMIS was designed to assist irrigators in managing their water resources more efficiently.	Status	CIMIS weather stations collect weather data on a minute-by-minute basis. Hourly data reflect the previous hour's 60 minutes of readings. Hourly and daily values are calculated and stored in the data loggers. CIMIS data are retrieved every hour.	Evapotranspiration (ETo), solar radiation, air temperature, wind (speed, direction), precipitation, relative humidity	Active stations: • 136 Oasis (north) • 181 Westmorland North (south) Historic stations (1994–2012): • 127 Salton Sea West • 128 Salton Sea East	Hourly, daily, monthly	2014–present (2019) Ongoing	DWR CIMIS (California Department of Water Resources n.d.)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
California Air Resources Board	Air Quality Index	Compliance Status & trends	Number of days of non-attainment of air quality standards (State and national).	AQI: PM_{10}, $PM_{2.5}$, ozone (days exceeding standards)	Imperial County—six sites (Brawley, Calexico [2], Westmorland, El Centro, Niland) Salton Sea Basin	Hourly, daily, monthly	Ongoing	CARB
IVAN	Air Quality Index alerts for neighborhoods in Imperial County, for environmental justice	Status	IVAN (Identifying Violations Affecting Neighborhoods) is an environmental justice monitoring and reporting network of 40 air monitors located throughout Imperial County for more neighborhood-level data. These monitors measure current levels of particulate matter air pollution ($PM_{2.5}$ and PM_{10}). Data are not validated and cannot be used to determine whether air quality standards are being met.	Community Air Quality Level: particulate matter	40 stations, Imperial County	Daily, past 30 and 90 days	2013–2017 May be ongoing depending on funding	Comite Civico del Valle, California Environmental Health Tracking Program (IVAN Imperial n.d.)
Imperial Valley Air Quality	Current air quality index and health advisory conditions	Status	The AQI is the U.S. Environmental Protection Agency's tool for communicating daily air quality. For each pollutant, an AQI value of 100 generally corresponds to an ambient air concentration that equals the level of the short-term national ambient air quality standard for protection of public health. AQI values at or below 100 are generally thought of as satisfactory. When AQI values are above 100, air quality is unhealthy: at first for certain sensitive groups of people, then for everyone as AQI values increase. The ozone AQI is an eight-hour index; for particle pollution, it is a 24-hour index.	PM_{10}, $PM_{2.5}$, ozone	Imperial Valley—seven sites (Brawley, Calexico, Westmorland, El Centro, Niland, Holtville, Mexicali)	Daily	Ongoing	CARB, ICAPCD, EPA

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Biological Resources—Bird								
General Avian Surveys	Describe bird use on a seasonal and annual basis and assess changes	Status & Trends	Follows protocols used for 1999 comprehensive bird surveys. Survey methodology varies by strata. *Shoreline:* By airboat at pre-selected survey points within the shoreline locations determined each year, representative of the shoreline segment. *Open water:* 600-m-wide transects by boat. *Created freshwater and saline impoundments:* Open water—Visual surveys at established points over a specified time span. Vegetated areas—North American Marsh Bird Monitoring Protocols (Conway 2011). *Agricultural lands:* Visual observations for five minutes at 11 points spaced 400 m along 4 km by 300 m transects. *Halophytic scrub:* Landbird monitoring protocol (Ralph et al. 1993).	Species composition Abundance Seasonal patterns of use Spatial distribution of use	Salton Sea (open water) Salton Sea shoreline Created freshwater impoundments Created saline impoundments Agricultural lands Halophytic scrub	Seasonal: Late winter (January–March) Spring migration (March–May) Breeding season (May–August) Early fall (August–October) Early winter (November–January)	Shoreline point counts conducted by USFWS and CDFW 2000–2012	CDFW and USFWS (CDFW n.d.[1]), Point Blue (Shuford et al. 2000), National Audubon Society (Jones et al. 2019)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Colonial Breeding Bird Surveys	Establish conditions and trends for colony breeding birds	Status & Trends	Follows protocols used for USFWS Pacific Flyway colony nesting surveys and 1999 comprehensive bird surveys.	Number of nests Breeding success	Salton Sea shoreline Halophytic scrub Inland water—Ramer and Finney lakes	Multiple observations during February–September	2014–present (2019)	CDFW—submitting info to USFWS (California Department of Fish and Wildlife n.d.[1]), Point Blue (Shuford et al. 2000), National Audubon Society (Jones et al. 2019), other studies (Molina and Sturm 2004; Shuford et al. 2020a, 2020b)
Roosting Bird Surveys	Quantify use at roosting areas and changes over time	Status & Trends	Follows protocols used for 1999 comprehensive bird surveys, which includes simultaneous counts at three to six sites by two observers at 1.5 hours before dusk.	Species Abundance	Salton Sea shoreline Created freshwater impoundments Agricultural lands Halophytic scrub	Biannual Spring migration (January–March) Fall migration (August–December)	Not conducted yet	CDFW (California Department of Fish and Wildlife n.d.[1]), Point Blue (Shuford et al. 2000)
Dead and Sick Bird Counts	Identify incidence, magnitude, and vectors of avian disease outbreaks	Status & Trends	Dead and/or sick birds collected and enumerated to determine incidence, magnitude, and vectors of disease outbreaks.	Causal agent Mode of transmission Abundance Species	Salton Sea (open water) Salton Sea shoreline Created freshwater impoundments Created saline impoundments	Monthly, increased as needed	2005–present (2019)	CDFW (California Department of Fish and Wildlife n.d.[1])
Aerial Piscivorous Bird Surveys	Assess changes in piscivorous bird populations	Status & Trends	Aerial surveys using fixed-wing aircraft of piscivorous birds (e.g., double-crested cormorants, brown pelican, American white pelican). Aircraft travels in a counterclockwise direction around the Salton Sea perimeter, and over wildlife areas.	Abundance of piscivorous birds	Salton Sea shoreline Halophytic scrub Nearby created habitats	Six surveys per year (November–May)	2005–present	CDFW (Idrisi 2019), Point Blue (Shuford et al. 2000)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Comprehensive Shorebird Surveys	Assess shorebird presence at the Salton Sea	Status & Trends	Recording all shorebirds along defined sections of the shoreline	Species Abundance	Entire Salton Sea Shoreline Refuge Wister Wildlife Area	Annually (November 15–December 15)	2012–2018; December 15, 2021	Point Blue (Shuford et al. 2000), National Audubon Society (Jones et al. 2019)
Waterbird surveys	Monitor the spatial and temporal patterns of waterbirds at the Salton Sea	Status & trends	Visual count from shore of shoreline and offshore (within 1 km) zones.	Species Abundance	Mid and northern sections of the Salton Sea (nine sites)	Weekly (seven sites), monthly (two sites)	July 2014–June 2018	Oasis Bird Observatory (McKernan and McGaugh 2018)
Waterbird Survey	Monitor the spatial and temporal patterns of waterbirds at the Salton Sea	Status & Trends Focused study	1 km^2 survey box, 20-minute visual count per box. Nine survey dates total.	Species Abundance (count)	14 sites around the entire shoreline	November 2016–March 2018: Every two months Summer 2018 onward: monthly	November 2016–March 2018 Summer 2018–present (2019)	Audubon California (Orr et al. 2018), National Audubon Society (Jones et al. 2019)
Avian usage/General Wildlife Surveys	Assess avian and wildlife usage of created marsh habitat	Effectiveness	Surveys concentrate on avian usage of Phases I and II; other wildlife sightings are also recorded. Site visits are conducted diurnally early in the morning, monthly over the course of the year.	Presence/absence Behavior/usage (qualitative)	Managed marsh complex (Phase I and Phase 2)	Monthly	2017	IID (Imperial Irrigation District 2018a)
Marsh Bird Call-back Surveys	Assess marsh bird usage of created marsh habitat	Effectiveness	North American Marsh Bird Survey Protocol (C. Conway)	Presence/absence	Managed marsh (Phase I and Phase 2; 29 survey points) Wister Wildlife Area Refuge	Annually (March–May) requires three to four separate visits spaced three weeks apart	2017 CDFW: 2005–present (2019) USFWS: Unknown	IID, CDFW, USFWS (Imperial Irrigation District 2018a), Point Blue (Shuford et al. 2000)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Southwestern Willow Flycatcher Surveys	To determine habitat occupancy within the Imperial Valley and around the Salton Sea, and assess impacts/ compensatory mitigation requirements for water conservation and transfer actions	Baseline	Requirement of IID's California Endangered Species Act permit. Each site is visited several times and surveyed using taped breeding calls.	Presence/absence	New River at confluence with Fig Lagoon New River north back at Imperial wetland (Rice Drain No. 3) New River delta Alamo River delta Southwest Salton Sea drainage ditch (Trifolium Dr. No. 1) Palm Wash 1 and 2 from Highway 111 to the Sea (south of Bombay Beach, California) San Felipe Creek delta	Variable occurrence, between April 15 and May 15. Before IID water conservation actions that could affect tamarisk (suitable habitat)	2016–2017	IID (Imperial Irrigation District 2018a)
Audubon Christmas Bird Count	Annual community science single-day count to document species diversity and relative abundance.	Status & Trends	15-mile-diameter survey circle. North—six or seven groups of citizen birdwatchers spread out over the count circle for a day of counting wintering birds around the north end of the Salton Sea. Typically, 130–140 species are recorded.	Species Abundance	Salton Sea north (near the Whitewater River) Salton Sea south (near the Refuge)	Annual (one day in late December)	Salton Sea North: 1965–present Salton Sea South: 1939–present Ongoing	Audubon–San Bernadino Valley and San Diego chapters
Biological Resources—Fish								
Desert Pupfish (CDFW)	Evaluate desert pupfish occupancy and habitat conditions within the Salton Sea and relevant drains and tributaries	Status & Trends	Trapping surveys using minnow traps baited with canned cat food. Conduct in season when species is active.	Relative abundance (catch-per-unit-effort) Selected habitat conditions: DO, temperature, salinity	Selected tributaries, irrigation drains, refuges (artificial habitat), shoreline pools/ponds, and Salton Sea proper (primarily embayments), including San Felipe Creek, Upper and Lower Salt Creek, and Varner Harbor	Ranges from quarterly to every five to 10 years. Season: Late March–October or early November	2014–2019	CDFW (California Department of Fish and Wildlife n.d.[2]; Keeney 2016)

Indicator/ Monitoring Activity	Purpose	Type	Methodology	Metrics	Location(s)	Frequency/ Timing	Sampling Years	Agency/Source
Fish Population Gill-Netting	Monitor changes in fish populations over time	Status & Trends	Gill-netting using two 45-m-long, five-panel monofilament gill nets set at the water surface. An additional two nets are set at the bottom of the water column at the pelagic sites. Nets are typically set at one or two sites in the morning and hauled in after 24 hours.	Relative abundance (catch-per-unit effort for gill-netting) Species composition Size class	Sampling locations within Salton Sea pelagic, near-shore, and estuarine habitats Eight historic: North Basin, North Desert Shores, The Dome, Inter-basin, The Cliffs, South Salton City, North Wister, and South Basin Six new (2018): North Shore, Whitewater River delta, Bat Caves, Alamo River delta, New River delta, and Naval Test Base	2017–2018: Summer 2002–2008: *Spring:* April and May *Summer:* July and August *Fall:* October and November *Winter:* January and February	2002, 2003–2008, 2017–2018	CDFW and USFWS (California Department of Fish and Wildlife n.d.[2], 2017; Idrisi 2019)

NOTES: AQI = Air Quality Index; CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; cfs = cubic feet per second; CIMIS = California Irrigation Management Information System; DO = dissolved oxygen; DWR = California Department of Water Resources; EC = electrical conductivity; EPA = U.S. Environmental Protection Agency; ft/s = feet per second; ICAPCD = Imperial County Air Pollution Control District; IID = Imperial Irrigation District; IVAN = Identifying Violations Affecting Neighborhoods; km = kilometers; km^2 = square kilometers; LiDAR = light detection and ranging; m = meters; mg/L = milligrams per liter; NLCD = National Land Cover Database; NWIS = National Water Information System; PI-SWERL = Portable In-Situ Wind ERosion Laboratory; $PM_{2.5}$ = particulate matter 2.5 micrometers and smaller; PM_{10} = particulate matter 10 micrometers and smaller in aerodynamic diameter; PM_{COARSE} = coarse particulate matter with an aerodynamic diameter of 2.5 to 10 micrometers; PRBO = Point Reyes Bird Observatory; Reclamation = U.S. Bureau of Reclamation; Refuge = Sonny Bono Salton Sea National Wildlife Refuge; Se = selenium; Sea = Salton Sea; TDS = total dissolved solids; TSS = total suspended solids; USFWS = U.S. Fish and Wildlife Service; USGS = U.S. Geological Survey; WRF = Weather Research and Forecasting Model

SOURCE: Data compiled by Environmental Science Associates in 2019

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Appendix B

Monitoring Indicators and Priority by Resource Category

APPENDIX B
Monitoring Indicators and Priority by Resource Category

The Salton Sea Monitoring and Assessment Plan (MAP) outlined a comprehensive set of data needed to support long-term management of the Salton Sea. However, challenges exist with respect to cost, duration, and long-term data management (Case et al. 2013). It may not be feasible to sample all metrics with the required replication to make meaningful comparisons at all sites. In some cases, this may mean not measuring highly variable metrics, and instead using resources for monitoring less variable metrics (Interagency Ecological Program Tidal Wetlands Monitoring Project Work Team 2017). To focus MIP monitoring activities, indicators were defined and prioritized using a progression of criteria (U.S. Environmental Protection Agency 2008):

1. *Conceptual Relevance or Soundness*—Is the indicator relevant to the question and the resource at risk? Is the indicator correlated to environmental conditions and/or responses?
2. *Feasibility of Implementation*—Are the methods practical, technically feasible, cost-effective, and efficient for use in in terms of funding, manpower, sample processing, and the complexity of analysis and data interpretation?
3. *Response Variability*—Are human errors of measurement and natural variability over time and space sufficiently understood and documented? Is the indicator quantifiable and repeatable? Is the indicator ecologically responsive, with high signal-to-noise ratio and high discriminatory ability?
4. *Interpretation and Utility*—Will the indicator convey information on resource conditions that is meaningful to Salton Sea managers and decision-makers? Is the indicator understandable and relevant to stakeholders? Is the indicator currently monitored or likely to be easily monitored in the future? Can monitoring efforts be coordinated among federal, State, and local entities and communities?

Proposed indicators were reviewed by Working Group experts and assigned to one of the following priority categories:

- *Primary Priority (Priority 1)*—core indicators for understanding changing conditions and their relationship to Salton Sea Management Program (SSMP) actions. These indicators have well-understood and strong linkages or correlation with status and function of Salton Sea resources. In addition, the methods of measurement are feasible and the analysis and interpretation is meaningful and actionable.
- *Secondary Priority (Priority 2)*—indicators that could improve understanding, but may have indirect linkage or weak correlation to ecosystem function, are less relevant to management decisions, and/or less feasible to measure (e.g., more expensive or logistically difficult).
- *Focused Study (Priority 3)*—indicators that may be considered for a distinct stand-alone study that may provide deeper understanding of causal mechanisms, but is not essential to track

important long-term status and trends. This could include indicators that may be conceptually relevant but lack clear methods and means of interpretation at the present time, metrics that are not strongly linked or responsive to changes in conditions at the Salton Sea, or information that is not actionable by managers.

Table B-1 lists the indicators with their respective priority levels. Implementing partners are entities that will or could undertake monitoring, such an agency (federal, state or regional), tribe, university or non-governmental organization.

TABLE B-1
MONITORING INDICATORS AND PRIORITY BY RESOURCE CATEGORY

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Hydrology						
Salton Sea elevation	Direct driver of shoreline and playa location and area.	USGS has an established gauge to measure elevation. If levels drop too far, the gauge may need to be moved.	Analytical variability is minimal and known. Water surface elevation can be used with bathymetric mapping to reliably quantify the volume and area of the Sea, extent of exposed playa, length of shoreline, and depth, and other factors relevant to existing and future conditions.	Direct correlate of shoreline habitat and playa exposure. Necessary for understanding playa exposure for dust suppression projects, and available water for created saline impoundment projects.	Primary	USGS (ongoing)
Inflow—rivers	Inflows affect water level and volume, and are a key driver for water quality, aquatic habitat suitability within the Sea, and playa exposure. Rivers contribute more than 90% of Sea inflow.	USGS maintains gauges on the Alamo, New and Whitewater rivers.	Inflow data are used by the SALSA2 model to predict salinity, shoreline elevation, and water depth, and to validate the predicted water surface elevations. The Whitewater River gauge maxes out around 200 cfs and thus misses inflows from larger storm events.	Inflow data can be used to develop a refined water balance, which can then predict salinity, nutrient and selenium loading, shoreline locations, and water depth.	Primary	USGS (ongoing)
Inflow—small tributaries (San Felipe Creek, Salt Creek)	The tributaries provide important habitat for desert pupfish.	The gauge at San Felipe Creek is not functional.	Historical data could be used, as they are currently in the SALSA2 model (Imperial Irrigation District 2018).	Small creek inflows contribute a very small proportion of the Sea's inflow. Small creek inflows have a major influence on local conditions. Monitoring these inflows would inform potential habitat creation and air quality management. San Felipe Creek is located near proposed dust suppression projects and supports populations of desert pupfish.	Primary	USGS (San Felipe Creek—historic, Salt Creek—active)
Inflow—direct drains	Flows from drains discharging on the playa can support small patches of new wetland and riparian habitats emerging near the shoreline. These areas could support desert pupfish and Yuma Ridgways rail. Drains do not make a substantial contribution to the Sea's inflow.	Direct-drain flow monitoring should be coordinated with IID and CVWD. Some drains are already monitored, and information is reported to the RWQCB.Implementation requires coordination and permission from IID and CVWD.	CVWD collects flow data monthly. CVWD monitoring uses a Sontek flow meter or dedicated pump meter, depending on site conditions.	Direct drains contribute a very small proportion of the Sea's inflow. These drains may provide habitat for desert pupfish and Yuma Ridgways rail.	Primary	IID and CVWD (ongoing)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Groundwater levels	Shallow groundwater levels or water table levels could influence playa emissivity by contributing to soil moisture.	Groundwater wells would be installed and depth measurements manually taken using a well depth sounder or other typical sensor. CVWD and partners may install wells on the east Coachella Valley/north side of the Salton Sea. More investigation is needed to identify locations with sufficient water quality and pump rates that will be sustainable without causing a negative impact on the aquifer. Security considerations are required for any permanent monitoring equipment at groundwater wells.	Spatial variation is not known.	Shallow groundwater may be a water source for establishing vegetation to control dust. The total volume of groundwater is likely insufficient as a water source for constructed ponds.	Primary	IID
Stratification	Stratification and mixing of lake waters is a critical driver of water quality (anoxia, reduction of sulfate to hydrogen sulfide) that affects aquatic habitat suitability. Upwelling and mixing events result in periodic die-pffs of aquatic life (invertebrates and fish).	Direct measurements of water quality attributes (temperature, DO) using a handheld sonde at multiple depths (i.e., vertical profile) are a simple and efficient method to characterize stratification. Access to sampling sites in the Salton Sea may be constrained by difficult boat access.	Vertical profile is a good indicator of whether the lake is stratified or mixed. Stratified conditions develop gradually (over weeks) during periods without strong winds, and therefore would be detected by monthly or possibly quarterly sampling.	In the Sea, the functional relationship is well understood between stratification, upwelling of bottom-water layers due to winds, and mixing that results in anoxia of surface waters. Vertical profiles will be useful for management of constructed impoundments. It is unknown whether these will be deep enough to result in seasonal stratification, or whether they will remain well-mixed.	Primary	Reclamation (ongoing)
Hydrodynamics (currents)	The purpose of current/velocity monitoring would be to monitor the circulation, stratification, and vertical mixing of the Salton Sea for its influence on water and sediment quality, which in turn affect fish and bird populations and the design and management of restoration projects.	Current (water velocity) measurements may be used to provide vertical water-velocity profile information to quantify stratification. Access to sampling sites in the Sea may be constrained by difficult boat access.	Using vertical profiles of temperature, salinity, and DO at multiple depths would be an easier method for quantifying stratification.	Current (water velocity) measurements have also been previously considered for Salton Sea monitoring to calibrate hydrodynamic models of the Sea for stratification, mixing, and circulation. These hydrodynamic models formerly served the purpose of earlier restoration concepts aimed at reducing the size of the lake; however, there is not currently a direct effort to change the Sea. Therefore, velocity monitoring is unnecessary for calibrating hydrodynamic models.	Focused Study	Reclamation (ongoing)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Water Quality—Surface Water						
Temperature Dissolved oxygen Conductivity (EC) (a measure of salinity) pH Turbidity	These parameters are key drivers of biological processes and habitat suitability within the Sea. Salinity (measured by conductivity) is a determinant of aquatic habitat suitability, because of the physiological tolerances of most biota. Dissolved oxygen is an integrator of many water quality processes and directly relevant to aquatic species. Deeper waters can become anoxic, and lethal events can occur if those waters are mixed by wind. pH affects ecological productivity, Sediment (measured by turbidity and suspended solids) provides attachment for pollutants such as selenium, heavy metals, and bacteria.	Easily measured and among the normal suite of measurements. Access to sampling sites in the Sea may be constrained by difficult boat access.	Analytical variability is minimal and known. Natural variability can be large (temperature, DO), but the seasonality of the signal is typically known and changes in seasonal DO minima could be detected. EC (“conductivity”) is a surrogate measure for salinity and is usually represented as “specific conductivity,” which is conductivity normalized to 25ºC (µS/cm at 25°C). Monitoring EC provides information on salt content, which can be correlated to laboratory-derived measurements of TDS.	Salinity is one of the benchmark measures and a key driver of the Sea’s physicochemical condition. It is a long-standing metric that is well understood by the public and managers. Salinity can be expressed as parts per thousand or mg/L. There is information about species physiological tolerances to help predict future aquatic foodweb conditions based on salinity.	Primary	Reclamation (ongoing), IID (ongoing)
Total Suspended Solids, Total Dissolved Solids	TDS is a common measurement of salinity. Sediment (measured by turbidity and suspended solids) provides attachment for pollutants such as selenium, heavy metals, and bacteria.	Requires collection of water grab samples for lab analysis. Access to sampling sites in Sea may be constrained by difficult boat access.	Analytical variability is minimal and known.	TDS is a commonly used metric of salinity, expressed as mg/L. Salinity is also sometimes expressed as parts per thousand. Conductivity is a more easily obtained and interpreted metric of salinity.	Secondary	Reclamation (ongoing)
Nutrients (N, P)	Excessive nutrients from agricultural drainage to the Salton Sea result in eutrophication, which affects dissolved oxygen and is a factor for aquatic habitat suitability, especially for fish.	Requires collection of water grab samples for lab analysis. Access to sampling sites in the Sea may be constrained by difficult boat access.	Analytical variability is minimal and known. Spatial/temporal variation is not known.	Useful for determining nutrient loads and the productivity of created habitats.	Primary	Reclamation (ongoing)
Selenium	Selenium poses a bioaccumulation risk, particularly in higher trophic levels (e.g., piscivorous birds). Can interfere with reproductive success in certain waterbird species.	Requires collection of water and sediment grab samples for lab analysis. Access to sampling sites in the Sea may be constrained by difficult boat access.	Analytical variability is minimal and known.	Selenium concentrations in water sources (river, irrigation drains, the Salton Sea) are a consideration for constructed habitat ponds.	Primary	Reclamation (ongoing), IID (ongoing)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Other contaminants (not selenium)	*Arsenic*—bioaccumulation risk in fish; toxicity to biota. *Boron*—toxicity to plants; possible bioaccumulation. *Legacy pesticides*—observed in sediments and fish tissue. *Current-use pesticides*—can be toxic to aquatic organisms at low levels.	Requires collection of water and sediment grab samples for lab analysis. Can be expensive and intensive to get the full suite of potential contaminants and to sample with sufficient frequency to cover spatial/temporal variation. Access to sampling sites in the Sea may be constrained by difficult boat access.	High spatial/temporal variation requires many/frequent samples.	Information about metals and pesticides would be useful for identifying potential risk at future impoundment sites, but may not be something that can be managed.	Secondary (primary for ponds)	To be determined
Water Quality—Groundwater						
Groundwater quality—salinity	Salinity measures the potential for using groundwater as water supply to establish vegetation for dust control.	Easily measured with sondes and inexpensive.	Analytical variability is minimal. Spatial/temporal variation is not known, but would be expected to be less variable than surface water.	Water quality information (salinity, contaminants) would be needed to determine whether groundwater would be suitable for vegetation establishment.	Primary	To be determined
Geography						
Land cover	A measure of the type and amount of suitable habitat available to support fish and wildlife.	Natural community types (i.e., wetlands, waters) can be mapped from aerial imagery.		Useful for understanding and prioritizing placement of managed habitats and dust suppression projects.	Primary	IID (ongoing)
Playa area extent	The area and location of exposed playa is a key determinant of shoreline habitat availability and amount of potentially emissive surfaces.	Playa area can be measured from satellite aerial imagery.	In conjunction with bathymetric information, water surface elevation can be used to reliably quantify the volume and area of the Sea, extent of exposed playa, length of shoreline, depth, and other factors relevant to characterizing existing and future conditions.	Exposed playa is a driver for particulate matter, the main air quality stressor in the Salton Basin. This information is necessary to determine placement of managed habitats and dust suppression projects.	Primary	IID (ongoing)
Surface characteristics	Characteristics of playa soils (e.g., crust, moisture) and topography are correlated with risk of particulate emissions, which is a known air quality stressor in the Salton basin.			Informs emissivity and habitat potential. Necessary for prioritizing and placement of managed habitats and dust suppression projects.	Secondary	IID (ongoing)
Playa emissivity potential	Emissivity is a key factor of likelihood and volume of particulate emissions, which is a known air quality stressor in the Salton basin.			Informs emissivity potential; necessary for prioritizing and placement of managed habitats and dust suppression projects.	Focused Study	IID (ongoing)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Air Quality						
Meteorology/ Climate	Wind speed and direction are useful for understanding dust movement from exposed playa and prioritizing dust suppression projects. Local meteorology (wind, air temperature) strongly affects hydrodynamics (turnover of anoxic high-sulfide deeper water), which in turn may be associated with odors from large-scale algae blooms, fish kills, or other biological decomposition events.	Requires installation of specialized instrumentation and approval by regulatory agencies.	High winds (>25 mph) are linked to high mobilization of particulate matter.	Focused studies have identified dust sources and likelihood of events based on wind direction, speed, and frequency.	Primary	IID (ongoing)
Ambient air quality (particulate matter $PM_{10,}$ $PM_{2.5}$)	Inhalable particulate matter is the principal air quality stressor in the Salton Sea Basin. PM_{10} emissions are highly correlated with fugitive dust from exposed playa and other lands. $PM_{2.5}$ is a significant portion of particulates only in urban areas where mechanically generated and windblown dust are not significant source contributors.	Requires installation of specialized instrumentation and approval by regulatory agencies.	High winds (>25 mph) are linked to high mobilization of particulate matter.	Necessary for prioritization and placement of managed habitats and dust suppression projects. State and federal air quality standards for PM_{10} have been exceeded at the Sea. Standards for $PM_{2.5}$ are not exceeded and the potential for significant increases in emissions in the future is low.	Primary (PM_{10}) Secondary ($PM_{2.5}$)	IID (ongoing)
Particulate matter chemistry (constituent analysis)	Helpful to understand particulate matter chemistry to evaluate sources and inform placement of managed habitats and dust suppression projects.	Requires installation of specialized instrumentation and approval by regulatory agencies. Requires laboratory analysis of collected samples.	High winds (>25 mph) are linked to high mobilization of particulate matter and potential for exposure to compounds.	Focused studies would identify potential improvements to community health from dust suppression projects.	Focused Study	
Gaseous pollutants	Relevant only if projects require substantial numbers of fossil-fueled equipment.	Requires installation of specialized instrumentation and approval by regulatory agencies.	Dependent on the number, types, and usage of fossil-fueled equipment.	Monitoring of ozone precursor and other combustion emissions (ozone, NO_X, sulfur dioxide, hydrogen sulfide, and ammonia) is deemed a low priority, unless very large-scale restoration activities with substantial numbers of heavy-duty equipment are contemplated.	Secondary	

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Biological Resources—Birds						
General bird survey (shoreline area survey)	The Salton Sea is a vital stopover and wintering site for migratory birds on the Pacific Flyway. Variation in migratory species abundance may reflect factors beyond the Salton watershed, such as habitat availability elsewhere on the Pacific Flyway.	Area surveys have been conducted from shore and boat. In recent years there has been a lack of boat access, which limits coverage. Surveys from shore are contingent on permission and accessibility by foot. Foot surveys from shore are labor-intensive to achieve sufficient coverage. In the MAP, frequency is identified as monthly; however, this frequency could potentially be reduced. Frequency could be reduced to three times annually, to reflect the months with the highest levels of bird use at the Salton Sea between 2016 and 2018 in fall, winter, and spring (September, February, and April, respectively) (Audubon California 2018; Jones, pers. comm., 2021). If additional monitoring is desired, conducting monitoring six times annually would capture composition, abundance, and distribution during the late winter, spring migration, breeding season, early fall, and early winter.	The survey protocol can be expanded to collect qualitative habitat information and establish repeatable permanent photo points to detect long-term changes in habitat quality. Bird distribution can be highly variable spatially and temporally, and across years. Avian survey locations should be stratified amongst habitat types and geographic localities. Variation in migratory species abundance may reflect factors beyond the Salton watershed, such as habitat availability elsewhere on the Pacific Flyway.	Bird use of the Salton Sea is a restoration target. Information on Sea-wide status and trends of bird species over time, including shifts in bird guilds, will guide management related to habitat projects (habitat design, performance monitoring). Survey locations should be stratified with consideration of future SSMP projects to provide reference data. One additional monitoring location near the southern Wister-Frink project area may be desirable.	Primary	CDFW (ongoing and historic); Audubon and Oasis Bird Observatory (ongoing)
Piscivorous bird surveys (aerial survey)	Piscivorous birds are a restoration target.	The aerial survey protocol is well-established.	May not detect smaller species from the plane.	Piscivorous birds are a restoration target. Data on the status and trends of piscivorous bird populations before and after implementation of habitat projects will support effectiveness monitoring and inform the need for construction of different habitat types.	Primary	CDFW (ongoing)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Colonial breeding bird surveys	Rocky outcrops on Mullet Island once provided important habitat for colonial breeding birds (cormorants) before the receding Salton Sea exposed a land bridge for terrestrial predators. Monitoring can identify where and whether colonial breeders (such as cormorants that use rocky nest sites, herons that use trees and inundated snags) are still breeding at the Salton Sea.	The aerial survey protocol is well-established.	A direct aerial count of breeding pairs can be unreliable. Nesting pairs would be estimated from photographs or videos.	Monitoring is necessary to document status and trends of nesting bird colonies during the breeding season before and after implementation of SSMP habitat projects, as well as to inform the need for construction of different habitat types to support nesting colonies.	Primary	CDFW (ongoing)
Colonial roosting bird surveys	Roosting habitat is a key habitat element for some colonial bird species. The locations could be located in the shoreline, halophytic scrub, agricultural land, or created freshwater impoundment geographic strata (Case et al. 2013).	The aerial survey protocol is well-established.	Surveys provide a “snapshot” of bird use on the day of each survey and do not provide precise quantitative estimates of comprehensive bird use at roost sites around the Salton Sea.	Monitoring could be informative to document the status and trends of roosting bird colonies during the wintering season, as species such as double-crested cormorants may utilize different habitats during winter. Monitoring would inform status and trends before and after implementation of SSMP habitat projects, and would inform the need for construction of different habitat types to support roosting colonies.	Secondary	
Marsh bird surveys	Wetlands around the Sea provide important habitat for marsh birds, including sensitive species. Managed wetlands are minimally affected by Sea hydrology. Natural wetlands emerging on the exposed playa could provide more habitat for marsh bird species.	Marsh bird survey protocols are well-established. Surveys are currently focused on managed wetlands. Protocol surveys are time/staff intensive.	Marsh bird survey protocols are well-established.	Yuma Ridgway’s rail is federally listed as endangered and black rail is a state species of concern. Marsh bird data (presence, relative abundance, distribution) in managed marshes and wetlands emerging at/near restoration projects will be useful for management of these sensitive species. Marsh establishment may be a limiting factor in the development of SSMP projects, given the presence of fully protected species. Monitoring would characterize the existing marsh bird use (abundance and distribution) and identify status and trends in bird use of marsh areas at the Salton Sea, which would provide important information to help guide future SSMP	Primary	CDFW

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
				management actions. Monitoring before and after implementation of SSMP habitat projects would help inform the need for construction of different habitat types. Marsh habitat will be closely associated with SSMP projects because marsh habitat has become established on and/or adjacent to the locations of many projects proposed under the SSMP.		
Dead and sick-bird counts	Lower priority; CDFW is responsible for management actions related to avian disease, though not directly informative of SSMP projects. Salton Sea has historically had a high frequency of avian disease outbreaks, and scientists have expressed concerns that disease outbreaks may increase as salinity increases in the Sea, given avian distribution patterns (e.g., high densities at freshwater inflows).	Access may be difficult in some locations such as private lands, or on lands requiring encroachment permits. Some areas may be inaccessible because access by water and on shorelines is limited by the presence of sands, mud, and muck.		Monitoring would document trends in avian disease before and after implementation of SSMP habitat projects, and could potentially inform the design and management of constructed habitats to minimize the risk of avian outbreaks.	Secondary	
Biological Resources—Fish						
General fish surveys	Provide a forage base for fish-eating bird species. Abundance and size distribution are key metrics of fish population size and recruitment success. In the past, high abundance of tilapia (an omnivorous feeder of algae and water column invertebrates) may have affected the trophic structure of invertebrates and birds that feed on this species. Rising salinity and periodic anoxic events have depressed populations of fish in the open water.	Accessibility may be limited; thus, sampling locations will depend on access to the Sea.	A combination of beach seining, a longer bag seine net deployed via a small boat, and gill netting may be used to sample a variety of fish.	Monitoring can be used to inform the need for construction of different habitat types (e.g., ponds).	Primary	

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Biological Resources—Plankton and Macroinvertebrates						
Primary productivity (chlorophyll *a* is measured via water quality sampling)	Good general indicator of general primary productivity by green algae, which is a foundation of the aquatic food web.	Easily measured as part of water quality monitoring using a sonde or grab sample for lab analysis.		Good indicator of general productivity and eutrophication, which could inform the design and management of created impoundments. Does not inform which species of green algae are present, or the presence of other primary producers (cyanobacteria).	Primary	CDFW
Phytoplankton surveys	Indicator of Salton Sea ecosystem health; key food source for zooplankton.	Access may be difficult in some locations, given limitations on boat launching sites. Requires specialized lab analysis for species identification.	High seasonal variability likely.		Secondary	CDFW
Zooplankton surveys	Key food source for fish and invertebrate-foraging birds. Abundance and diversity can be indicative of water quality and prey availability.	Access may be difficult in some locations, given limitations on boat launching sites. Requires specialized lab analysis for species identification.	High seasonal variability likely.		Secondary	CDFW
Macroinvertebrate (water column and benthic) surveys	Macroinvertebrates (boatmen, pileworms if present, brine fly larvae, brine shrimp) are a key food source for birds and fish. Abundance and diversity can be indicative of water quality and prey availability.	Access may be difficult in some locations, given limitations on boat launching sites. Requires specialized lab analysis for species identification.	High seasonal variability likely.	Certain species can be indicative of water quality as per the guidelines of the State Water Resource Water Board's Surface Water Ambient Monitoring Program.	Primary	CDFW Audubon (ongoing with bird shoreline survey)
Cyanobacteria and harmful algal blooms	The algal community may shift from phytoplankton (green algae) to species that form harmful algal blooms (HABs) such as cyanobacteria (blue-green algae), diatoms and dinoflagellates. Blooms and die-offs of toxin-producing algae can adversely affect conditions (anoxia, toxicitiy) for aquatic life and human beneficial uses.	Opportunistic visual observations of algal blooms would be noted in the field as they occur. Remote sensing technologies allow daily assessment of algal blooms in specific regions of the Salton Sea, and differentiation of algal biomass from the green in color "gypsum blooms." HAB species can be identified by algal pigment fluorometry (cyanobacteria), and microcroscopy and/or DNA probes (diatoms and dinoflagellates).	Cyanobacteria blooms are episodic depending on conditions (warm, still water) and difficult to predict. The salinity range of various HAB species is unknown. trends with increasing salinity.	Cyanotoxins from harmful algal blooms can affect public health and avian health. Algal blooms affect aquatic productivity and habitat suitability for fish and wildlife. Information from other saline lakes (e.g. Great Salt Lake) could help predict future	Primary	None

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Microbial loop	As water quality changes (increasing salinity, temperature, nutrients), the microbial community (cyanobacteria) may become the dominant basis of the food chain. When HAB-forming species dominate the phytoplankton community, the transfer of carbon to zooplankton and higher trophic levels is interrupted because zooplankton do not graze on these HAB species and carbon may instead enter the microbial food web.	Identification of microbiota requires specialized expertise. Species can be identified by algal pigment fluorometry (cyanobacteria), and microcroscopy and/or DNA probes (diatoms and dinoflagellates).	Cyanobacteria blooms are episodic depending on conditions (warm, still water) and difficult to predict. The salinity tolerance of various species is unknown.	Understanding the algal community composition will increase understanding of food web processes and habitat suitability for species using the Salton Sea open water and nearshore habitats. This information can also inform design and management of created ponds.	Focused Study	None
Biological Resources—Special-Status Species						
Desert pupfish surveys	Desert pupfish are one of the only native fish species in the Salton Basin (shoreline pools, small tributaries, and drains).	Sampling with minnow traps in small tributaries and drains is a proven method. Placement of traps is dependent on access permission (irrigation drains). Requires a federal collecting permit.	Many of the localities that support pupfish have highly variable flows (seasonal, spatial). Pupfish abundance and distribution can be highly variable.	Desert pupfish is a protected species (federal and state endangered). Restoration projects should minimize impacts, and where feasible, should contribute to recovery. Pupfish are expected to use created impoundments. Data on pupfish distribution and abundance/condition will be important to minimize and mitigate impacts from projects. Habitat information collected during pupfish surveys (flows, aquatic vegetation, other fish species) can be used to assess site suitability for supporting pupfish. Habitat conditions in constructed ponds are expected to be suitable for desert pupfish, which can contribute to species recovery. The primary purpose in some ponds (e.g., SCH ponds) is to provide forage fish for the piscivorous birds, not to serve as a pupfish refuge; however, there are other ponds (e.g., 25-acre CVWD mitigation habitat) where the primary purpose will be to create habitat for desert pupfish.	Primary	CDFW (ongoing), IID (past periodically)

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
Southwestern willow flycatcher surveys	Nests in riparian woody habitat, which is expanding in some areas where drains discharge directly on the exposed playa.	Established survey protocol (e.g., USGS southwestern willow flycatcher protocol). Implemented annually by IID in managed marsh.		The southwestern willow flycatcher is federally listed as endangered.	Primary	IID (ongoing)
Western snowy plover surveys	The Salton Sea is a key interior breeding habitat for this species. The species breeds along the Salton Sea shoreline.	Access to private lands will require permission and possibly encroachment permits. Some shoreline areas may be inaccessible due to soft substrates (sands, mud, and muck).		The interior western snowy plover is not a population of concern under the federal Endangered Species Act. Species presence should be considered in project placement and design in order to avoid impacts.	Secondary	
Socioeconomics						
Public participation at SSMP events	Monitoring the effectiveness of public engagement (the accessibility and extent to which the goals of the SSMP are understood by the public) is important in understanding how surrounding communities understand the environmental conditions at the Sea and the goals and projects of the SSMP.	These monitoring efforts will build on existing public engagement monitoring efforts conducted by DWR: • Attendance at meetings and events • Use of electronic media (website visits, newsletters) • Social media engagement (secondary) • Surveys and focus groups An effort should be made to repeat methods of engagement to provide interpretable data. Changes in outreach methods that result from participation monitoring results should be documented.	These indicators are quantifiable and repeatable. Changes in the methods of public participation and the team tracking participation over time should be documented and included in the reporting.	Evaluating the effectiveness of public engagement—including the degree to which it is accessible and follows the public engagement plan—is important, as it may inform further refinements of the public engagement plan. Better public engagement will elicit public input that will contribute to prioritizing and refining management actions.	Primary	DWR
Community benefits	Tracking community benefits created by the SSMP will promote further understanding of the relationship between the surrounding community and SSMP projects and of whether SSMP projects are addressing community interests and needs.	Track local jobs created by direct hiring/spending by DWR. Induced job creation will be tracked using IMPLAN multipliers based on direct spending. Tracking of community benefits will be done by DWR and will involve documenting project components that result in increases in recreation, access, etc. These will	Because jobs indirectly created by DWR projects will be estimated using IMPLAN projections, these data may produce a completely accurate picture of local jobs created by DWR projects. Findings from IMPLAN modeling should be ground-truthed by using annual, regional job data from the California Employment Development Department.	Monitoring community benefits that result from SSMP projects and/or funding identified or facilitated by DWR will document the extent to which projects are addressing diverse community needs and interests. This information will be used to guide community outreach and engagement in the siting, design, and management of future SSMP projects.	Primary	DWR

Indicator	Conceptual Relevance	Feasibility of Implementation	Response Variability	Interpretation and Utility	Priority	Implementing Partner
		be documented at the completion of each SSMP project.				
Economic indicators	Establish a baseline understanding of economic conditions of the communities around the Salton Sea that may inform implementation of SSMP projects. Near-term implementation of management actions to control dust and restore habitat are not expected to directly and measurably affect economic indicators. Information about general economic conditions will provide a better context for understanding the economic needs and overall socioeconomic health of the communities surrounding the Salton Sea. This will inform prioritization and implementation of management actions.	U.S. Census Bureau data are free and available for communities of various sizes around the Salton Sea. The five-year estimates from the American Community Survey should be used to increase the statistical reliability of the data gathered while annual data are also gathered.	Near-term projects implemented by the SSMP are not expected to directly measurably affect indicators gathered from U.S. Census Bureau data forms. To increase the ability of these data to provide useful information about economic conditions in communities around the sea, data should be gathered for a variety of geographies (i.e., at the county scale, the census tract level, and the community-wide level around the Salton Sea) to capture changes on both the regional and community level and to capture changes in economic conditions in all communities around the Sea.	Monitoring economic indicators may inform the prioritization of SSMP actions with respect to economic need in the communities around the Salton Sea and maintain an up-to-date understanding of the region's overall socioeconomic health to inform program implementation.	Secondary	DWR

NOTES: °C = degrees Celsius; µS/cm = microsiemens per centimeter; Audubon = Audubon California; CDFW = California Department of Fish and Wildlife; cfs = cubic feet per second; CVWD = Coachella Valley Water District; DO = dissolved oxygen; DWR = California Department of Water Resources; EC = electrical conductivity; IID = Imperial Irrigation District; MAP = Salton Sea Ecosystem Monitoring and Assessment Plan; mg/L = milligrams per liter; mph = miles per hour; N = nitrogen; NO_X = nitrogen oxides; P = phosphorus; $PM_{2.5}$ = particulate matter 2.5 micrometers and smaller; PM_{10} = particulate matter 10 micrometers and smaller in aerodynamic diameter; Reclamation = U.S. Bureau of Reclamation; SALSA2 = Salton Sea Elevation Model version 2; SCH = Salton Sea Species Conservation Habitat Project; Se = selenium; Sea = Salton Sea; SSMP = Salton Sea Management Program; TDS = total dissolved solids; USGS = U.S. Geological Survey

SOURCE: Data compiled by Environmental Science Associates in 2022

Sources

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Salton Sea Authority

Memorandum

To: Salton Sea Authority Board of Directors

From: G. Patrick O'Dowd, Executive Director /GM

Date: February 15, 2024

Re: Desert Shores Amended Scope of Work - Gafcon, Inc.

On November 16, 2023, this board ratified a contract between Gafcon, Inc. and the Salton Sea Authority for a preliminary scope of work related to the Desert Shores Project. Gafcon's efforts since execution thereof has identified additional evaluative and preliminary work necessary to get this project to the point where it can be successfully designed and built. Attached is the revised scope of work (SOW), which is segregated into two components:

Preliminary Project Feasibility Assessment	$50,000.00
Community Engagement	$15,000.00
Total Scope of Work	$65,000.00

The project team has reviewed this revised SOW and is aligned herewith.

Staff Recommendation: Approve amended scope of work, subject to confirming with the Bureau of Reclamation that sufficient funds are available to cover the proposed SOW under the grant agreement.

Scope of Work to the Agreement for Services
The Salton Sea Authority and Gafcon, Inc.
dated October 24, 2023
Amended as of February 15, 2024

The following Scope of Work for the Desert Shores Restoration Project as limited to special services under Government Code Section 53060 and includes a summary of the professional services which shall be performed by Gafcon:

A. Preliminary Project Feasibility Assessment

Perform and manage the review of the project scope, technical feasibility, financial feasibility, operational feasibility of the Desert Shores Renovation Project for the purposes of aligning with the goals and objectives developed by the Salton Sea Authority, as follows:

- Identification of key stakeholders and their respective roles.
- Facilitate meetings with stakeholders and consultants as required.
- Review project history and available data.
- Review and analyze project description and CEQA/NEPA status.
- Review design documents, if any.
- Consult with project retained engineers on technical feasibility and challenges.
- Perform **Stakeholder Engagement**.
- Based on stakeholder engagement, project scope, and other inputs, develop a draft **Project Charter** to renovate the Desert Shores Project
- Develop **Preliminary Project Schedule**.
- Develop a **Preliminary Project Cost (Budget) Estimate** which includes **Sustainment (O&M) Costs** and the assemblage of existing budget funds available for the Project and identification of gap funding required, and potential strategies to secure additional funding resources.
- Perform **Project Risk Analysis** on known risks and recommended responses.

B. Community Engagement:

As directed by the Salton Sea Authority, Gafcon shall conduct public meetings, workshops (AKA Charrettes), and community presentations relating to the project and obtain community feedback on the project.

C. Project Deliverables

- **Community Charrette Report** of findings and recommend strategies of ongoing engagement/updates.
- Revised Desert Shores Renovation **Project Charter and Scope**
- Preliminary Desert Shores Renovation **Project Schedule**
- Preliminary Desert Shores Renovation **Project Budget**
- Current identification of **Risks** and recommended **Responses**

D. Project Schedule

- All Project Deliverables noted above shall be completed and delivered to the Salton Sea Authority no later than May 24, 2024.

COMPENSATION

Gafcon shall provide the services outlined in the above Scope of Work on a time and materials basis for the following:

A. Preliminary Project Feasibility Assessment: not-to-exceed amount of $50,000.00

B. Community Engagement: budget allowance of $15,000.00

Total Estimated Fee: $65,000.00

PROFESSIONAL	NAME	HOURLY RATE
Chief Development Officer	Bryan Benso	$200
Project Executive	Paul Najar	$195
Water Consultant	Henry Martinez	$185
Senior Architect and Planner	Jeff Causey	$175
Project Manager	Norman Aiello	$175
Stakeholder Relations Coordinator	Ben Hueso	$160
Project Coordinator	Mitzi Barnes	$90

AGREEMENT FOR SERVICES

GAFCON, Inc.

THIS AGREEMENT FOR SERVICES ("Agreement"), made and entered into effective the 24th day of October, 2023, by and between the Salton Sea Authority, a California Joint Powers Agency ("AUTHORITY") and **GAFCON, Inc.**, a California corporation licensed to do business within the state of California ("CONSULTANT") (individually, "Party;" collectively, "Parties").

RECITALS

WHEREAS, AUTHORITY desires to retain a qualified individual, firm or business entity to provide Professional Project Management Services for the Restoring Habitat and Improving Air and Water Quality at the Salton Sea project; and

WHEREAS, CONSULTANT represents that it is qualified and experienced to perform the services; and

WHEREAS, AUTHORITY desires to engage CONSULTANT to provide services by reason of its qualifications and experience for performing such services, and CONSULTANT has offered to provide the required services for the Project on the terms and in the manner set forth herein.

NOW, THEREFORE, in consideration of their mutual covenants, AUTHORITY and CONSULTANT have and hereby agree to the following:

1. DEFINITIONS.

1.1. "Proposal" shall mean CONSULTANT's document entitled, "Salton Sea Authority Desert Shores" proposal dated September 6, 2023 and submitted to AUTHORITY's Executive Director. The Proposal is attached hereto as **Exhibit "A"** and incorporated herein this by reference.

2. CONTRACT COORDINATION.

2.1. The Executive Director or his/her designee shall be the representative of AUTHORITY for all purposes under this Agreement. The AUTHORITY's Executive Director or his/her designee is hereby designated as the Contract Manager for AUTHORITY. He/she shall supervise the progress and

execution of this Agreement. Subject to the he AUTHORITY's Projects Committee review and recommendation, the AUTHORITY's Executive Committee shall approve the original Agreement.

2.2. CONSULTANT shall assign a single Contract Manager to have overall responsibility for the progress and execution of this Agreement. Should circumstances or conditions subsequent to the execution of this Agreement require a substitute Contract Manager for any reason, the Contract Manager designee shall be subject to the prior written acceptance and approval of AUTHORITY's Contract Manager.

3. DESCRIPTION OF WORK.

CONSULTANT shall provide all materials and labor to perform this Agreement consistent with the Proposal, as set forth in **Exhibit "B."** In the event of a conflict amongst this Agreement and the Proposal, this Agreement shall take precedence over the Proposal.

4. WORK TO BE PERFORMED BY CONSULTANT.

4.1. CONSULTANT shall comply with all terms, conditions and requirements of the Proposal and this Agreement.

4.2. CONSULTANT shall perform such other tasks as necessary and proper for the full performance of the obligations assumed by CONSULTANT hereunder.

4.3. CONSULTANT shall:

4.3.1. Procure all permits and licenses, pay all charges and fees, and give all notices that may be necessary and incidental to the due and lawful prosecution of the services to be performed by CONSULTANT under this agreement;

4.3.2. Keep itself fully informed of all existing and proposed federal, state and local laws, ordinances, regulations, orders and decrees which may affect those engaged or employed under this Agreement;

4.3.3. At all times observe and comply with, and cause all of its employees to observe and comply with all of said laws, ordinances, regulations, orders and decrees mentioned above; and

4.3.4. Immediately report to AUTHORITY's Contract Manager in writing any discrepancy or inconsistency it discovers in said laws, ordinances, regulations, orders and decrees

mentioned above in relation to any plans, drawings, specifications or provisions of this Agreement.

5. REPRESENTATIONS BY CONSULTANT.

5.1. CONSULTANT understands and agrees that AUTHORITY has limited knowledge in the multiple areas specified in the Proposal. CONSULTANT has represented itself to be an expert in these fields and understands that AUTHORITY is relying upon such representation.

5.2. CONSULTANT represents and warrants that it is a lawful entity possessing all required licenses and authorities to do business in the State of California and perform all aspects of this Agreement.

5.3. CONSULTANT shall not commence any work under this Agreement or provide any other services, or materials, in connection therewith until CONSULTANT has received written authorization from AUTHORITY's Contract manager to do so.

5.4. CONSULTANT represents and warrants that the people executing this Agreement on behalf of CONSULTANT have the authority of CONSULTANT to sign this Agreement and bind CONSULTANT to the performance of all duties and obligations assumed by CONSULTANT herein.

5.5. CONSULTANT represents and warrants that any employee, contractor and/or agent who will be performing any of the duties and obligations of CONSULTANT herein possess all required licenses and authorities, as well as the experience and training, to perform such tasks.

5.6. CONSULTANT represents and warrants that the allegations contained in the Proposal are true and correct.

5.7. CONSULTANT understands that AUTHORITY considers the representations made herein to be material and would not enter into this Agreement with CONSULTANT if such representations were not made.

5.8. CONSULTANT understands and agrees not to discuss this Agreement or work performed pursuant to this Agreement with anyone not a party to this Agreement without the prior permission of AUTHORITY. CONSULTANT further agrees to immediately advise AUTHORITY of any contacts or inquiries made by anyone not a party to this Agreement with respect to work performed pursuant to this Agreement.

5.9. Prior to accepting any work under this Agreement, CONSULTANT shall perform a due diligence review of its files and advise AUTHORITY of any conflict or potential conflict CONSULTANT may have with respect to the work requested.

5.10. CONSULTANT understands and agrees that in the course of performance of this Agreement CONSULTANT may be provided with information or data considered by the owner or the AUTHORITY to be confidential. AUTHORITY shall clearly identify such information and/or data as confidential. CONSULTANT shall take all necessary steps necessary to maintain such confidentiality including but not limited to restricting the dissemination of all material received to those required to have such data in order for CONSULTANT to perform under this Agreement.

5.11. CONSULTANT represents that the personnel dedicated to this project as identified in CONSULTANT's Proposal, will be the people to perform the tasks identified therein. CONSULTANT will not substitute other personnel or engage any contractors to work on any tasks identified herein without prior written notice to AUTHORITY.

6. TERM OF AGREEMENT.

This Agreement shall commence on the date first written above and shall remain in effect for a period of one (1) year, with no extensions.

7. COMPENSATION.

7.1. AUTHORITY hereby agrees to pay CONSULTANT fees not to exceed amounts outlined in **Exhibit B** based on documented invoices submitted consistent with the requirements set forth in **Financial Assistance Agreement No. R22AC00215 Between Bureau of Reclamation and Salton Sea Authority for Restoring Habitat and Improving Air and Water Quality at the Salton Sea ("GRANT")**, a copy of which is attached as **Exhibit C.**

7.2. The fee for any additional services authorized by AUTHORITY will be computed upon actual hours and expenses incurred by CONSULTANT and based on CONSULTANT's current standard rates as set forth in the Proposal. Additional services or costs will not be paid without a prior written agreement between the Parties.

7.3. Except as provided under paragraph 7.1 and 7.2, AUTHORITY shall not be responsible to pay CONSULTANT any compensation, out of pocket expenses, fees, reimbursement of expenses or

other remuneration.

8. PAYMENT.

8.1. CONSULTANT shall bill AUTHORITY on a time and material basis as set forth in **Exhibit "A.",** but not to exceed amounts outlined in **Exhibit "B".** AUTHORITY shall pay CONSULTANT for completed and approved services upon presentation of its itemized billing in accordance with Section 9 hereafter.

8.2. AUTHORITY shall have the right to retain five percent (5%) of the total of amount of each invoice, not to exceed five percent (5%) of the total compensation amount of the completed project. "Completion of the Project" is when the work to be performed has been completed in accordance with this Agreement, as determined by AUTHORITY, and all subcontractors, if any, have been paid in full by CONSULTANT. Upon completion of the Project CONSULTANT shall bill AUTHORITY the retention for payment by AUTHORITY.

9. METHOD OF PAYMENT.

CONSULTANT shall at any time prior to the fifteenth (15^{th}) day of each April, July, October, and January, submit to AUTHORITY a written claim for compensation for services performed. The claim shall be in a format approved by AUTHORITY and required by the GRANT. No payment shall be made by AUTHORITY prior to the claims being approved in writing by AUTHORITY's Contract Manager or his/her designee. CONSULTANT may expect to receive payment within thirty (30) days after GRANT reimbursement is received by AUTHORITY.

10. TIME FOR COMPLETION OF THE WORK.

The Parties agree that time is of the essence in the performance of this Agreement. Program scheduling shall be as described in Exhibits unless revisions are approved by both AUTHORITY's Contract Manager and CONSULTANT's Contract Manager. Time extensions may be allowed for delays caused by AUTHORITY, other governmental agencies or factors not directly brought about by the negligence or lack of due care on the part of CONSULTANT.

11. MAINTENANCE AND ACCESS OF BOOKS AND RECORDS.

CONSULTANT shall maintain books, records, documents, reports and other materials developed under this Agreement as follows:

11.1. CONSULTANT shall maintain all ledgers, books of accounts, invoices, vouchers, canceled checks, and other records relating to CONSULTANT's charges for services or expenditures and disbursements charged to AUTHORITY for a minimum period of three (3) years, or for any longer period required by law, from the date of final payment to CONSULTANT pursuant to this Agreement.

11.2. CONSULTANT shall maintain all reports, documents, and records, which demonstrate performance under this Agreement for a minimum period of five (5) years, or for any longer period required by law, from the date of termination or completion of this Agreement.

11.3. Any records or documents required to be maintained by CONSULTANT pursuant to this Agreement shall be made available to AUTHORITY for inspection or audit at any time during CONSULTANT's regular business hours provided that AUTHORITY provides CONSULTANT with seven (7) days advanced written or e-mail notice. Copies of such documents shall, at no cost to AUTHORITY, be provided to AUTHORITY for inspection at CONSULTANT's address indicated for receipt of notices under this Agreement.

12. SUSPENSION OF AGREEMENT.

AUTHORITY's Contract Manager shall have the authority to suspend this Agreement, in whole or in part, for such period as deemed necessary due to unfavorable conditions or to the failure on the part of CONSULTANT to perform any provision of this Agreement. CONSULTANT will be paid the compensation due and payable to the date of suspension.

13. TERMINATION.

AUTHORITY retains the right to terminate this Agreement for any reason by notifying CONSULTANT in writing twenty (20) days prior to termination and by paying the compensation due and payable to the date of termination; provided, however, if this Agreement is terminated for fault of CONSULTANT, AUTHORITY shall be obligated to compensate CONSULTANT only for that portion of CONSULTANT's services which are of benefit to AUTHORITY. Said compensation is to be arrived at by mutual agreement between AUTHORITY and CONSULTANT; should the parties fail to agree on said compensation, an independent arbitrator shall be appointed and the decision of the arbitrator shall be binding upon the parties.

14. INSPECTION.

CONSULTANT shall furnish AUTHORITY with every reasonable opportunity for AUTHORITY to ascertain that the services of CONSULTANT are being performed in accordance with the requirements and intentions of this Agreement. All work done and materials furnished, if any, shall be subject to AUTHORITY's Contract Manager's inspection and approval. The inspection of such work shall not relieve CONSULTANT of any of its obligations to fulfill its Agreement as prescribed.

15. OWNERSHIP OF MATERIALS.

All original drawings, videotapes, studies, sketches, computations, reports, information, data and other materials given to or prepared or assembled by or in the possession of CONSULTANT pursuant to this Agreement shall become the permanent property of AUTHORITY and shall be delivered to AUTHORITY upon demand, whether or not completed, and shall not be made available to any individual or organization without the prior written approval of AUTHORITY.

16. INTEREST OF CONSULTANT.

16.1. CONSULTANT covenants that it presently has no interest, and shall not acquire any interest, direct or indirect, financial or otherwise, which would conflict in any manner or degree with the performance of the services hereunder.

16.2. CONSULTANT covenants that, in the performance of this Agreement, no sub-contractor or person having such an interest shall be employed.

16.3. CONSULTANT certifies that no one who has or will have any financial interest under this Agreement is an officer or employee of AUTHORITY.

17. INDEMNIFICATION.

17.1. CONSULTANT agrees to the fullest extent permitted by law to indemnify, defend, protect and hold AUTHORITY and its representatives, officers, directors, designees, employees, successors and assigns harmless from any and all claims, expenses, liabilities, losses, causes of actions, demands, losses, penalties, attorneys' fees and costs, in law or equity, of every kind and nature whatsoever arising out of or in connection with CONSULTANT's negligent acts and omissions or willful misconduct under this Agreement ("Claims"), whether or not arising from the passive negligence of AUTHORITY, but does not include Claims that are the result of the negligence or willful misconduct of AUTHORITY.

17.2. CONSULTANT agrees to defend with counsel acceptable to AUTHORITY, indemnify and hold AUTHORITY harmless from all Claims, including but not limited to:

17.2.1. Personal injury, including but not limited to bodily injury, emotional injury, sickness or disease or death to persons including but not limited to AUTHORITY's representatives, officers, directors, designees, employees, agents, successors and assigns, subcontractors and other third parties and/or damage to property of anyone (including loss of use thereof) arising out of CONSULTANT's negligent performance of, or willful misconduct surrounding, any of the terms contained in this Agreement, or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable;

17.2.2. Liability arising from injuries to CONSULTANT and/or any of CONSULTANT's employees or agents arising out of CONSULTANT's negligent performance of, or willful misconduct surrounding, any of the terms contained in this Agreement, or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable;

17.2.3. Penalties imposed upon account of the violation of any law, order, citation, rule, regulation, standard, ordinance or statute caused by the negligent action or inaction, or willful misconduct of CONSULTANT or anyone directly or indirectly employed by CONSULTANT or anyone for whose acts CONSULTANT may be liable;

17.2.4. Infringement of any patent rights which may be brought against AUTHORITY arising out of CONSULTANT's work;

17.2.5. Any violation or infraction by CONSULTANT of any law, order, citation, rule, regulation, standard, ordinance or statute in any way relating to the occupational health or safety of employees; and

17.2.6. Any breach by CONSULTANT of the terms, requirements or covenants of this Agreement.

17.3. These indemnification provisions shall extend to Claims occurring after this Agreement is terminated, as well as while it is in force.

18. <u>INDEPENDENT CONTRACTOR</u>.

In all situations and circumstances arising out of the terms and conditions of this Agreement,

CONSULTANT is an independent contractor, and as an independent contractor, the following shall apply:

18.1. CONSULTANT is not an employee or agent of AUTHORITY and is only responsible for the requirements and results specified by this Agreement or any other agreement.

18.2. CONSULTANT shall be responsible to AUTHORITY only for the requirements and results specified by this Agreement and except as specifically provided in this Agreement, shall not be subject to AUTHORITY's control with respect to the physical actions or activities of CONSULTANT in fulfillment of the requirements of this Agreement.

18.3. CONSULTANT is not, and shall not be, entitled to receive from, or through, AUTHORITY, and AUTHORITY shall not provide, or be obligated to provide, CONSULTANT with Workers' Compensation coverage or any other type of employment or worker insurance or benefit coverage required or provided by any Federal, State or local law or regulation for, or normally afforded to, an employee of AUTHORITY.

18.4. CONSULTANT shall not be entitled to have AUTHORITY withhold or pay, and AUTHORITY shall not withhold or pay, on behalf of CONSULTANT, any tax or money relating to the Social Security Old Age Pension Program, Social Security Disability Program, or any other type of pension, annuity, or disability program required or provided by any Federal, State or local law or regulation.

18.5. CONSULTANT shall not be entitled to participate in, nor receive any benefit from, or make any claim against any AUTHORITY fringe program, including, but not limited to, AUTHORITY's pension plan, medical and health care plan, dental plan, life insurance plan, or any other type of benefit program, plan, or coverage designated for, provided to, or offered to AUTHORITY's employees.

18.6. AUTHORITY shall not withhold or pay, on behalf of CONSULTANT, any Federal, State, or local tax, including, but not limited to, any personal income tax, owed by CONSULTANT.

18.7. CONSULTANT is, and at all times during the term of this Agreement, shall represent and conduct itself as an independent contractor, not as an employee of AUTHORITY.

18.8. CONSULTANT shall not have the authority, express or implied, to act on behalf of, bind

or obligate AUTHORITY in any way without the written consent of AUTHORITY.

19. INSURANCE.

19.1. CONSULTANT agrees at its own cost and expense to procure and maintain during the entire term of this Agreement, and any extended term, commercial general liability insurance (bodily injury and property damage), employer's liability insurance, commercial automobile liability insurance (bodily injury and property damage) and professional liability insurance in a sum acceptable to AUTHORITY and adequate to cover potential liabilities arising in connection with the performance of this Agreement and in any event not less than the minimum limit set forth as follows:

Insurance	Minimum Limit
Errors & Omissions Coverage (professional liability – malpractice)	One million dollars ($1,000,000.00) Per person, per occurrence.
Workers' Compensation, Coverage A	Statutory
Employer's Liability, Coverage B	One million dollars ($1,000,000.00)
Commercial General Liability (Including Contractual Liability) Bodily Injury Property Damage	One million dollars ($1,000,000.00) combined single limit to any one person ("CSL") and two million dollars ($2,000,000.00) aggregate for any one accident, including personal injury, death and property damage.
Commercial Automobile Liability (owned, hired & non-owned vehicles)	One hundred thousand dollars ($100,000) combined single limit and three hundred thousand dollars ($300,000) aggregate, including owned, non-owned and hired vehicles.

19.2. Special Insurance Requirements. All insurance required shall:

19.2.1. Be procured from California admitted insurers (licensed to do business in California) with a current rating by Best's Key Rating Guide, acceptable to AUTHORITY. A rating of

at least A-VII shall be acceptable to AUTHORITY; lesser ratings must be approved in writing by AUTHORITY.

19.2.2. Be primary coverage as respects AUTHORITY and any insurance or self-insurance maintained by AUTHORITY shall be in excess of CONSULTANT's insurance coverage and shall not contribute to it.

19.2.3. Name AUTHORITY and their officers, employees, and volunteers as additional insured on all policies, except Workers' Compensation insurance and Errors & Omissions insurance, and provide that AUTHORITY may recover for any loss suffered by AUTHORITY due to CONSULTANT's negligence.

19.2.4. State that it is primary insurance and regards AUTHORITY as an additional insured and contains a cross-liability or severability of interest clause.

19.2.5. Not be canceled, non-renewed or reduced in scope of coverage until after thirty (30) days written notice has been given to AUTHORITY. CONSULTANT may not terminate such coverage until it provides AUTHORITY with proof that equal or better insurance has been secured and is in place. Cancellation or change without prior written consent of AUTHORITY shall, at the option of AUTHORITY, be grounds for termination of this Agreement.

19.2.6. If this Agreement remains in effect more than one (1) year from the date of its original execution, AUTHORITY may, at its sole discretion, require an increase to liability insurance to the level then customary in similar AUTHORITY Agreements by giving sixty (60) days notice to CONSULTANT.

19.3. Additional Insurance Requirements.

19.3.1. AUTHORITY is to be notified immediately of all insurance claims. AUTHORITY is also to be notified if any aggregate insurance limit is exceeded.

19.3.2. The comprehensive or commercial general liability shall contain a provision of endorsements stating that such insurance:

a. Includes contractual liability;

b. Does not contain any exclusions as to loss or damage to property caused by

explosion or resulting from collapse of buildings or structures or damage to property underground, commonly referred to by insurers as the "XCU Hazards;"

c. Does not contain a "pro rata" provision which looks to limit the insurer's liability to the total proportion that its policy limits bear to the total coverage available to the insured;

d. Does not contain an "excess only" clause which require the exhaustion of other insurance prior to providing coverage;

e. Does not contain an "escape clause" which extinguishes the insurer's liability if the loss is covered by other insurance;

f. Includes AUTHORITY as an additional insured.

g. States that it is primary insurance and regards AUTHORITY as an additional insured and contains a cross-liability or severability of interest clause.

19.4. Deposit of Insurance Policy. Promptly on issuance, reissuance, or renewal of any insurance policy required by this Agreement, CONSULTANT shall, if requested by AUTHORITY, provide AUTHORITY satisfactory evidence that insurance policy premiums have been paid together with a duplicate copy of the policy or a certificate evidencing the policy and executed by the insurance company issuing the policy or its authorized agent.

19.5. Certificates of Insurance.

CONSULTANT agrees to provide AUTHORITY with the following insurance documents on or before the effective date of this Agreement:

19.5.1. Complete copies of certificates of insurance for all required coverages including additional insured endorsements shall be attached hereto as **Exhibit "D"** and incorporated herein.

19.5.2. The documents enumerated in this Paragraph shall be sent to the following:

Salton Sea Authority
Attention: Executive Director
82995 Highway 111
Suite 200
Indio CA 92201

19.6. Additional Insurance. Nothing in this, or any other provision of this Agreement, shall be

construed to preclude CONSULTANT from obtaining and maintaining any additional insurance policies in addition to those required pursuant to this Agreement.

20. WORKERS' COMPENSATION CERTIFICATION.

20.1. Prior to the commencement of work, CONTRACTOR shall sign and file with AUTHORITY the following certification: "I am aware of the provisions of California Labor Code §§3700 et seq. which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

20.2. This certification is included in this Agreement and signature of the Agreement shall constitute signing and filing of the certificate.

20.3. CONSULTANT understands and agrees that any and all employees, regardless of hire date, shall be covered by Workers' Compensation pursuant to statutory requirements prior to beginning work on the Project.

20.4. If CONSULTANT has no employees, initial here: _____.

21. ASSIGNMENT.

Neither this Agreement nor any duties or obligations hereunder shall be assignable by CONSULTANT without the prior written consent of AUTHORITY. CONSULTANT may employ other specialists to perform services as required with prior approval by AUTHORITY.

22. NON-DISCRIMINATION.

During the performance of this Agreement, CONSULTANT and its subcontractors shall not unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over forty (40)), marital status and denial of family care leave. CONSULTANT and its subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. CONSULTANT and its subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, §7285 et seq.). The applicable

regulations of the Fair Employment and Housing Commission implementing Government Code §12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Agreement by reference and made a part hereof as if set forth in full. The applicable regulations of §504 of the Rehabilitation Act of 1973 (29 U.S.C. §794 (a)) are incorporated into this Agreement by reference and made a part hereof as if set forth in full. CONSULTANT and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement. CONSULTANT shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under this Agreement.

23. NOTICES AND REPORTS.

23.1. Any notice and reports under this Agreement shall be in writing and may be given by personal delivery or by mailing by certified mail, addressed as follows:

AUTHORITY	**CONSULTANT**
Salton Sea Authority Attention: Executive Director 82995 Highway 111 Suite 200 Indio CA 92201	GAFCON, Inc. 10301 Meanley Drive, Suite 225 San Diego, CA 92131

23.2. Notice shall be deemed to have been delivered only upon receipt by the Party, seventy-two (72) hours after deposit in the United States mail or twenty-four (24) hours after deposit with an overnight carrier.

23.3. The addressees and addresses for purposes of this paragraph may be changed to any other addressee and address by giving written notice of such change. Unless and until written notice of change of addressee and/or address is delivered in the manner provided in this paragraph, the addressee and address set forth in this Agreement shall continue in effect for all purposes hereunder.

24. ENTIRE AGREEMENT.

This Agreement contains the entire Agreement between COUNTY and CONSULTANT relating to the transactions contemplated hereby and supersedes all prior or contemporaneous agreements, understandings, provisions, negotiations, representations, or statements, either written or oral.

25. MODIFICATION.

No modification, waiver, amendment, discharge, or change of this Agreement shall be valid unless the same is in writing and signed by both Parties.

26. CAPTIONS.

Captions in this Agreement are inserted for convenience of reference only and do not define, describe or limit the scope or the intent of this Agreement or any of the terms thereof.

27. PARTIAL INVALIDITY.

If any provision in this Agreement is held by a court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

28. GENDER AND INTERPRETATION OF TERMS AND PROVISIONS.

As used in this Agreement and whenever required by the context thereof, each number, both singular and plural, shall include all numbers, and each gender shall include a gender. CONSULTANT as used in this Agreement or in any other document referred to in or made a part of this Agreement shall likewise include the singular and the plural, a corporation, a partnership, individual, firm or person acting in any fiduciary capacity as executor, administrator, trustee or in any other representative capacity or any other entity. All covenants herein contained on the part of CONSULTANT shall be joint and several if more than one person, firm or entity executes the Agreement.

29. WAIVER.

No Waiver of any breach or of any of the covenants or conditions of this Agreement shall be construed to be a waiver of any other breach or to be a consent to any further or succeeding breach of the same or any other covenant or condition.

30. CHOICE OF LAW.

This Agreement shall be governed by the laws of the State of California. This Agreement is made and entered into in Imperial County, California. Any action brought by either party with respect to this agreement shall be brought in a court of competent jurisdiction within said County.

31. AUTHORITY.

31.1. Each individual executing this Agreement on behalf of CONSULTANT represents and warrants that:

31.1.1. He/She is duly authorized to execute and deliver this Agreement on behalf of CONSULTANT;

31.1.2. Such execution and delivery is in accordance with the terms of the Articles of Incorporation or Partnership, any by-laws or Resolutions of CONSULTANT and;

31.1.3. This Agreement is binding upon CONSULTANT accordance with its terms.

31.2. CONSULTANT shall deliver to AUTHORITY evidence acceptable to AUTHORITY of the foregoing within thirty (30) days of execution of this Agreement.

32. COUNTERPARTS.

This Agreement (as well as any amendments hereto) may be executed in any number of counterparts, each of which when executed shall be an original, and all of which together shall constitute one and the same Agreement. No counterparts shall be effective until all Parties have executed a counterpart hereof.

33. REVIEW OF AGREEMENT TERMS.

33.1. Each Party has received independent legal advice from its attorneys with respect to the advisability of making the representations, warranties, covenants and agreements provided for herein, and with respect to the advisability of executing this Agreement.

33.2. Each Party represents and warrants to and covenants with the other Party that:

33.2.1. This Agreement in its reduction to final written form is a result of extensive good faith negotiations between the Parties and/or their respective legal counsel;

33.2.2. The Parties and their legal counsel have carefully reviewed and examined this Agreement for execution by said Parties; and

33.3. Any statute or rule of construction that ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

34. NON-APPROPRIATION.

This Agreement is based upon the availability of public funding. In the event that public funds are unavailable and not appropriated for the performance of the services set forth in this Agreement, the

Agreement shall be terminated without penalty after written notice to CONSULTANT of the unavailability and/or non-appropriation of funds.

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IN WITNESS WHEREOF, the Parties have executed this Agreement on the day and year first above written.

Salton Sea Authority

By: _____

G. Patrick O'Dowd
Executive Director

GAFCON Inc.

By: _____

DocuSigned by:
602D3A60E731499...

Robin Duveen
Co-Chief Executive Officer

EXHIBIT A

SALTON SEA AUTHORITY
DESERT SHORES

September 6, 2023

gafcon

TABLE OF CONTENTS

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FIRM PROFILE

Gafcon is a multi-disciplinary owners' representative firm with expertise in planning and managing complex development projects. With a local presence in County of Imperial, we are known throughout Southern California for providing unparalleled service and value to clients.

For more than 35 years, we have provided a broad range of real estate development, community engagement, program planning, project management, technology, and design related services to public and private clients.

With more than 150 accomplished professionals serving both in-house and on-site, our size provides us with the resources to meet our clients' needs efficiently and effectively while providing unique solutions that delight our clients.

Our in-depth knowledge of the real estate and development industry and its business issues gives us a unique combination of practical experience and intellectual acumen that we deliver to every client. Our business philosophy is client-centric: we treat our clients' challenges as our own. Staying ahead of trends within the development industry enables Gafcon to forecast the future of real estate development, proactively anticipating our clients' needs and focusing our services to deliver innovative solutions to complex problems.

TOP 50 PM/CM FIRMS IN THE NATION

Gafcon has been recognized in Engineering News Record as one of the Top 50 Program Management Firms in the nation. Constructech Magazine presented Gafcon with a Vision Award for our use of technology in Program Management. Services include:

- Entitlement Planning
- Real Estate Advisory
- Constructability Review
- Construction Claims
- Construction Management
- Cost Estimating/Management
- Labor Relations
- Planning/Programming
- Program/Project Controls
- Program/Project Management
- Scheduling
- Technology Solutions

CLIENT SERVICE

Our team is committed to providing excellent service to our clients through the quality of the services we provide. Our core values for client service are based on the following key steps:

1. Voice of the client – from day one, we will identify, prioritize, document, and assess the Salton Sea Authority's client quality requirements to ensure consistent understanding and client satisfaction.
2. Commitment to excellence, client satisfaction, and continuous improvement.
3. Mitigation of client risk by assessing processes, products, the performance of work, and services against defined performance requirements.
4. Identify, investigate, track, and correct non-conformances, including compliance with regulatory agency requirements and the contract specifications.
5. Effective communication of quality requirements to all stakeholders.
6. Oversight of planning, organizing, and directing quality resources for each project's success.
7. Management of quality standards at all levels of the project delivery team.

Our overarching goal is to make certain the Salton Sea Authority receives the very best of our services by designing and implementing our client-specific management plan. Our Principal-in-Charge, Paul Najar, will be engaged throughout our contract's lifecycle, ensuring we are providing the right resources, our services are meeting your expectations, and making immediate corrections when necessary to safeguard successful execution of our work.

PROPOSED STAFF

PAUL NAJAR

Principal-in-Charge / Imperial Division Business Leader

YEARS OF EXPERIENCE
30

EDUCATION
University of California, Martin Luther King School of Law, Davis

BA, Joint Degree in Philosophy and Humanities, University of California, Irvine

LICENSES/ CERTIFICATIONS
California State Bar

PROFESSIONAL AFFILIATIONS
Adjunct Faculty, University of San Diego Law School, In-House Corporate Course

Association of Corporate Counsel (ACC), San Diego Chapter, Past President)

AWARDS/RECOGNITION
Best Corporate Counsel Lawyers in San Diego, 2012, 2014, 2015, and 2017

La Mancha Publico Pro Bono Award, Casa Cornelia Law Center, 2020

Best Corporate Counsel of the Year, San Diego Business Journal, 2019

Best In-House Lawyers in San Diego, San Diego Transcript, 2019

SUMMARY

Paul is the Senior Vice President, General Counsel, and Imperial Valley Business Line Leader of Gafcon, Inc. He has more than 30 years of experience in the fields of construction, finance, government relations, joint ventures, and real estate transactions. He started his career at California Federal Bank advising on real estate/special assets and then continued at the University of California, Irvine, as campus counsel, where he oversaw real estate and construction transactions for the campus and UCI Medical Center.

In 2011, he joined Gafcon to lead its legal, risk management, and human resources departments. With his strong relationships in the Imperial Valley, Paul leads Gafcon's business and development initiatives in this growing community. He serves as member of the Gafcon's Board of Directors, a variety of nonprofit Boards, as well as past President of the Association of Corporate Counsel. Paul served as Adjunct Faculty at the University of San Diego (USD) School of Law from 2013-2020 and was recently recognized by his peers as San Diego Corporate Counsel of the Year.

SELECT EXPERIENCE

Seaport San Diego | San Diego, CA | General Counsel | Led the legal team associated with the $3.5B project that includes a tower, hotels, shops, and restaurants along with parks and promenades, a new urban beach, and upgraded commercial fishing facilities.

San Joaquin Transportation Corridor | Irvine, CA | University Counsel | Advised Chancellor in relation to the donation of 25 acres of University land as protected habitat and mitigation measures associated with the construction of SR-73.

Great Park of OC | Orange County, CA | Project Leader | Supported the design, management, and operation team in relation to a review associated with master planning and schematic design of the 1,347-acre Great Park of Orange County on the former site of the El Toro Marine Base.

UCI Research Park | Irvine, CA | University Counsel | Advised Chancellor on the initial phases of 185-acre $1.5B campus expansion that connected businesses with direct STEM talent partnerships and opportunities including companies, such as Toshiba, GE Health Care and Intel.

FERNANDO RAMOS, CE

Senior Project Manager

YEARS OF EXPERIENCE

30

EDUCATION

B.S, Civil Engineering Universidad Autonoma de Baja California, Mexico

Post Graduate Studies, Business Administration applied to Civil Engineering, Universidad Autonoma de Baja California, México

LICENSES/ CERTIFICATIONS

Professional Civil Engineer, Mexico RCE # 1774162

SUMMARY

Fernando has over 30 years in project management with expertise in design, construction, quality control, scheduling, budget, cost evaluation, and risk identification. He has been involved in the management of required and qualified personnel, resources, and design criteria for the preparation of engineering construction documents and construction management activities.

SELECT EXPERIENCE

Sanders, Inc. Architecture and Engineering | El Centro, CA | Senior Project Manager Consultant and Senior Project Manager | Solar and Geothermal Projects in the Imperial Valley, CA and the Country of Mexico.

J.A. Sanders Contractor | El Centro, CA) | Senior Project Manager | Responsible for the construction of the Operations and Maintenance Facilities for the Ocotillo Wind Project in Ocotillo, CA for Blattner Energy, Inc.

The Holt Group, Inc. | El Centro, CA | Development Design, Engineer, and Project Manager |

- Prepare proposals for the public and private sector
- Setting up and coordinating local consulting teams for preparation of plans to be in compliance with the local regulations
- Prepare construction bidding documents and selection of contractor
- Prepare construction schedule, construction management, and document control
- Budget management, including payment requests, change orders, and RFI's

Intergen (International Generator) | Mexicali, B.C. | Off-Site Engineer | Conducted all efforts and coordination to build a $20M Sewage Treatment Plant, 5.5 mile gray water aqueduct, and a natural gas pipeline and meter station for a 1,065 MW Power Plant.

Sempra Energy International | San Diego, CA | Project Manager | Developed a new Local Distribution Company (Natural Gas) and a natural gas compression station in Mexico. Installation of natural gas pipelines for residential, commercial, and industrial uses, managed a $12M budget per year for the gas pipeline, and a $35M compressor station.

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BRYAN BENSO

CO-CEO

YEARS OF EXPERIENCE

32

EDUCATION

BS, Business Administration, University of Illinois

LICENSES/ CERTIFICATIONS

Tribal Administration Certification, Claremont McKenna College

Certified Commercial Investment Member, CCIM Certification Coursework

PROFESSIONAL AFFILIATIONS

Southern California Development Forum (SCDF)

National Association of Industrial and Office Properties (NAIOP)

Imperial Valley Regional Chamber of Commerce (IVRCC)

2005 Presenter at Primavera Annual Conference, New Orleans, LA

2006 Presenter at Lorman Seminars, San Diego, CA

Legal Seminars, Los Angeles, CA

SUMMARY

Bryan has 32 years of experience as a real estate development professional. He is currently the Chief Development Officer for Gafcon's Development Division. His responsibilities include identifying, sourcing, performing due diligence feasibility, and strategizing for various investment projects. Throughout his career, Bryan has provided third-party development management and due diligence efforts to a wide variety of regional and national-based clients. He has been responsible for developing short- and long-term real estate and project development strategies based on robust financial, operational, and stakeholder needs. With decades of experience in real estate planning, investment, development, construction, and project management, Bryan has been responsible for leading strategic growth and development in capital investment projects and day-to-day oversight of multiple partnerships and direct investments.

SELECT EXPERIENCE

Seaport San Diego Redevelopment | San Diego, CA | Chief Development Officer | As Chief Development Officer, Bryan provides strategic development expertise for Seaport San Diego, a $2.5B re-imagining of one of the most important pieces of real estate on San Diego's waterfront. It is being designed to provide valuable community resources and world-class amenities and attractions for residents and visitors. Ongoing programs and activities along with parks, a plaza, an urban beach, and other public spaces on the water's edge will anchor Seaport San Diego. It will bring families and friends together for relaxation, education, and fun to create a new world class destination.

Bridge to Breakwater Redevelopment Master Plan | Los Angeles, CA | Program Manager / Co-Managing Member of Gafcon and EE&K Architects Joint Venture | Bryan was responsible for the full development of a 420-acre master plan for a Port of Los Angeles owned property. The plan included a new cruise terminal, site infrastructure, public open space, high-end retail component (The Edge), cultural arts district, marinas, hotel development sites, new city owned Expo building, historic fire boat display, and the new red car historic terminal and museum. The scope included all architectural and engineering planning, cultural resourcing, community outreach, feasibility and business plan development, and funding options analysis.

China Basin Landing | Los Angeles, CA | Project Manager | As Project Manager, Bryan provided development support services for the renovation of the 465,000 SF historical warehouse (circa 1920's), which was reinforced, repaired, and converted to commercial and retail offices, comprising the largest waterfront office facility in San Francisco. Gafcon provided all staff augmentation necessary for the development elements of this project, including all specialty permitting, financial planning, and tenant improvement lease evaluations. The team prepared various decision tree scenarios for the Owner's consideration.

JEFF CAUSEY, AIA, NCARB, LEED AP BD+C

Senior Architect and Planner

SUMMARY

Based on over 40 years of international, national, and local architecture and planning experience, Jeff provides a diverse background in cultural understanding and alternate delivery methods worldwide. His experience includes residential, office, mixed-use, and bridged high-rise buildings, multi-phase residential towers, and post-tension concrete, steel, and hybrid structure systems. Jeff has designed and delivered more than 10M SF of public work facilities specializing in fast-track design-build delivery, meeting strict schedule and budget constraints. He has managed projects in a variety of markets, including residential, hospitality, retail, mixed-use, higher education, tribal, urban, and civic/public works.

YEARS OF EXPERIENCE

42

EDUCATION

BArch, University of Notre Dame

LICENSES/ CERTIFICATIONS

Licensed Architect, CA No. C26744

National Council of Architectural Registration Boards (NCARB) No. 45919

Leadership in Energy and Environmental Design Accredited Professional for Building Design and Construction (LEED AP BD+C)

PROFESSIONAL AFFILIATIONS

American Institute of Architects (AIA)

Design-Build Institute of America (DBIA)

Society for College and University Planning (SCUP)

Urban Land Institute (ULI)

United States Green Building Council (USGBC)

Founding Board Member Ace Mentorship San Diego

Coalition for Adequate School Housing (CASH)

Community College Facility Coalition (CCFC)

SELECT EXPERIENCE

***Leichtag** | Encinitas, CA | Director of Architecture and Planning | The 68-Acre project is an eco-smart master planned community.

***Seaport San Diego, Master Plan and Program** | San Diego, CA | Director of Architecture and Planning | The $3.5B project includes a tower, hotels, shops, and restaurants along with parks and promenades, a new urban beach, and upgraded commercial fishing facilities.

El Centro Federal Courthouse | El Centro, CA | Principal-in-Charge/Lead Master Planner | A 62,000 SF Federal Courthouse.

***Zizhu** | Shanghai, China | Director of Architecture and Planning | The $12B+, 3,200-acre master planned community is situated along the Huangpu River includes residential, education, office, hotel, retail, entertainment, and transit.

***Bayfront Village Eco-Smart Community** | San Diego, CA | Project Executive/Director | A 3,400-unit mixed-use project, which includes residential, office, hotel, and entertainment.

***Pointe Resort Communities Master Plan (Pointe Squaw Peak, Pointe Tapatio, Pointe South Mountain)** | Phoenix, AZ | Principal-in-Charge | 2,000 guest suites, 50,000 SF of conference space, 250 residential units, waterparks, stables, retail, restaurants, office, and hotel.

***Forbes Landing Mixed Use Facility** | Boston, MA | Principal-in-Charge | The 1.45M SF facility includes hotels, residential, office, retail, and education.

Yuma Municipal Government Center | Yuma, AZ | Principal-in-Charge/ Lead Master Planner | The 150,000 SF center includes city offices and council chambers.

** Specific Plans/Conditional Use Permits/CIM Design Review/California Coastal Commission*

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BEN HUESO

Stakeholder Relations Coordinator

YEARS OF EXPERIENCE

20

EDUCATION

BA, Sociology, University of California, Los Angeles with a Minor in Urban Studies and Planning

Post-Graduate work in Community and Economic Development at San Diego State University

Studied Russian Language, University of Odessa, Ukraine

PROFESSIONAL AFFILIATIONS

Delta Stewardship Council

SUMMARY

Ben tenure in the California Legislature will be defined by his extensive work on signature initiatives relating to the restoration of the Salton Sea, the improvement of relations between California and Mexico, and the environmental restoration of the Tijuana River Valley Basin.

He champions policies that support neighborhood revitalization, reinvestment, investing in community infrastructure, schools, libraries, community parks, efficient mass transit, environmental stewardship, and combating climate change. Ben has been recognized for his efforts to expand drinkable water, healthcare, education, affordable housing, and jobs for underserved communities and for being a consumer and ratepayer advocate.

He believes that in addition to strong leadership, local government needs the proper tools to spur the economic development that is necessary to build safe and healthy communities. He helped enact a series of laws and programs that support local governments efforts to bring opportunity and vitality to their communities.

SELECT EXPERIENCE

California State Senate | California | Senator | Ben has been a strong champion for the Imperial Valley and worked to improve the economic, environmental, and social conditions of the entire region. His work on the restoration of the Salton Sea has been significant and during his time in the California Legislature he has secured over $100M towards this effort. He has also been a strong advocate for increased higher education opportunities in the region as well, this was demonstrated in his last year in office when he secured $80M for the San Diego State University Brawley campus to develop a STEM building to aid development of a workforce for the upcoming lithium extraction at the Salton Sea area.

California State Assembly | California | Public Official | During his three-year tenure, among other duties, Ben served as the Chair of Assembly Water Parks and Wildlife; the State Senate's Energy, Utilities, and Telecommunications Committee; the Chairman of the Select Committee on California Mexico Cooperation; and the Chairman of the California Latino Legislative Caucus.

City of San Diego Community and Economic Development Department | San Diego, CA | Council President | Ben successfully realized major community revitalization projects, including affordable housing, parks, libraries, and neighborhoods serving retail and industries that pay quality wages. Additionally, he ran for City Council, where he served as Council President, Coastal Commissioner, and Board Member for the San Diego County Association of Governments (SANDAG) Board of Governors.

VICTOR NAVA

Project Coordinator

SUMMARY

Victor is a versatile respected community leader, development officer, seasoned banker and volunteer serving the Imperial Valley Region for over 25 years. He has established strong community networks to transform relationships within Imperial County that were once fragmented and parochial. It is his mission to lead and support dynamic developments that will enhance the quality of life throughout the Imperial Valley. More importantly to develop community first projects driven by the four P's Purpose, People, Planet, and Profit.

YEARS OF EXPERIENCE

25

EDUCATION

Business Economics/ Accounting, University of California, Santa Barbara

AA Liberal Studies, Imperial Valley College

PROFESSIONAL AFFILIATIONS

Imperial County Office of Education (ICOE) Board of Directors

Imperial Valley Regional Chamber of Commerce

Brawley Chamber of Commerce

Holtville Chamber of Commerce

Imperial County Southern Border Committee

City of Calexico Quick Build Community Advisory Committee (Safe Routes Partnership)

Accessity (Formally known as Accion)

Innercare (Formally known as Clinicas Del Pueblo Inc.)

Imperial Valley Economic Development Center

Imperial County Association of Realtors

Imperial Valley Small Business Development Center

US Small Business Administration (SBA)

EXPERIENCE

San Diego State University (SDSU) | Calexico, CA | Director of Development & P3 Initiatives | As Director of Development, Victor was an involved and consultative community leader. He was responsible for building relationships between, donors, public-public, public private partnerships and SDSU Imperial Valley. Additionally, he was responsible for annual giving, planned giving, as well as major and principal gift development and focused on cross-campus collaborations. He worked with development and a senior staff and administrators to set priorities and devise strategies for fund-raising and growth activities. Victor fostered relationships with federal, state, county and city officials, leaders of economic development agencies, non-governmental organizations, and foundations to attract development partners to support research, creativity, and innovation at SDSU Imperial Valley. Victor recently worked jointly with the SDSU's Governmental Affairs team and the President's office to secure the $80M state funding for their new STEM facility.

Mechanics Bank/Rabobank NA | El Centro/Brawley, CA | Various Management Roles | As Branch Manager, Victor provided leadership and strategic direction for the El Centro, Brawley, Julian and Holtville branch locations and evaluated and analyzed bank data for adherence to budget goals and other financial targets. He Represented the bank at community events to further enhance the banks image and develop new business opportunities. Additionally, Victor served as Retail Sales Manager formulating and expanding business development activities. He actively participated in committees establishing the needs for future growth. As Treasury Relationship Manager, Victor served as a liaison between Commercial/Agriculture Relationship Managers and the Community Banking Division. He worked closely with Relationship Managers on cross selling products and services to develop a full banking relationship, customer service and problem-solving for commercial and agriculture clients.

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ANDREW REGENBERG

Director, Real Estate and Development

YEARS OF EXPERIENCE

20

EDUCATION

BA, Sociology, University of California, Los Angeles with a Minor in Urban Studies and Planning

Post-Graduate work in Community and Economic Development at San Diego State University

Studied Russian Language, University of Odessa, Ukraine

PROFESSIONAL AFFILIATIONS

Delta Stewardship Council

SUMMARY

Andrew is an experienced real estate professional with 24 years of experience evaluating and managing a wide range of real estate ventures from a financial, market, and operating perspective. Over the course of his career, Andrew worked as a VP/Director of Finance and Operations Manager for some of the top public and private real estate development companies in the industry including Lennar, Kennedy Wilson International, and J.F. Shea Company. In these roles, Andrew provided financial leadership in the acquisition of well over $500M in assets, managed development budgets exceeding $400M, and secured debt and joint venture financing for land, apartment, hotel, and for sale housing developments. Andrew has also worked directly for Gafcon for seven years providing financial and market advisory services to public and private sector clients across all real estate asset classes. Andrew's experience working directly for leading real estate companies while also servicing public and private sector clients in a consulting capacity provides a unique and valuable perspective for clients. Andrew's primary areas of expertise include: Financial and Market Feasibility, Financial Planning and Analysis, Project Management, Financial Modeling, Project Financing, and Asset Management. Andrew holds a Master of Business Administration degree with an emphasis in Finance from Chapman University and a Bachelor of Arts degree with an emphasis in Urban Planning from UC Santa Barbara. Andrew also holds a California Real Estate Broker License.

SELECT EXPERIENCE

Meritage Homes | Southern California | Director of Finance | Andrew provided financial and strategic leadership for the Southern California division with +$300M in annual revenue. He lead financial and operational forecasts for the division and partner with all functional groups (Sales, Marketing, Operations, Land Acquisition, Land Development, Forward Planning, etc.) to exceed financial and operational goals.

CalAtlantic Homes - A Lennar Company | Inland Empire, CA | Vice President of Finance | Andrew provided financial leadership for the Inland Empire division with +$290M in annual revenue. He led the division's quarterly forecasts and annual business planning process. Andrew provided analytical support to the management to improve homebuilding operations and to identify opportunities for cost savings.

Beazer Homes | Southern California | Director of Financial Planning & Analysis | Andrew led the Southern California Division's financial operations. He was a key member of the senior management team, and partnered with the Area President, Division President, and the division management team to drive improved financial results. Andrew managed monthly financial forecasts, financial reporting, and operational metrics reporting.

The Trust for Public Land, Kellogg Park | Ventura, CA

Project Cost: $2.8M

Gafcon provided project and construction management, which included extensive coordination with project field consultants such as Native Americans, archaeologists, flora and fauna experts, local artists, along with both federal and state associated specialists. The park project was completed ahead of schedule and at a lower than estimated construction cost.

The 2.4 acres where Kellogg Park now sits was initially slated for a dense residential development. Fortunately, The Trust for Public Land was able to purchase the vacant land after learning of the local Ventura community members passionate plea for more park space. After eight years, Kellogg Park opened to the ecstatic public with unique playground designs, open space and outdoor fitness equipment areas, an amphitheater with community art, an interactive water play area, decorative gates and fencing, landscaping, and evening lighting throughout associated structures, such as a community garden shed and a state-of-the-art, high-grade stainless-steel restroom.

Sustainability was also an important feature for the park. A sand-filter swale reflects the natural character of the nearby Ventura River, which filters stormwater runoff as well as serving as a use amenity with learning and play facilities scattered along its course. Other sustainable features included minimal turf and water-efficient irrigation.

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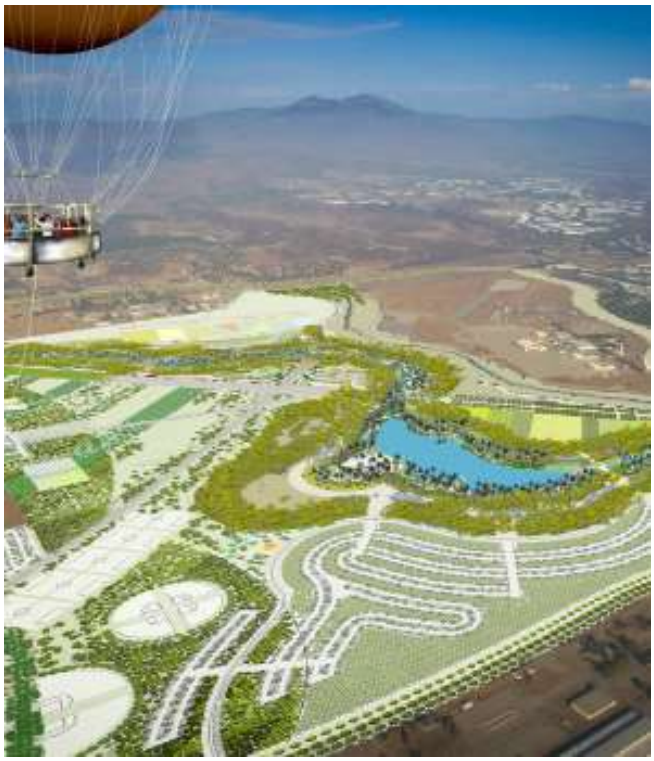
Orange County Great Park | Irvine, CA

Project Cost: $1.5B

Gafcon, Inc. was retained by the Orange County Great Park Corporation to provide design management for the proposed Great Park Master Plan, which included a 1,347-acre urban park to be developed within the former 4,700-acre El Toro Marine Air Station in central Orange County. Gafcon, Inc. was responsible for directing and coordinating all aspects of the project's design relating to budget, timeline, and quality assurance. Gafcon, Inc. and master designer, Ken Smith Landscape Architect of New York, formed Great Park Design Studio, consisting of 42 consultants.



2009 AIA Honor Award in Regional & Urban Design
American Institute of Architects (National)

2009 Focused Planning Issue Award
American Planning Association (National)

2009 National Honor Award for Analysis & Planning
American Society of Landscape Architects (National)

2009 National Award for Research
American Society of Landscape Architects (National)

2009 Professional Honor Award for General Design (Orange County Great Park Observation Balloon Preview Park)
American Society of Landscape Architects (National)

2008 Focused Planning Issue Award
American Planning Association (California Chapter)

2008 Focused Planning Issue Award
American Planning Association (Orange County Chapter)

2008 Honor Award in Regional & Urban Design
American Institute of Architects (California Council)

2007 SERCAL Members Award
California Society for Ecological Restoration

City of Coronado Capital Improvement Program | Coronado, CA

Project Cost: $60M

Beginning in 1992, the City of Coronado selected Gafcon as their project management consultant to assist in the coordination of a new $40M capital improvement program. Again, in 2015, the City selected Gafcon as their project manager/ construction manager for the new City Hall and Town Hall, as well as other Capital Improvement Projects. Gafcon services included design management, construction management, and staff augmentation services for the new 9,250 SF City Hall, 3,200 SF Town Hall, and John D. Spreckels Center and Bowling Green, Skate Board Park, parking, and public plaza.

JOHN D. SPRECKELS CENTER & BOWLING GREEN

Gafcon provided a full range of project management services, including RFP preparation and response review; change order management; claims dispute resolution; claims avoidance; and project controls such as budgeting, estimating, and scheduling. Gafcon also provided shop drawing and submittal management; public works contract law research; chaired coordination meetings, coordinated technical inspection services, labor compliance; stakeholder coordination, project close out administration; and move-in planning and coordination.

In 2017, the project received Leadership in Energy and Environmental Design (LEED) Silver Certification from the U.S. Green Building Council.

Del Mar Civic Center and Town Hall and Park | Del Mar, CA

Program Value Cost: $60M

The City of Del Mar's new Civic Center is the largest capital project in the City's 59-year history. "The $17.8M project was completed within budget and on time," stated Assistant City Manager Kristen Crane, who oversaw planning and construction.

The civic center includes a 3,000 SF Town Hall and a 13,000 SF plaza that will host events such as a weekly farmers market, as well as serving as a de facto park where the public can enjoy panoramic ocean views, and a 140-space parking structure.

Gafcon, Inc. was selected to manage the pre-construction phase of the project from schematic design through the first stages of construction. This included establishment of the adjusted project budget; cost estimate and program verification; plan review at each design submission; temporary office location analysis; consultant services RFPs; scope determination; negotiations; agreements and ongoing management; construction contract development; constructability review prior to bidding; creation of bid documents and bid process management.

2019 WoodWorks Wood Design Award for Wood in Government Buildings

Coastal Craftsman Architecture of Del Mar

2018 Orchid Award in Architecture, Del Mar Civic Center

San Diego Architectural Foundation

2018 Merit Award in Architecture, Del Mar Civic Center and Town Hall

The American Institute of Architects, San Diego Chapter (AIASD)

Other Relevant Projects

Leichtag Agricultural Community Parks

National Orange Show

North Embarcadero San Diego

OCGP Preview Park

OCGP Balloon Park

Port of LA 22nd Street Park

Port of LA Promenade Parks and Waterfront

San Manuel Kiic Atiac Cultural Park

Seaport San Diego Embarcadero

Seaport San Diego Rocco Park

SDUSD Fields and Parks (12)

Zizhu Happy Sunshine Park

MENU OF PROFESSIONAL SERVICES

- ☐ Community Engagement
- ☐ Grant Writing / Grant Application
- ☐ Community Planning
- ☐ Project Management
- ☐ Comprehensive / General Planning
- ☐ Real Estate Support Services
- ☐ Permitting
- ☐ Labor Relations

Community Engagement

With decades as owner's representatives for complex real estate development projects, we are endowed with a singular understanding of the challenges.

Community planning should be imaginative and implementation focused. It is a collaborative process that engages the residents, community leaders, landowners, and stakeholders to make informed choices by capturing the overall vision and local issues that matter.

To achieve client goals, our planning process centers around three basic tenets:

- **Community Engagement:** Community outreach and stakeholder engagement are vital to understanding existing conditions and establishing a collective vision. Empowering citizens, business leaders, stakeholders, public entities, and elected officials creates a lasting imprint on the community.
- **Informed Decision-Making:** Planning transcends visioning and design. Communicating relevant information to stakeholders allows informed decisions to guide a plan's development and resulting actions.
- **Implementation and Funding:** Plans should focus on lasting improvements tailored to each community and that can be sustained over the long run. We turn concepts into focused action and clear direction on what to do next, who should lead, and how it can be funded.

Grant Writing / Grant Application

Gafcon's extended team researches funding opportunities, writes compelling narratives with well-placed visuals, and provide specialized services fine-tuned to your needs.

Our team can assist in bringing projects to life through our extensive experience in helping our clients with the entire grant process – from developing winning strategies to helping your staff find the best funding for your projects.

Our extended team provides technical or narrative writing and editing, as well as graphic design of the final application, including visuals.

Community Planning

Successful community plans are no accident: they come from hard work and collaboration with our clients. Our approach emphasizes aspirational planning (what does the community want to be?) with a focus on implementation (what steps will be required to remain successful?) and measurable outcomes (what should we anticipate as a result of the community's success?)

Whether it's a small community park or a 75 acre waterfront project like Seaport San Diego, community plans are most effective when a dynamic process is crafted to engage community leaders and stakeholders in thoughtful consideration of the relationships between land use, the environment, community resources, and economic vitality and how they shape our communities.

Gafcon's approach to planning centers on a commitment to:

- Use goal-setting and visioning exercises to understand baseline community desires.
- Create an understanding of community dynamics.
- Conduct a process that fosters a constructive conversation of community challenges and desires.
- Provide a framework upon which to offer realistic and measurable strategies for the plan's major elements.
- Apply an interdisciplinary approach where the ultimate Plan is integrated with other community plans, investments, and initiatives.

Comprehensive / General Planning

Gafcon approaches comprehensive planning with a core purpose in mind: to facilitate a process for informed decision making that is aligned with community values and vision, community development strategies, and urban design and transportation priorities. Community engagement is an integral part of our approach, and our processes use a variety of outreach techniques to identify and address each community's unique strengths and challenges.

Project Management

Gafcon has successfully managed billions of dollars worth of construction projects over its 35-year history. We provide the following services:

- Owner's representative
- Vendor management
- Document management
- Obtain licenses
- Bidding assistance
- Prepare RFP for construction/bid package preparation
- GC selection and bid analysis
- Budgeting
- Estimating
- Facilitate the value engineering A and E
- Scheduling
- Coordinate owner, architect, and consultant (OAC) meetings
- Oversee onsite construction management
- Manage inspections
- Obtain temporary and final certificate of occupancy
- Project closeout
- Turnkey project management
- Cost Controls

Professional Real Estate Support Services

Our clients can select any one of our services or choose a "turn key" project management. Our services include:

- Owners' representative
- Site identification and coordination
- Market assessment and analysis
- Due diligence, test fit and detailed site plans
- Budgeting
- Proforma review
- Up-front budgeting
- Source alternative funding mechanisms
- Design procurement services
- Provide or hire other development services consultants
- Prepare Request for Proposals (RFP) for new properties/projects
- Procure due diligence services including environmental, survey, and geotechnical
- Scheduling
- Project delivery
- Development Project/Program Set Up
- Internal client training
- Development of site standards
- BIM solutions
- Permitting and Design Management
- Driving your multi-site development program
- Perform as an extension of your staff
- Driver and/or executor of entitlement reviews
- Procure design/permitting consultants
- Lead consultant coordination
- Perform design reviews
- Deliver weekly project updates
- Construction Phase Services
- Vendor management
- Document management
- Bidding assistance
- Prepare RFP for construction/bid package preparation
- GC selection and bid analysis
- Coordinate with estimators
- Onsite construction management
- Manage inspections
- Obtain temporary and final certificate of occupancy
- Project closeout

Permitting

- Driving your multi-site development program
- Perform as an extension of your staff
- Driver and/or executor of entitlement reviews
- Procure design/permitting consultants
- LEED consultant coordination
- Perform design reviews
- Permit expediting
- Deliver weekly project updates

Labor Relations

Labor law is a complex and ever-changing landscape. As one of California's first State-Approved Labor Compliance Programs (LCP ID# 2003.0053), Gafcon has managed over $10B in labor compliance programs for diverse clientele throughout California and has amassed years of lessons learned. We have a deep understanding of the nuances of labor compliance monitoring, project labor agreement (PLA), and prevailing wage enforcement, including federal, state, and local requirements to help you navigate a constantly evolving field.

Our firm mitigates risk by making certain contractors know the rules and regulations before starting work on any project. Creating value for our clients and our communities is a vital component of Gafcon's purpose. Specific labor relations services we offer include:

- Project Labor Agreement
- Skilled and Trained
- Outreach
- Regular presentations to the contractors
- Ongoing communication with the contractors
- Ongoing communication with agency project staff
- Periodic meetings with contractor organizations, prime contractors, and subcontractors interested in doing work with the agency
- Ongoing LCP requirements/administration training and workshops for the agency staff
- Local Hire
- DBE/MBE/WBE Participation Outreach

Recommended Initial Scope of Work

The Gafcon team will schedule and lead a 3-4 hour, in person, Project Charter and Plan Charrette with the Salton Sea Authority to discuss, among other things, status of CEQA, NEPA, goals, tasks, project scope, schedule, and stakeholders. Following the meeting and within 2 weeks, Gafcon shall draft and deliver a written Project Charter and Plan a detailed scope of services and estimated fee for the project services. The Charter shall include:

- Purpose and Objectives
- Scope of Work Execution Plan
- Milestones
- Facilitate alignment of Stakeholders
- Participate in drafting a Governance Charter
- Estimated Budget
- Act as Client's Coordinator with respect to the County's CEQA and NEPA work

The Gafcon team will schedule and lead a second meeting with the Salton Sea Authority to review the Charter deliverables.

TRACK 1

Project Charter

- SEE ABOVE

Rates

Gafcon is pleased to submit the following proposed rates.

POSITION	NAME	RATE
Chief Development Officer	Bryan Benso	$200
Principal-in-Charge	Paul Najar	$195
Senior Architect and Planner	Jeff Causey	$185
Senior Project Manager	Fernando Ramos	$175
Stakeholder Relations Coordinator	Ben Hueso	$160
Project Coordinator	Victor Nava	$150
Director, Real Estate and Development	Andrew Regenberg	$185

Notes:

- Rates will be escalated at 3%/year each fiscal year starting 7/1/24

Reimbursable Expenses

Client shall reimburse Gafcon for all out-of-pocket expenses associated with this project, plus an administrative fee equal to five percent (5%) of the expenses.

The following are examples of the various expenses that are typically related to Gafcon's Services, however, these examples are not intended to be inclusive of all potential reimbursable expenses:

- Postage, shipping, couriers, and copies.
- Blueprinting, photo reproducing, and photography for jobsite surveys or related activities.
- Mileage costs shall be charged at the prevailing IRS rate to and from the project(s) and the respective Gafcon office.

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San Diego (HQ) | Los Angeles | Orange County | Imperial Valley

116 South Imperial Avenue, Suite B
Imperial, CA 92251
858.875.0010

EXHIBIT B

Task	Estimated Cost	Timeline (Oct 1 start date)
1. Initial 3-4 hour meeting with 4 Gafcon team members	$3,000	Oct 15 – Oct 30
2. Facilitate alignment of stakeholders and their participation ~~ng~~ in governance charter drafting	$5,000 to $7,500	Oct 15 – Nov 14
3. Draft ~~ing of the~~ agreed-upon project charter and lead follow-up meeting	$3,500	Nov 30
4. Create ~~ing~~ an estimated budget for the full Desert Shores project with key milestones and timelines	$3,000 to $6,000	Dec 15
5. Act ~~ing~~ as coordinator of CEQA and NEPA for a 150-day period	$5,000 to $7,000	Oct 15 – Mar 13, 2024 (150 days)
6. Develop scope and budget for Phase II project management through project completion	$2,500	Jan 15
Total	$22,000 to $29,500	

EXHIBIT C

NOTICE OF AWARD

1. DATE ISSUED *MM/DD/YYYY* 02/28/2022	**1a. SUPERSEDES AWARD NOTICE dated** except that any additions or restrictions previously imposed remain in effect unless specifically rescinded
2. CFDA NO. 15.571 - Salton Sea Program	
3. ASSISTANCE TYPE Cooperative Agreement	
4. GRANT NO. R22AC00215-00 **Originating MCA #**	**5. TYPE OF AWARD** Other
4a. FAIN R22AC00215	**5a. ACTION TYPE** New
6. PROJECT PERIOD *MM/DD/YYYY* From 11/01/2021	*MM/DD/YYYY* Through 12/31/2025
7. BUDGET PERIOD *MM/DD/YYYY* From 11/01/2021	*MM/DD/YYYY* Through 12/31/2025

AUTHORIZATION (Legislation/Regulations)

Fish and Wildlife Coordination Act of 1934, Public Law 85-624, as amended; as limited and delegated by the Secretary of the Interior

8. TITLE OF PROJECT (OR PROGRAM)
Restoring Habitat and Improving Air and Water Quality at the Salton Sea

9a. GRANTEE NAME AND ADDRESS
Salton Sea Authority
82995 US Highway 111 STE 200
Indio, CA 92201-5678

9b. GRANTEE PROJECT DIRECTOR
Johnathan Mcdannell
82995 US HIGHWAY 111 STE 200
INDIO, CA 92201-5678
Phone: 760-863-2695

10a. GRANTEE AUTHORIZING OFFICIAL
Mr. G. Patrick O'Dowd
82995 US Highway 111 Ste 200
Indio, CA 92201-5678
Phone: 760-863-2695

10b. FEDERAL PROJECT OFFICER
Ms. Leslie Dieguez
P.O. Box 61470
LCB-10101
Acquisition and Assistance Management Office
Boulder City, NV 89006

ALL AMOUNTS ARE SHOWN IN USD

11. APPROVED BUDGET (Excludes Direct Assistance)

I Financial Assistance from the Federal Awarding Agency Only
II Total project costs including grant funds and all other financial participation — II

a.	Salaries and Wages	$	1,539.00
b.	Fringe Benefits	$	1,062.00
c.	Total Personnel Costs	$	2,601.00
d.	Equipment	$	0.00
e.	Supplies	$	0.00
f.	Travel	$	0.00
g.	Construction	$	1,195,222.00
h.	Other	$	0.00
i.	Contractual	$	52,177.00
j.	TOTAL DIRECT COSTS	$	1,250,000.00
k.	INDIRECT COSTS	$	0.00
l.	**TOTAL APPROVED BUDGET**	$	1,250,000.00
m.	Federal Share	$	1,250,000.00
n.	Non-Federal Share	$	0.00

12. AWARD COMPUTATION

a. Amount of Federal Financial Assistance (from item 11m)	$	1,250,000.00
b. Less Unobligated Balance From Prior Budget Periods	$	0.00
c. Less Cumulative Prior Award(s) This Budget Period	$	0.00
d. **AMOUNT OF FINANCIAL ASSISTANCE THIS ACTION**	$	1,250,000.00
13. Total Federal Funds Awarded to Date for Project Period	$	1,250,000.00

14. RECOMMENDED FUTURE SUPPORT
(Subject to the availability of funds and satisfactory progress of the project):

YEAR	TOTAL DIRECT COSTS	YEAR	TOTAL DIRECT COSTS
a. 2	$	d. 5	$
b. 3	$	e. 6	$
c. 4	$	f. 7	$

15. PROGRAM INCOME SHALL BE USED IN ACCORD WITH ONE OF THE FOLLOWING ALTERNATIVES:
a. DEDUCTION
b. ADDITIONAL COSTS
c. MATCHING
d. OTHER RESEARCH (Add / Deduct Option)
e. OTHER *(See REMARKS)*

b

16. THIS AWARD IS BASED ON AN APPLICATION SUBMITTED TO, AND AS APPROVED BY, THE FEDERAL AWARDING AGENCY ON THE ABOVE TITLED PROJECT AND IS SUBJECT TO THE TERMS AND CONDITIONS INCORPORATED EITHER DIRECTLY OR BY REFERENCE IN THE FOLLOWING:

a. The grant program legislation
b. The grant program regulations.
c. This award notice including terms and conditions, if any, noted below under REMARKS.
d. Federal administrative requirements, cost principles and audit requirements applicable to this grant.

In the event there are conflicting or otherwise inconsistent policies applicable to the grant, the above order of precedence shall prevail. Acceptance of the grant terms and conditions is acknowledged by the grantee when funds are drawn or otherwise obtained from the grant payment system.

REMARKS (Other Terms and Conditions Attached - ● Yes ○ No)
See next page

GRANTS MANAGEMENT OFFICIAL:
Leslie Dieguez, Grants Management Specialist
P.O. Box 61470
LCB-10101
Boulder City, NV 89006
Phone: 702-293-8369

17. VENDOR CODE 0071372151		**18a. UEI**		**18b. DUNS** 111370784	**19. CONG. DIST.** 36
LINE#	**FINANCIAL ACCT**	**AMT OF FIN ASST**	**START DATE**	**END DATE**	**TAS ACCT**	**PO LINE DESCRIPTION**
1	0051018833-00010	$224,778.00	11/01/2021	12/31/2025	0680	Mitigation & Revitalization Services
2	0051018833-00020	$1,025,222.00	11/01/2021	12/31/2025	0680	Construction

REMARKS:

Recipients are NOT required to sign the Notice of Award or any other award document or amendment. Recipients indicate their acceptance of an award or amendment to an existing award, including award terms and conditions, by starting work, drawing down funds, or accepting the award or amendment via electronic means. Recipient acceptance of an award/amendment carries with it the responsibility to be aware of and comply with all terms and conditions applicable to the award. Recipients are responsible for ensuring that their subrecipients and contractors are aware of and comply with applicable award statutes, regulations, and terms and conditions. Recipient failure to comply with award terms and conditions can result in Reclamation taking one or more of the remedies and actions described in 2 CFR 200.339343.

AWARD ATTACHMENTS

SALTON SEA AUTHORITY R22AC00215-00

1. Agreement Template

TABLE OF CONTENTS

Financial Assistance Agreement No. R22AC00215
Between
Bureau of Reclamation
And
Salton Sea Authority
For
Restoring Habitat and Improving Air and Water Quality at the Salton Sea

I. OVERVIEW AND SCHEDULE

1. AUTHORITY

This Financial Assistance Agreement (Agreement) is entered into between the United States of America, acting through the Department of the Interior, Bureau of Reclamation (Reclamation) and Salton Sea Authority (Recipient), pursuant to Fish and Wildlife Coordination Act of 1934, Public Law 85-624, 16 U.S.C. 661 et seq., as amended, and Section 7(a) of the Fish and Wildlife Coordination Act (FWCA) of 1956 (70 Stat 1122; 16 U.S.C. 742f(a)); as limited and delegated by the Secretary of the Interior delegation of authority to the Bureau of Reclamation at 255 DM 1.1B. The following section, provided in full text, authorizes Reclamation to award this Agreement:

Fish and Wildlife Coordination Act of 1934, Public Law 85-624, 16 U.S.C. 661 et seq., as amended, and Section 7(a) of the Fish and Wildlife Coordination Act (FWCA) of 1956 (70 Stat 1122; 16 U.S.C. 742f(a)); as limited and delegated by the Secretary of the Interior delegation of authority to the Bureau of Reclamation at 255 DM 1.1B

SEC. 7. (a) The Secretary of the Interior, with such advice and assistance as he may require from the Assistant Secretary for Fish and Wildlife, shall consider and determine the policies and procedures that are necessary and desirable in carrying out efficiently and in the public interest the laws relating to fish and wildlife. The Secretary, with the assistance of the departmental staff herein authorized, shall— (1) develop and recommend measures which are appropriate to assure the maximum sustainable production of fish and fishery products and to prevent unnecessary and excessive fluctuations in such production; (2) study the economic condition of the industry, and whenever he determines that any segment of the domestic fisheries has been seriously disturbed either by wide fluctuation in the abundance of the resource supporting it, or by unstable market or fishing conditions or due to an other factors he shall make such recommendations to the President and the Congress as he deems , appropriate to aid in stabilizing the domestic fisheries; (3) develop and recommend special promotional and informational activities with a view to stimulating the consumption of fishery products whenever he determines that there is a prospective or actual surplus of such products; 70 STAT.] PUBLIC LAW 1024-AUG. 8, 1956 112a (4) take such steps as may be required for the development, advancement, management, conservation, and protection of the fisheries resources; and (5) take such steps as may be

required for the development, management, advancement, conservation, and protection of wildlife resources through research, acquisition of refuge lands, development of existing facilities, and other means.

255 DM 1.B

1.1 **Delegation**. Subject to the exceptions in Section 1.2, the Commissioner of Reclamation (Commissioner) is delegated the authority of the Assistant Secretary – Water and Science to:

B. Take the following actions, either directly or by providing financial assistance to non-Federal parties, pursuant to the Conservation of Wild Life, Fish and Game Act of March 10, 1934 (Pub. L. 73-121; 48 Stat. 401) as amended by the Fish and Wildlife Coordination Act of August 14, 1946 (Pub. L. 85-624; 72 Stat. 563; 16 U.S.C. 661-666c); Section 5 of the Endangered Species Act of 1973, December 28, 1973 (Pub. L. 93-205; 87 Stat. 884; 16 U.S.C. 1534); and Section 7(a) of the Fish and Wildlife Coordination Act of 1956, August 8, 1956 (70 Stat. 1122; 16 U.S.C. 742f(a)), regarding the construction and/or continued operation and maintenance of any Federal reclamation project:

(1) plan, design, and construct, including acquiring lands or interest therein as needed for:

(a) fish passage and screening facilities at any non-Federal water diversion or storage project; or

(b) projects to create or improve instream habitat.

(2) acquire or lease water or water rights from willing sellers or lessors; or

(3) monitor and evaluate the effect of Reclamation actions on Endangered Species Act-listed species.

2. PUBLIC PURPOSE OF SUPPORT OR STIMULATION

To provide habitat for species dependent on the Sea ecosystem and to reduce dust emissions from the increased extent of exposed lakebed that may impact public health. The goal is to provide approximately 30 acres of aquatic habitat suitable for piscivorous or other bird species and to support sensitive fish and wildlife such as desert pupfish, snowy plover and burrowing owls. In addition, the project will develop sustainable habitat to support tilapia (needed to support piscivorous birds) in a sheltered harbor, habitat that has been lost as the keys became disconnected from the Sea. Habitat benefits for terrestrial species and nesting birds are also anticipated through revegetation on adjacent land parcels.

By providing aquatic habitat on exposed lakebed, the project will also reduce dust emissivity in the area. Lastly, the project's water needs, and associated infrastructure will be designed needed for future projects that will provide additional habitat and dust suppression benefits on neighboring lands that currently do not have a water source for project implementation.

3. BACKGROUND AND OBJECTIVES

The Salton Sea is a 1000-km2 terminal lake located in the desert area of southeastern California. This saline (74,250 TDS mg/L reflects January 2020 Reclamation) lake started as fresh water in 1905–07 by accidental flooding of the Colorado River, and is maintained by agricultural runoff of irrigation water diverted from the Colorado River.

Desert Shores is located on the western shore of the Salton Sea, in the northwest corner of Imperial County at an elevation of -197' below sea level. Inlets were created at Desert Shores whenever a number of channels or "fingers" were built into the Salton Sea. Due to the Salton Sea experiencing decreased water levels and increased sedimentation, the channels' access to the Sea has been blocked. Desert Shores' channels have been separated from the Salton Sea by a stretch of dry playa, and the remaining water is foul and colored red by halophilic bacteria.

Objectives:
The primary goals of the Project are the following:

- Restore water to the 30 acres of historic, aquatic habitat suitable for piscivorous or other bird species.
- To prevent dust emissions from this part of the exposed lakebed, provide access to the Sea for continued monitoring.
- To provide a potential water source for future projects on lands adjacent to Desert Shores where no water is currently available.

The proposed restorations to the Project will also contribute to satisfying the following objectives:

- Protect and increase the economic benefits arising from healthy watersheds, fishery resources and instream flow.
- Protect and restore aquatic, wetland, and migratory bird ecosystems, including fish and wildlife corridors and the acquisition of water rights for instream flow.
- Fulfill the obligations of the State of California in complying with the terms of multiparty settlement agreements related to water resources.
- Remove barriers to fish passage.
- Collaborate with federal agencies in the protection of fish native to California and wetlands in the Central Valley of California.
- Protect and restore rural and urban watershed health to improve watershed storage capacity, forest health, protection of life and property, storm water resource management and greenhouse gas reduction.
- Assist in the recovery of endangered, threatened, or migratory species by improving watershed health, instream flows, fish passage, coastal or inland wetland restoration, or other means, such as implementation of a natural community conservation plan and habitat conservation plan.

4. PERIOD OF PERFORMANCE AND FUNDS AVAILABILITY

This Agreement becomes effective on the date shown in block 1 of the United States of America, Department of the Interior, Notice of Award (NOA). The Agreement shall remain in effect through the date shown in block 6 of the NOA. The project period for this Agreement may only be changed through written amendment of the Agreement by a Reclamation Grants Officer (GO).

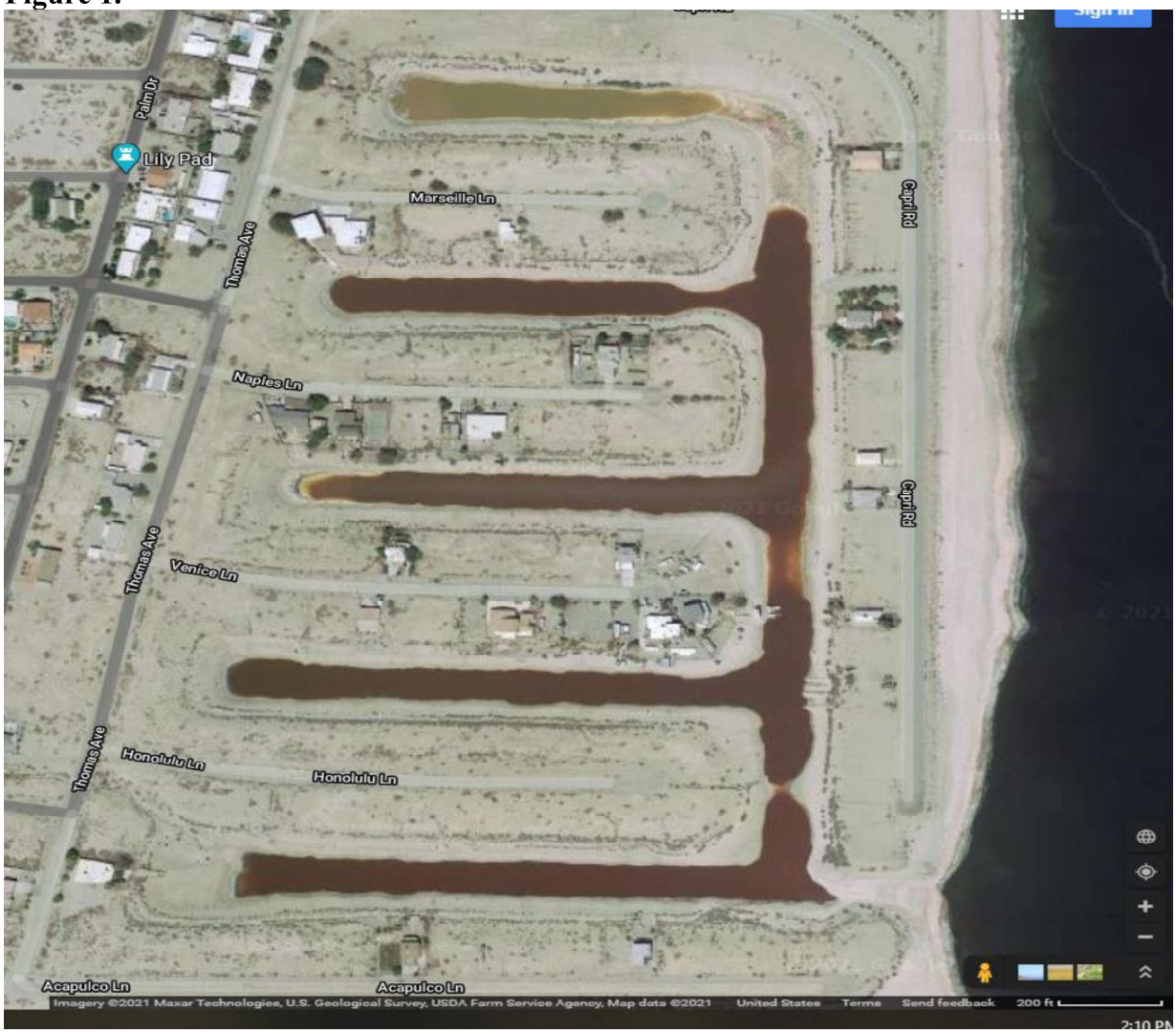
No legal liability on the part of the Government for any payment may arise until funds are made available, in writing, to the Recipient by a Reclamation GO. The total estimated project cost for this Agreement is $1,250,000.00 and the total estimated amount of Federal funding is $1,250,000.00. The initial amount of federal funds available is limited to $1,250,000.00 as indicated by "Amount of Financial Assistance This Action" within block 12 of the NOA. Subject to the availability of Congressional appropriations, subsequent funds will be made available for payment through written amendments to this Agreement by a Reclamation GO.

5. SCOPE OF WORK AND MILESTONES

The Project will restore water at the northwestern portion of the Salton Sea at the Desert Shores Marina needed for habitat restoration and dust suppression activities. The Project is within the unincorporated Desert Shores Community (Figure 1 Attached) that is located within Imperial County.

The project involves the provision of building an earthen berm across the opening of the Desert Shores Marina to the Salton Sea resulting in the development of a natural barrier separating the marina from the Salton Sea. The project involves flooding the Desert Shores Marina so that the inlets will once again be covered by fresh water that allows the marina to be functional. Using an average depth of about 10ft., the bank at full capacity would be 300 acre-ft. and thus, the initial filling is estimated to be twice that or 600 acre-ft. Note that with an average depth of 10 ft., the system would have the occupancy to maintain both deep and shallow water habitat.

Figure 1.



Water sources are still being investigated; however, it is anticipated that the most likely source would be local groundwater, possibly a blend of shallow brackish groundwater and deeper fresher water. Two wells would be needed to provide some redundancy during winter months and higher capacity to meet increased demands during summer months when evaporation is at a peak. Each well would feed a different inflow point to improve circulation. For example, one inflow point could be located at the north end and another at the south end of the channels, with a spillway into the Sea in the middle of the current outlet. Each well would have a pump powered by a small solar array. The solar arrays would be fenced and have security cameras.

Figure 2. The attached Coachella Valley Water District map provides the location of each aforementioned well in proximity to Desert Shore.

Month	Evap (in)	Evap (ft)	Seepage (ft)	Releases (ft)	Total Losses (ft)	Total Losses (ac-ft)	Pumping per Well* (ac-ft)	Pumping per Well* (gpm)
January	1.5	0.13	0.17	0.40	0.70	20.9	10.5	78
February	1.4	0.12	0.17	0.40	0.69	20.6	10.3	77
March	4.5	0.38	0.17	0.30	0.85	25.4	12.7	94
April	7.2	0.60	0.17	0.10	0.87	26.0	13.0	97
May	8.3	0.69	0.17	0.00	0.86	25.7	12.9	96
June	8.2	0.68	0.17	0.00	0.85	25.4	12.7	94
July	8.2	0.68	0.17	0.00	0.85	25.4	12.7	94
August	10.9	0.91	0.17	0.00	1.08	32.3	16.2	120
September	9.4	0.78	0.17	0.00	0.95	28.4	14.2	106
October	5.0	0.42	0.17	0.20	0.79	23.6	11.8	88
November	4.7	0.39	0.17	0.20	0.76	22.7	11.4	84
December	3.0	0.25	0.17	0.40	0.82	24.5	12.3	91
Total	**72.3**	**6.03**	**2.00**	**2.00**	**10.03**	**300.9**	**150.5**	**93**
						Ave	12.5	93
						Max	16.2	120
						Min	10.3	77

*Assumes two wells.

Reference
Alex M. Sturrock, Jr., *Evaporation and Radiation Measurements at Salton Sea, California*, US Geological Survey Water-Supply Paper 2053, 1978

The following are the tasks for this Project:

1. Project Management:
The Recipient will serve as the lead agency in providing project management, fiscal accountability, and interagency coordination in this endeavor. The Recipient is a joint powers authority empowered to work in consultation and cooperation with tribes, water districts, non-governmental agencies, federal, state and local governments. The Recipient has been working with the Desert Shores Channel Restoration Project Planning Committee. Recipient will provide the grant management expertise and the Planning Committee members will include project expertise through a combination of County staff, a biological and cultural consultant, a consulting contractor, state funders/collaborators of Salton Sea projects, the local water district and air pollution district representatives. Imperial County will provide environmental permitting, interagency coordination, planning, and legal counsel assistance that is called upon for support with this Project as needed.

The scope of work will require project management from Imperial County in coordination with the Salton Sea Authority and the Desert Shores Channel Restoration Project Planning Committee for general coordination and meetings, procurement of design services, scheduling and oversight with multiple agencies, contractors and subcontractors.

2. Groundwater Analysis and Hydrogeological Report:

The Imperial County will solicit proposals from qualified consultants in groundwater analysis to prepare a Hydrogeological Report for the project. The Report shall establish that groundwater quality and quantity are adequate and will not adversely impact uses allowed in the areas causing or exacerbating any potential for overdraft condition in the groundwater basin or sub basin. The purpose of the investigation will be to determine the feasibility of extracting 300 Acre/Feet yearly, with two (2) proposed new water wells (primary and secondary). The Report will be integrated into the California Environmental Quality Act (CEQA) environmental review process.

3. CEQA/NEPA Compliance:

Based on the scope of activity, it has been determined that a Categorical Exemption is the appropriate compliance documentation under the CEQA.

4. Stormwater Pollution Prevention Plan (SWPPP) - Plan Required:
As the project site will result in over an acre of disturbance during construction, a SWPPP will be required to be prepared and implemented.

5. Water Quality and 401 Certification - Permit Required:
A 401 Certificate application shall be completed and submitted to the State of California for review and approval. All necessary supporting documentation will be included with the application. The Lower Colorado Basin Region Resource Management Office (LCR RMO) will review and approve the application package prior to submission.

6. Sampling and Analysis Plan for USACE Preliminary Coordination:
Through initial coordination, it is not anticipated that a formal delineation of waters of the US will be required by the United States Army Corps of Engineers (USACE) as part of permitting. It has been included in the Milestone Schedule in case a formal delineation of waters of the US will be required.

7. Aquatic Resources Delineation (ARD):
Request the USACE to perform aquatic resources delineations for applicants requesting permits under Section 404 of the Clean Water Act.

8. Section 404 Clean Water Act - 404 Permit or Letter of Permission Required: A 404 Permit application will be completed and submitted to USACE for review and approval. The 404 Permit shall meet the requirements of USACE Nationwide Permit (NWP) 35. All necessary supporting documentation will be included with the application. The LCR RMO will review and approve of the application package prior to submission. Preliminary coordination with the

USACE has indicated that a Letter of Permission may be substituted for the 404 Permit, based on project review and further coordination efforts.

9. Section 1602 of the State Fish and Game Code - Permit required:
A streambed alteration agreement shall be filed with the Inland Desert Region of the California Department of Fish and Wildlife. The LCR RMO will approve of the application package prior to submission.

10. Regional Water Quality Control Board (RWQCB):
Each Regional Board makes critical topography decisions for its region, including setting standards, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions.

11. Cultural Compliance Survey – Survey Required: Includes procurement, survey, and deliverables.

12. Fugitive Dust Control Plan:
Plan details to cover all potential issues; bio and waters, construction traffic and noise, construction dust control, cultural, on and offsite noise, nighttime activities, water source for dust control and water source for project implementation. Landowner coordination is required as part of this plan development.

13. ESA and Section 107 Compliance – Ongoing:
As part of the NEPA compliance process, coordination will be conducted with appropriate entities and LCR RMO will conduct correspondence that indicates formal or informal consultation with USFWS's California Ecological Services Office regarding impacts to endangered species will be obtained and filed for the subject property and provided to the LCR RMO. A biological assessment will be conducted to determine whether any impacts could occur to the Desert Pupfish. If the Desert Pupfish are determined to be potentially impacted by the Project, a Section 7 permit from the EPA will be required. Bird species protected by the Migratory Bird Treaty Act were identified and there is some mitigation that will be required consistent with CDFW regulations. Additionally, pre-construction biological surveys will need to be incorporated into the construction specification documents to be included as part of the construction costs.

14. Land Use and Grading Permit: Required:
Permits necessary from various Imperial County departments, as there are different jurisdictional authorities for land use permits and the grading permits.

15. Pre-Construction/Mobilization of Equipment:
Prior to construction and after completion of construction, the mobilization and demobilization of construction equipment including the dredge and transport pipeline for dredged material will need to occur.

16. Construction – On-Site Construction
Includes construction management, approval on plans/specs, solar array installation and monitoring, and on-site construction.

17. Construction - Testing for Dewatering Effluent:
In accordance with permitting requirements, the testing of the dewatering effluent will need to be sampled prior to being returned to the Salton Sea.

18. Demobilization of Equipment Removal: Self-explanatory.

19. Monitoring & Close-Out: This activity finalizes all project activities completed across all phases of the project to formally close the project. Salton Sea Authority will be working with the County of Imperial and the Bahia Delmar Property Owners Association at Desert Shores who created a Desert Shores Restoration Oversight Committee to work cooperatively with SSA and Imperial County throughout the project and grant close-out activities. This local group will then be responsible for the maintenance and continuance of the project after the funding responsibilities have been completed.

Project Schedule:

PROJECT MILESTONE SCHEDULE				
Task #	**Task**	**Activity**	**Begin Date**	**Completion Date**
1.	**Project Management**	a) Bid solicitation b) Contract with Design Services c) Procurement of Contracts d) Scheduling e) Invoicing f) Oversight	a-e) 2/2022	a-e) 12/2025
2.	**Groundwater Analysis & Hydrogeological Report**	a) Bid Solicitation b) Data Gathering c) Hydrogeological Characterization d) Groundwater Extraction Feasibility Study e) Final Report	a) 11/2021 b) 12/2021 c) 03/2022 d) 03/2022 e) 04/2022	a) 12/2021 b) 02/2022 c) 03/2022 d) 04/2022 e) 06/2022

3.	**CEQA/NEPA Compliance**	a) Preparation of Notice of Exemption (NOE) for CEQA b) Coordination with BLM for NEPA Compliance	a) 2/2022 b) 3/2022	a) 5/2022 b) 6/2022
4.	**SWPPP**	a) Procurement of SWPPP Preparation b) SWPPP Preparation c) SWPPP Implemented	a) 10/2022 b) 10/2022 c) 3/2023	a) 11/2022 b) 12/2022 c) 7/2023
5.	**401 Certificate**	a) Application Submission to CA b) LCR RMO Approval Certification	a) 9/2023 b) 9/2023	a) 12/2023 b) 12/2023
6.	**Sampling & Analysis Plan for USACE**	a) Coordination with USACE b) Submit Sampling and Analysis Plan c) Conduct Sampling & Submit to USACE	a) 8/2022 b) 1/2023 c) 1/2023	a) 1/2023 b) 1/2023 c) 1/2023
7.	**Aquatic Resources & Delineation Report (ARD)**	a) Coordination with USACE b) Conduct Sampling & ARD Report c) Submit Aquatic Resources & Delineation Plan	a) 8/2022 b) 1/2023 c) 2/2023	a) 1/2023 b) 1/2023 c) 2/2023
8.	**404 Permit**	a) Application Submission to USACE b) 404 Permit Issued	a) 1/2023 b) 1/2023	a) 4/2023 b) 4/2023
9.	**1602 Streambed Alteration Permit**	a) Application & F&W b) Submission to Department of Fish and Wildlife c) Permit Issued	a) 12/2023 b) 12/2023	a) 12/2023 b) 12/2023 c) 7/2023

10.	**RWQCB**	a) Application Submission to CA b) LCR RMO Approval certification	a) 8/2023 b) 10/2023	a) 9/2023 b) 10/2023
11.	**Cultural Compliance Surveys**	a) Procurement of Survey b) Survey Conducted c) Report Submitted	a) 1/2023 b) 8/2023 c) 8/2023	a) 4/2023 b) 8/2023 c) 8/2023
12.	**Fugitive Dust Control Plan**	a) Permit Application prepared b) Imperial County Air Pollution Control District Review and Approval	a) 5/2023 b) 6/2023	a) 6/2023 b) 7/2023
13.	**ESA & Section 107 Permit**	a) Coordination with EPA b) Application Submission to EPA c) Section 107 Permit Issued	a) 6/2023 b) 8/2023 c) 9/2023	a) 7/2023 b) 8/2023 c) 9/2023
14.	**Land Use and Grading Permit Required**	a) Permit Application(s) Prepared for Imperial County b) County Review and Approval	a) 6/2023 b) 8/2023	a) 7/2023 b) 8/2023
15.	**Pre-Construction Mobilization**	a) Pre-construction Survey & Staking b) Pre-construction Equipment On-site	a) 9/2023 b) 9/2023	a) 10/2023 b) 10/2023
16.	**Construction - Testing for Dewatering Effluent**	a) Drainage of Area Depending on Soil Conditions b) On-site Monitoring As Needed	a) 10/2023 b) 10/2023	a) 12/2023 b) 12/2023

17.	**Construction**	a) Construction Management b) Approval on Plans/Specs c) On-site Construction d) Solar Array Installation e) Solar Array Monitoring	a) 7/2023 b) 9/2023 c) 10/2023 d) 1/2025 e) 7/2025	a) 7/2023 b) 10/2023 c) 12/2024 d) 6/2025 e) 9/2025
18.	**Demobilization**	a) Equipment Removal	a) 7/2025	a) 8/2025
19.	**Monitoring & Close-Out**	a) Monitoring b) Close Out	a) 2/2022 b)10/2025	a) 12/2025 b) 12/2025

6. RESPONSIBILITY OF THE PARTIES

6.1 Recipient Responsibilities

6.1.1 The Recipient shall carry out the Scope of Work (SOW) in accordance with the terms and conditions stated herein. The Recipient shall adhere to Federal, state, and local laws, regulations, and codes, as applicable, and shall obtain all required approvals and permits. If the SOW contains construction activities, the Recipient is responsible for construction inspection, oversight, and acceptance. If applicable, the Recipient shall also coordinate and obtain approvals from site owners and operators.

6.1.2 The Recipient shall not request reimbursement on construction costs until all regulatory compliance is complete. The estimated construction costs in the amount of $1,025,222.00 will be suspended in the Automated Standard Application for Payments (ASAP) system and will not be considered reimbursable until the Recipient has received a formal Notice to Proceed from the GO upon completion of environmental compliance activities. See below Section I.11. Regulatory Compliance for more information.

6.1.3 All payment requests submitted by the Recipient through the ASAP system will require review and approval of the payment request by a Reclamation GO prior to disbursement. Recipient is required to submit financial support for each ASAP payment request to the assigned Grants Management Specialist, for review prior to release of the requested payment. See below Section I.12. Agency Review of Payments Within Automated Standard Application for Payments (ASAP) System for more information.

6.2 Reclamation Responsibilities

6.2.1 Reclamation will monitor and provide Federal oversight of activities performed under this Agreement. Monitoring and oversight includes review and approval of financial status and performance reports, payment requests, and any other deliverables identified as part of the SOW. Additional monitoring activities may include site visits, conference calls, and other on-site and off-site monitoring activities. At the Recipient's request, Reclamation may also provide technical assistance to the Recipient in support of the SOW and objectives of this Agreement.

6.2.2 Reclamation will conduct Post-Award Monitoring. The Grants Officer Technical Representative (GOTR) will coordinate and confirm the type of monitoring with the Recipient. Anticipated monitoring for this project includes quarterly coordination call meetings through the project design and compliance phases, and it may increase to the monthly call meetings during the project implementation and construction phases. As opportunities are available, the GOTR may conduct periodic visits in place of calls meetings.

6.2.3 Substantial involvement by Reclamation is anticipated during the performance of activities funded under this cooperative Agreement. In support of this Agreement, Reclamation will be responsible for the following: regular (monthly or more as needed) coordination meetings on project design and review of environmental compliance documents, as well as providing information as required for compliance and permitting. Coordination meetings are necessary to ensure the project design meets the intent of the State of California's Salton Sea Management Program (SSMP) goals for restoring aquatic habitat and to ensure that water infrastructure is suitable to support future projects on nearby Reclamation lands.

7. BUDGET

7.1 Budget Estimate. The following is the estimated budget for this Agreement. As Federal financial assistance agreements are cost-reimbursable, the budget provided is for estimation purposes only. Final costs incurred under the budget categories listed may be either higher or lower than the estimated costs. All costs incurred by the Recipient under this Agreement must be in accordance with any pre-award clarifications conducted between the Recipient and Reclamation, as well as with the terms and conditions of this Agreement. Final determination of the allowability, allocability, or reasonableness of costs incurred under this Agreement is the responsibility of the GO. Recipients are encouraged to direct any questions regarding allowability, allocability or reasonableness of costs to the GO for review prior to incurrence of the costs in question.

BUDGET ITEM DESCRIPTION	TOTAL COST
6a. PERSONNEL (SALARIES AND WAGES)	
	$ 1,561.88
6b. FRINGE BENEFITS	
	$ 1,039.12
6f. CONTRACTUAL including Subawards	
	$ 52,177.00
6g. CONSTRUCTION	
	$ 1,195,222.00
TOTAL DIRECT COSTS:	$ 1,250,000.00
TOTAL ESTIMATED PROJECT/ACTIVITY COSTS:	$ 1,250,000.00

7.2 Cost Sharing Requirement

Non-Federal cost-share is not required for this Agreement.

7.3 Pre-Award Incurrence of Costs

The Recipient shall be entitled to reimbursement for costs incurred on or after November 1, 2021, which if had been incurred after this Agreement was entered into, would have been allowable, allocable, and reasonable under the terms and conditions of this Agreement.

7.4 Allowable Costs

Costs incurred for the performance of this Agreement must be allowable, allocable to the project, and reasonable. The following regulations, codified within the Code of Federal Regulations (CFR), governs the allowability of costs for Federal financial assistance:

2 CFR 200 Subpart E, “Cost Principles”

Expenditures for the performance of this Agreement must conform to the requirements within this CFR. The Recipient must maintain sufficient documentation to support these expenditures. Questions on the allowability of costs should be directed to the GO responsible for this Agreement.

The Recipient shall not incur costs or obligate funds for any purpose pertaining to operation of the program or activities beyond the expiration date stated in the Agreement. The only costs which are authorized for a period of up to 120 days following the project period are those strictly associated with closeout activities for preparation of the final reports.

7.5 Revision of Budget and Program Plans

In accordance with 2 CFR 200.308(h) the recipient must request prior written approval for any of the following changes:

(a) A change in the approved scope of work or associated tasks, even if there is no associated budget revisions.

(b) Revisions which require additional Federal funds to complete the project.

(c) Revisions which involve specific costs for which prior written approval requirements may be imposed consistent with OMB cost principles listed in 2 CFR 200 Subpart E "Cost Principles".

7.6 Amendments

Any changes to this Agreement shall be made by means of a written amendment. Reclamation may make changes to the Agreement by means of a unilateral amendment to address changes in address, no-cost time extensions, changes to Key Personnel, the addition of previously agreed upon funding, or administrative corrections which do not impact the terms and conditions of this agreement. Additionally, a unilateral amendment may be utilized by Reclamation if it should become necessary to suspend or terminate the Agreement in accordance with 2 CFR 200.340.

All other changes shall be made by means of a bilateral amendment to the Agreement. No oral statement made by any person, or written statement by any person other than the GO, shall be allowed in any manner or degree to amend, modify or otherwise effect the terms of the Agreement.

All requests for amendment of the Agreement shall be made in writing, provide a full description of the reason for the request, and be sent to the attention of the GO. Any request for project period extension shall be made at least 45 days prior to the end of the project period of the Agreement or the project period date of any extension that may have been previously granted. Any determination to extend the project period or to provide follow-on funding for continuation of a project is solely at the discretion of Reclamation.

8. KEY PERSONNEL

8.1 Recipient's Key Personnel.

The Recipient's Project Manager for this Agreement shall be:

Johnathan McDanell
Grants Manager
82995 US Hwy. 11, Suite 200
Indio, CA 92201-5672
760-863-2695
jmcdannell@ssajpa.org

Additional key personnel for this Agreement are identified as follows:

G. Patrick O'Dowd
Executive Director/General Manager
82995 US Hwy. 11, Suite 200
Indio, CA 92201-5672
760-863-2695
jpodowd@ssajpa.org

9. LIMITATION OF AUTHORITIES

9.1 Grants Officer (GO).

The Reclamation GO is the only official with legal delegated authority to represent Reclamation. The Reclamation GO's responsibilities include, but are not limited to, the following:

(a) Formally obligate Reclamation to expend funds or change the funding level of the Agreement;

(b) Approve through formal amendment changes in the scope of work and/or budget;

(c) Approve through formal amendment any increase or decrease in the period of performance of the Agreement;

(d) Approve through formal amendment changes in any of the expressed terms, conditions, or specifications of the Agreement;

(e) Be responsible for the overall administration, management, and other non-programmatic aspects of the Agreement including, but not limited to, interpretation of financial assistance statutes, regulations, circulars, policies, and terms of the Agreement; Where applicable, ensures that Reclamation complies with the administrative requirements required by statutes, regulations, circulars, policies, and terms of the Agreement.

9.2 Grants Management Specialist (GMS).

The Reclamation Grants Management Specialist (GMS) is the primary administrative point of contact for this agreement and should be contacted regarding issues related to the day-to-day management of the agreement. Requests for approval regarding the terms and conditions of the agreement, including but not limited to amendments and prior approval, may only be granted, in writing, by a Reclamation GO. Please note that for some agreements, the Reclamation GO and the Reclamation GMS may be the same individual.

10. REPORTING REQUIREMENTS AND DISTRIBUTION

10.1 Noncompliance. Failure to comply with the reporting requirements contained in this Agreement may be considered a material noncompliance with the terms and conditions of the award. Noncompliance may result in withholding of payments pending receipt of required reports, denying both the use of funds and matching credit for all or part of the cost of the activity or action not in compliance, whole or partial suspension or termination of the Agreement, recovery of funds paid under the Agreement, withholding of future awards, or other legal remedies in accordance with 2 CFR 200.340.

10.2 Financial Reports. Federal Financial Reports shall be submitted by means of the SF-425 and shall be submitted according to the Report Frequency and Distribution schedule below. All financial reports shall be signed by an Authorized Certifying Official for the Recipient's organization.

10.3 Monitoring and Reporting Program Performance.

(a) Monitoring by the non-Federal entity. The non-Federal entity is responsible for oversight of the operations of the Federal award supported activities. The non-Federal entity must monitor its activities under Federal awards to assure compliance with applicable Federal requirements and performance expectations are being achieved. Monitoring by the non-Federal entity must cover each program, function or activity. See also 2 CFR 200.332 Requirements for pass-through entities.

(b) Non-construction performance reports. The Federal awarding agency must use standard, OMB-approved data elements for collection of performance information (including performance progress reports, Research Performance Progress Report, or such future collections as may be approved by OMB and listed on the OMB Web site).

(1) The non-Federal entity must submit performance reports at the interval required by the Federal awarding agency or pass-through entity to best inform improvements in program outcomes and productivity. Intervals must be no less frequent than annually nor more frequent than quarterly except in unusual circumstances, for example where more frequent reporting is necessary for the effective monitoring of the Federal award or could significantly affect program outcomes. Annual reports must be due 90 calendar days after the reporting period; quarterly or semiannual reports must be due 30 calendar days after the reporting period. Alternatively, the Federal awarding

agency or pass-through entity may require annual reports before the anniversary dates of multiple year Federal awards. The final performance report will be due 120 calendar days after the period of performance end date. If a justified request is submitted by a non-Federal entity, the Federal agency may extend the due date for any performance report.

(2) The non-Federal entity must submit performance reports using OMB-approved governmentwide standard information collections when providing performance information. As appropriate in accordance with above mentioned information collections, these reports will contain, for each Federal award, brief information on the following unless other collections are approved by OMB:

(i) A comparison of actual accomplishments to the objectives of the Federal award established for the period. Where the accomplishments of the Federal award can be quantified, a computation of the cost (for example, related to units of accomplishment) may be required if that information will be useful. Where performance trend data and analysis would be informative to the Federal awarding agency program, the Federal awarding agency should include this as a performance reporting requirement.

(ii) The reasons why established goals were not met, if appropriate.

(iii) Additional pertinent information including, when appropriate, analysis and explanation of cost overruns or high unit costs.

(c) Construction performance reports. For the most part, onsite technical inspections and certified percentage of completion data are relied on heavily by Federal awarding agencies and pass-through entities to monitor progress under Federal awards and subawards for construction. The Federal awarding agency may require additional performance reports only when considered necessary.

(d) Significant developments. Events may occur between the scheduled performance reporting dates that have significant impact upon the supported activity. In such cases, the non-Federal entity must inform the Federal awarding agency or pass-through entity as soon as the following types of conditions become known:

(1) Problems, delays, or adverse conditions which will materially impair the ability to meet the objective of the Federal award. This disclosure must include a statement of the action taken, or contemplated, and any assistance needed to resolve the situation.

(2) Favorable developments which enable meeting time schedules and objectives sooner or at less cost than anticipated or producing more or different beneficial results than originally planned.

Reclamation requires Performance reporting for all financial assistance awards, both Construction and non-Construction. Performance reports for Construction agreements shall meet the same minimum requirements outlined in paragraph (b)(2) above.

10.4 Report Frequency and Distribution. The following table sets forth the reporting requirements for this Agreement. Please note the first report due date listed for each type of report.

Required Reports	Interim Reports	Final Report
Performance Report		
Format	No specific format required. See content requirements within Section 10.3 and any program specific reporting requirements identified in Section 6.1 of this Agreement.	Summary of activities completed during the entire period of performance is required. See content requirements within Section 10.3 and any program specific reporting requirements identified in Section 6.1 of this Agreement.
Reporting Frequency	Quarterly	Final Report due within 120 days after the end of the period of performance.
Reporting Period	Federal fiscal quarters ending: December 31, March 31, June 30 September 30	Entire period of performance
Due Date	Within 30 days after the end of the Reporting Period.	Final Report due within 120 days after the end of the period of performance **or** completion of the project.
First Report Due Date	The first performance report is due for reporting period ending June 30, 2022.	N/A
Submit to:	Grants Officer at LCFA@usbr.gov or GrantSolutions	Grants Officer at LCFA@usbr.gov or GrantSolutions
Federal Financial Report		
Format	SF-425 (all sections must be completed)	SF-425(all sections must be completed)
Reporting Frequency	Quarterly	Final Report due within 120 days after the end of the period of performance or completion of the project.
Reporting Period	Federal fiscal quarters ending: December 31, March 31, June 30 September 30	Entire period of performance
Due Date	Within 30 days after the end of the Reporting Period.	Final Report due within 120 days after the end of the period of performance **or** completion of project.
First Report Due Date	The first Federal financial report is due for reporting period ending June 30, 2022.	N/A

Submit to:	Grants Officer at LCFA@usbr.gov or GrantSolutions	Grants Officer at LCFA@usbr.gov or GrantSolutions

11. REGULATORY COMPLIANCE

The Recipient agrees to comply or assist Reclamation with all regulatory compliance requirements and all applicable state, Federal, and local environmental and cultural and paleontological resource protection laws and regulations as applicable to this project. These may include, but are not limited to, the National Environmental Policy Act (NEPA), including the Council on Environmental Quality and Department of the Interior regulations implementing NEPA, the Clean Water Act, the Endangered Species Act, consultation with potentially affected Tribes, and consultation with the State Historic Preservation Office. If the Recipient begins project activities that require environmental or other regulatory compliance approval prior to receipt of written notice from a Reclamation GO that all such clearances have been obtained, then Reclamation reserves the right to initiate remedies for non-compliance as defined by 2 CFR 200.340 up to and including unilateral termination of this agreement.

12. AGENCY REVIEW OF PAYMENTS WITHIN AUTOMATED STANDARD APPLICATION FOR PAYMENTS (ASAP) SYSTEM

Payment requests by the Recipient through the ASAP system will require review and approval of the payment request by a Reclamation GO prior to disbursement. The Recipient is required to submit financial support for each ASAP payment request to the assigned Grants Management Specialist, for review prior to release of the requested payment.

13. GEOSPATIAL DATA.

Geospatial Data Act of 2018, Pub. L. 115-254, Subtitle F –Geospatial Data, §§ 751-759C, codified at 43 U.S.C. §§ 2801–2811 -Federal recipient collection of geospatial data through the use of the Department of the Interior financial assistance funds requires a due diligence search at the GeoPlatform.gov list of datasets to discover whether the needed geospatial-related data, products, or services already exist. If the required data set already exists, the recipient must use it. If the required data is not already available, the Recipient must produce the proposed geospatial data, products, or services in compliance with applicable proposed guidance and standards established by the Federal Geospatial Data Committee (FGDC) posted at https://www.fgdc.gov/standards.

The Recipient must submit a digital copy of all GIS data produced or collected as part of the award funds to the bureau or office via email or data transfer. All GIS data files shall be in open format. All delineated GIS data (points, lines or polygons) should be established in compliance with the approved open data standards with complete feature level metadata.

II. RECLAMATION STANDARD TERMS AND CONDITIONS

1. REGULATIONS

The regulations at 2 CFR Subtitle A, Chapter II, Part 200 "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards", are hereby incorporated by reference as though set forth in full text. Failure of a Recipient to comply with any applicable regulation or circular may be the basis for withholding payments for proper charges made by the Recipient and/or for termination of support.

2. PAYMENT

2.1 Payment (2 CFR 200.305).

(a) For states, payments are governed by Treasury-State Cash Management Improvement Act (CMIA) agreements and default procedures codified at 31 CFR part 205 and Treasury Financial Manual (TFM) 4A-2000, "Overall Disbursing Rules for All Federal Agencies".

(b) For non-Federal entities other than states, payments methods must minimize the time elapsing between the transfer of funds from the United States Treasury or the pass-through entity and the disbursement by the non-Federal entity whether the payment is made by electronic funds transfer, or issuance or redemption of checks, warrants, or payment by other means. See also §200.302(b)(6). Except as noted elsewhere in this part, Federal agencies must require recipients to use only OMB-approved, governmentwide information collection requests to request payment.

(1) The non-Federal entity must be paid in advance, provided it maintains or demonstrates the willingness to maintain both written procedures that minimize the time elapsing between the transfer of funds and disbursement by the non-Federal entity, and financial management systems that meet the standards for fund control and accountability as established in this part. Advance payments to a non-Federal entity must be limited to the minimum amounts needed and be timed to be in accordance with the actual, immediate cash requirements of the non-Federal entity in carrying out the purpose of the approved program or project. The timing and amount of advance payments must be as close as is administratively feasible to the actual disbursements by the non-Federal entity for direct program or project costs and the proportionate share of any allowable indirect costs. The non-Federal entity must make timely payment to contractors in accordance with the contract provisions.

(2) Whenever possible, advance payments must be consolidated to cover anticipated cash needs for all Federal awards made by the Federal awarding agency to the recipient.

(i) Advance payment mechanisms include, but are not limited to, Treasury check and electronic funds transfer and must comply with applicable guidance in 31 CFR part 208.

(ii) Non-Federal entities must be authorized to submit requests for advance payments and reimbursements at least monthly when electronic fund transfers are not used, and as often as they like when electronic transfers are used, in accordance with the provisions of the Electronic Fund Transfer Act (15 U.S.C. 1693-1693r).

(3) Reimbursement is the preferred method when the requirements in this paragraph (b) cannot be met, when the Federal awarding agency sets a specific condition per §200.208, or when the non-Federal entity requests payment by reimbursement. This method may be used on any Federal award for construction, or if the major portion of the construction project is accomplished through private market financing or Federal loans, and the Federal award constitutes a minor portion of the project. When the reimbursement method is used, the Federal awarding agency or pass-through entity must make payment within 30 calendar days after receipt of the billing, unless the Federal awarding agency or pass-through entity reasonably believes the request to be improper.

(4) If the non-Federal entity cannot meet the criteria for advance payments and the Federal awarding agency or pass-through entity has determined that reimbursement is not feasible because the non-Federal entity lacks sufficient working capital, the Federal awarding agency or pass-through entity may provide cash on a working capital advance basis. Under this procedure, the Federal awarding agency or pass-through entity must advance cash payments to the non-Federal entity to cover its estimated disbursement needs for an initial period generally geared to the non-Federal entity's disbursing cycle. Thereafter, the Federal awarding agency or pass-through entity must reimburse the non-Federal entity for its actual cash disbursements. Use of the working capital advance method of payment requires that the pass-through entity provide timely advance payments to any subrecipients in order to meet the subrecipient's actual cash disbursements. The working capital advance method of payment must not be used by the pass-through entity if the reason for using this method is the unwillingness or inability of the pass-through entity to provide timely advance payments to the subrecipient to meet the subrecipient's actual cash disbursements.

(5) To the extent available, the non-Federal entity must disburse funds available from program income (including repayments to a revolving fund), rebates, refunds, contract settlements, audit recoveries, and interest earned on such funds before requesting additional cash payments.

(6) Unless otherwise required by Federal statutes, payments for allowable costs by non-Federal entities must not be withheld at any time during the period of performance unless the conditions of §200.208, subpart D of this part, including §200.339, or one or more of the following applies:

(i) The non-Federal entity has failed to comply with the project objectives, Federal statutes, regulations, or the terms and conditions of the Federal award.

(ii) The non-Federal entity is delinquent in a debt to the United States as defined in OMB Circular A-129, “Policies for Federal Credit Programs and Non-Tax Receivables.” Under such conditions, the Federal awarding agency or pass-

through entity may, upon reasonable notice, inform the non-Federal entity that payments must not be made for financial obligations incurred after a specified date until the conditions are corrected or the indebtedness to the Federal Government is liquidated.

(iii) A payment withheld for failure to comply with Federal award conditions, but without suspension of the Federal award, must be released to the non-Federal entity upon subsequent compliance. When a Federal award is suspended, payment adjustments will be made in accordance with §200.343.

(iv) A payment must not be made to a non-Federal entity for amounts that are withheld by the non-Federal entity from payment to contractors to assure satisfactory completion of work. A payment must be made when the non-Federal entity actually disburses the withheld funds to the contractors or to escrow accounts established to assure satisfactory completion of work.

(7) Standards governing the use of banks and other institutions as depositories of advance payments under Federal awards are as follows.

(i) The Federal awarding agency and pass-through entity must not require separate depository accounts for funds provided to a non-Federal entity or establish any eligibility requirements for depositories for funds provided to the non-Federal entity. However, the non-Federal entity must be able to account for funds received, obligated, and expended.

(ii) Advance payments of Federal funds must be deposited and maintained in insured accounts whenever possible.

(8) The non-Federal entity must maintain advance payments of Federal awards in interest-bearing accounts, unless the following apply:

(i) The non-Federal entity receives less than $250,000 in Federal awards per year.

(ii) The best reasonably available interest-bearing account would not be expected to earn interest in excess of $500 per year on Federal cash balances.

(iii) The depository would require an average or minimum balance so high that it would not be feasible within the expected Federal and non-Federal cash resources.

(iv) A foreign government or banking system prohibits or precludes interest-bearing accounts.

(9) Interest earned amounts up to $500 per year may be retained by the non-Federal entity for administrative expense. Any additional interest earned on Federal advance payments deposited in interest-bearing accounts must be remitted annually to the Department of Health and Human Services Payment Management System (PMS) through an electronic medium using either Automated Clearing House (ACH) network or a Fedwire Funds Service payment.

(i) For returning interest on Federal awards paid through PMS, the refund should:

(A) Provide an explanation stating that the refund is for interest;

(B) List the PMS Payee Account Number(s) (PANs);

(C) List the Federal award number(s) for which the interest was earned; and

(D) Make returns payable to: Department of Health and Human Services.

(ii) For returning interest on Federal awards not paid through PMS, the refund should:

(A) Provide an explanation stating that the refund is for interest;

(B) Include the name of the awarding agency;

(C) List the Federal award number(s) for which the interest was earned; and

(D) Make returns payable to: Department of Health and Human Services.

(10) Funds, principal, and excess cash returns must be directed to the original Federal agency payment system. The non-Federal entity should review instructions from the original Federal agency payment system. Returns should include the following information:

(i) Payee Account Number (PAN), if the payment originated from PMS, or Agency information to indicate whom to credit the funding if the payment originated from ASAP, NSF, or another Federal agency payment system.

(ii) PMS document number and subaccount(s), if the payment originated from PMS, or relevant account numbers if the payment originated from another Federal agency payment system.

(iii) The reason for the return (e.g., excess cash, funds not spent, interest, part interest part other, etc.)

(11) When returning funds or interest to PMS you must include the following as applicable:

(i) For ACH Returns:
Routing Number: 051036706
Account number: 303000
Bank Name and Location: Credit Gateway—ACH Receiver St. Paul, MN

(ii) For Fedwire Returns[1]:
Routing Number: 021030004
Account number: 75010501
Bank Name and Location: Federal Reserve Bank Treas NYC/Funds Transfer Division New York, NY

[1]Please note that the organization initiating payment is likely to incur a charge from their Financial Institution for this type of payment.

(iii) For International ACH Returns:
Beneficiary Account: Federal Reserve Bank of New York/ITS (FRBNY/ITS)
Bank: Citibank N.A. (New York)
Swift Code: CITIUS33
Account Number: 36838868
Bank Address: 388 Greenwich Street, New York, NY 10013 USA
Payment Details (Line 70): Agency Locator Code (ALC): 75010501

Name (abbreviated when possible) and ALC Agency POC

(iv) For recipients that do not have electronic remittance capability, please make check[2] payable to: "The Department of Health and Human Services."
Mail Check to Treasury approved lockbox:
HHS Program Support Center, P.O. Box 530231, Atlanta, GA 30353-0231

[2]Please allow 4-6 weeks for processing of a payment by check to be applied to the appropriate PMS account.

(v) Questions can be directed to PMS at 877-614-5533 or PMSSupport@psc.hhs.gov.

2.2 Payment Method.

Recipients must utilize the Department of Treasury Automated Standard Application for Payments (ASAP) payment system to request advance or reimbursement payments. ASAP is a Recipient-initiated payment and information system designed to provide a single point of contact for the request and delivery of Federal funds. ASAP is the only allowable method for request and receipt of payment. Recipient procedures must minimize the time elapsing between the drawdown of Federal funds and the disbursement for agreement purposes.

In accordance with 2 CFR 25.200(b)(2) the Recipient shall "Maintain an active SAM registration with current information, including information on a recipient's immediate and highest level owner and subsidiaries, as well as on all predecessors that have been awarded a Federal contract or grant within the last three years, if applicable, at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency. If the Recipient allows their SAM registration to lapse, the Recipient's accounts within ASAP will be automatically suspended by Reclamation until such time as the Recipient renews their SAM registration.

3. PROCUREMENT STANDARDS (2 CFR 200.317 through 200.327)

§200.317 Procurements by States.

When procuring property and services under a Federal award, a State must follow the same policies and procedures it uses for procurements from its non-Federal funds. The State will comply with §§200.321, 200.322, and 200.323 and ensure that every purchase order or other contract includes any clauses required by §200.327. All other non-Federal entities, including subrecipients of a State, must follow the procurement standards in §§200.318 through 200.327.

§200.318 General procurement standards.

(a) The non-Federal entity must use its own documented procurement procedures which reflect applicable State, local, and tribal laws and regulations, provided that the procurements conform to applicable Federal law and the standards identified in this part.

(b) Non-Federal entities must maintain oversight to ensure that contractors perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders.

(c)

(1) The non-Federal entity must maintain written standards of conduct covering conflicts of interest and governing the actions of its employees engaged in the selection, award and administration of contracts. No employee, officer, or agent may participate in the selection, award, or administration of a contract supported by a Federal award if he or she has a real or apparent conflict of interest. Such a conflict of interest would arise when the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of the parties indicated herein, has a financial or other interest in or a tangible personal benefit from a firm considered for a contract. The officers, employees, and agents of the non-Federal entity may neither solicit nor accept gratuities, favors, or anything of monetary value from contractors or parties to subcontracts. However, non-Federal entities may set standards for situations in which the financial interest is not substantial or the gift is an unsolicited item of nominal value. The standards of conduct must provide for disciplinary actions to be applied for violations of such standards by officers, employees, or agents of the non-Federal entity.

(2) If the non-Federal entity has a parent, affiliate, or subsidiary organization that is not a state, local government, or Indian tribe, the non-Federal entity must also maintain written standards of conduct covering organizational conflicts of interest. Organizational conflicts of interest means that because of relationships with a parent company, affiliate, or subsidiary organization, the non-Federal entity is unable or appears to be unable to be impartial in conducting a procurement action involving a related organization.

(d) The non-Federal entity's procedures must avoid acquisition of unnecessary or duplicative items. Consideration should be given to consolidating or breaking out procurements to obtain a more economical purchase. Where appropriate, an analysis will be made of lease versus purchase alternatives, and any other appropriate analysis to determine the most economical approach.

(e) To foster greater economy and efficiency, and in accordance with efforts to promote cost-effective use of shared services across the Federal Government, the non-Federal entity is encouraged to enter into state and local intergovernmental agreements or inter-entity agreements where appropriate for procurement or use of common or shared goods and services.

(f) The non-Federal entity is encouraged to use Federal excess and surplus property in lieu of purchasing new equipment and property whenever such use is feasible and reduces project costs.

(g) The non-Federal entity is encouraged to use value engineering clauses in contracts for construction projects of sufficient size to offer reasonable opportunities for cost reductions. Value engineering is a systematic and creative analysis of each contract item or task to ensure that its essential function is provided at the overall lower cost.

(h) The non-Federal entity must award contracts only to responsible contractors possessing the ability to perform successfully under the terms and conditions of a proposed procurement. Consideration will be given to such matters as contractor integrity, compliance with public policy, record of past performance, and financial and technical resources. See also 200.212 Suspension and debarment.

(i) The non-Federal entity must maintain records sufficient to detail the history of procurement. These records will include, but are not necessarily limited to the following: rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price.

(j)

(1) The non-Federal entity may use a time and materials type contract only after a determination that no other contract is suitable and if the contract includes a ceiling price that the contractor exceeds at its own risk. Time and materials type contract means a contract whose cost to a non-Federal entity is the sum of:(i) The actual cost of materials; and

(ii) Direct labor hours charged at fixed hourly rates that reflect wages, general and administrative expenses, and profit.

(2) Since this formula generates an open-ended contract price, a time-and-materials contract provides no positive profit incentive to the contractor for cost control or labor efficiency. Therefore, each contract must set a ceiling price that the contractor exceeds at its own risk. Further, the non-Federal entity awarding such a contract must assert a high degree of oversight in order to obtain reasonable assurance that the contractor is using efficient methods and effective cost controls.

(k) The non-Federal entity alone must be responsible, in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements. These issues include, but are not limited to, source evaluation, protests, disputes, and claims. These standards do not relieve the non-Federal entity of any contractual responsibilities under its contracts. The Federal awarding agency will not substitute its judgment for that of the non-Federal entity unless the matter is primarily a Federal concern. Violations of law will be referred to the local, state, or Federal authority having proper jurisdiction.

§200.319 Competition.

(a) All procurement transactions for the acquisition of property or services required under a Federal award must be conducted in a manner providing full and open competition consistent with the standards of this section and §200.320.

(b) In order to ensure objective contractor performance and eliminate unfair competitive advantage, contractors that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals must be excluded from competing for such procurements. Some of the situations considered to be restrictive of competition include but are not limited to:

(1) Placing unreasonable requirements on firms in order for them to qualify to do business;

(2) Requiring unnecessary experience and excessive bonding;

(3) Noncompetitive pricing practices between firms or between affiliated companies;

(4) Noncompetitive contracts to consultants that are on retainer contracts;

(5) Organizational conflicts of interest;

(6) Specifying only a “brand name” product instead of allowing “an equal” product to be offered and describing the performance or other relevant requirements of the procurement; and

(7) Any arbitrary action in the procurement process.

(c) The non-Federal entity must conduct procurements in a manner that prohibits the use of statutorily or administratively imposed state, local, or tribal geographical preferences in the evaluation of bids or proposals, except in those cases where applicable Federal statutes expressly mandate or encourage geographic preference. Nothing in this section preempts state licensing laws. When contracting for architectural and engineering (A/E) services, geographic location may be a selection criterion provided its application leaves an appropriate number of qualified firms, given the nature and size of the project, to compete for the contract.

(d) The non-Federal entity must have written procedures for procurement transactions. These procedures must ensure that all solicitations:

(1) Incorporate a clear and accurate description of the technical requirements for the material, product, or service to be procured. Such description must not, in competitive procurements, contain features which unduly restrict competition. The description may include a statement of the qualitative nature of the material, product or service to be procured and, when necessary, must set forth those minimum essential characteristics and standards to which it must conform if it is to satisfy its intended use. Detailed product specifications should be avoided if at all possible. When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a “brand name or equivalent” description may be used as a means to define the performance or other salient requirements of procurement. The specific features of the named brand which must be met by offers must be clearly stated; and

(2) Identify all requirements which the offerors must fulfill and all other factors to be used in evaluating bids or proposals.

(e) The non-Federal entity must ensure that all prequalified lists of persons, firms, or products which are used in acquiring goods and services are current and include enough qualified sources to ensure maximum open and free competition. Also, the non-Federal entity must not preclude potential bidders from qualifying during the solicitation period.

(f) Noncompetitive procurements can only be awarded in accordance with §200.320(c).

§200.320 Methods of procurement to be followed.

The non-Federal entity must have and use documented procurement procedures, consistent with the standards of this section and §§200.317, 200.318, and 200.319 for any of the following methods of procurement used for the acquisition of property or services required under a Federal award or sub-award.

(a) Informal procurement methods. When the value of the procurement for property or services under a Federal award does not exceed the simplified acquisition threshold (SAT), as defined in §200.1, or a lower threshold established by a non-Federal entity, formal procurement methods are not required. The non-Federal entity may use informal procurement methods to expedite the completion of its transactions and minimize the associated administrative burden and cost. The informal methods used for procurement of property or services at or below the SAT include:

(1) Micro-purchases—(i) Distribution. The acquisition of supplies or services, the aggregate dollar amount of which does not exceed the micro-purchase threshold (See the definition of micro-purchase in §200.1). To the maximum extent practicable, the non-Federal entity should distribute micro-purchases equitably among qualified suppliers.

(ii) Micro-purchase awards. Micro-purchases may be awarded without soliciting competitive price or rate quotations if the non-Federal entity considers the price to be reasonable based on research, experience, purchase history or other information and documents it files accordingly. Purchase cards can be used for micro-purchases if procedures are documented and approved by the non-Federal entity.

(iii) Micro-purchase thresholds. The non-Federal entity is responsible for determining and documenting an appropriate micro-purchase threshold based on internal controls, an evaluation of risk, and its documented procurement procedures. The micro-purchase threshold used by the non-Federal entity must be authorized or not prohibited under State, local, or tribal laws or regulations. Non-Federal entities may establish a threshold higher than the Federal threshold established in the Federal Acquisition Regulations (FAR) in accordance with paragraphs (a)(1)(iv) and (v) of this section.

(iv) Non-Federal entity increase to the micro-purchase threshold up to $50,000. Non-Federal entities may establish a threshold higher than the micro-purchase threshold identified in the FAR in accordance with the requirements of this

section. The non-Federal entity may self-certify a threshold up to $50,000 on an annual basis and must maintain documentation to be made available to the Federal awarding agency and auditors in accordance with §200.334. The self-certification must include a justification, clear identification of the threshold, and supporting documentation of any of the following:

(A) A qualification as a low-risk auditee, in accordance with the criteria in §200.520 for the most recent audit;

(B) An annual internal institutional risk assessment to identify, mitigate, and manage financial risks; or,

(C) For public institutions, a higher threshold consistent with State law.

(v) Non-Federal entity increase to the micro-purchase threshold over $50,000. Micro-purchase thresholds higher than $50,000 must be approved by the cognizant agency for indirect costs. The non-federal entity must submit a request with the requirements included in paragraph (a)(1)(iv) of this section. The increased threshold is valid until there is a change in status in which the justification was approved.

(2) Small purchases—(i) Small purchase procedures. The acquisition of property or services, the aggregate dollar amount of which is higher than the micro-purchase threshold but does not exceed the simplified acquisition threshold. If small purchase procedures are used, price or rate quotations must be obtained from an adequate number of qualified sources as determined appropriate by the non-Federal entity.

(ii) Simplified acquisition thresholds. The non-Federal entity is responsible for determining an appropriate simplified acquisition threshold based on internal controls, an evaluation of risk and its documented procurement procedures which must not exceed the threshold established in the FAR. When applicable, a lower simplified acquisition threshold used by the non-Federal entity must be authorized or not prohibited under State, local, or tribal laws or regulations.

(b) Formal procurement methods. When the value of the procurement for property or services under a Federal financial assistance award exceeds the SAT, or a lower threshold established by a non-Federal entity, formal procurement methods are required. Formal procurement methods require following documented procedures. Formal procurement methods also require public advertising unless a non-competitive procurement can be used in accordance with §200.319 or paragraph (c) of this section. The following formal methods of procurement are used for procurement of property or services above the simplified acquisition threshold or a value below the simplified acquisition threshold the non-Federal entity determines to be appropriate:

(1) Sealed bids. A procurement method in which bids are publicly solicited and a firm fixed-price contract (lump sum or unit price) is awarded to the responsible bidder whose bid, conforming with all the material terms and conditions of the invitation for bids, is the lowest in price. The sealed bids method is the preferred method for procuring construction, if the conditions.

(i) In order for sealed bidding to be feasible, the following conditions should be present:

(A) A complete, adequate, and realistic specification or purchase description is available;

(B) Two or more responsible bidders are willing and able to compete effectively for the business; and

(C) The procurement lends itself to a firm fixed price contract and the selection of the successful bidder can be made principally on the basis of price.

(ii) If sealed bids are used, the following requirements apply:

(A) Bids must be solicited from an adequate number of qualified sources, providing them sufficient response time prior to the date set for opening the bids, for local, and tribal governments, the invitation for bids must be publicly advertised;

(B) The invitation for bids, which will include any specifications and pertinent attachments, must define the items or services in order for the bidder to properly respond;

(C) All bids will be opened at the time and place prescribed in the invitation for bids, and for local and tribal governments, the bids must be opened publicly;

(D) A firm fixed price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life cycle costs must be considered in determining which bid is lowest. Payment discounts will only be used to determine the low bid when prior experience indicates that such discounts are usually taken advantage of; and

(E) Any or all bids may be rejected if there is a sound documented reason.

(2) Proposals. A procurement method in which either a fixed price or cost-reimbursement type contract is awarded. Proposals are generally used when conditions are not appropriate for the use of sealed bids. They are awarded in accordance with the following requirements:

(i) Requests for proposals must be publicized and identify all evaluation factors and their relative importance. Proposals must be solicited from an adequate number of qualified offerors. Any response to publicized requests for proposals must be considered to the maximum extent practical;

(ii) The non-Federal entity must have a written method for conducting technical evaluations of the proposals received and making selections;

(iii) Contracts must be awarded to the responsible offeror whose proposal is most advantageous to the non-Federal entity, with price and other factors considered; and

(iv) The non-Federal entity may use competitive proposal procedures for qualifications-based procurement of architectural/engineering (A/E) professional services whereby offeror's qualifications are evaluated and the most qualified offeror is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in procurement of A/E professional services. It cannot be used to purchase other types of services though A/E firms that are a potential source to perform the proposed effort.

(c) Noncompetitive procurement. There are specific circumstances in which noncompetitive procurement can be used. Noncompetitive procurement can only be awarded if one or more of the following circumstances apply:

(1) The acquisition of property or services, the aggregate dollar amount of which does not exceed the micro-purchase threshold (see paragraph (a)(1) of this section);

(2) The item is available only from a single source;

(3) The public exigency or emergency for the requirement will not permit a delay resulting from publicizing a competitive solicitation;

(4) The Federal awarding agency or pass-through entity expressly authorizes a noncompetitive procurement in response to a written request from the non-Federal entity; or

(5) After solicitation of a number of sources, competition is determined inadequate.

§200.321 Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms.

(a) The non-Federal entity must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.

(b) Affirmative steps must include:

(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;

(4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;

(5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and

(6) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (b)(1) through (5) of this section.

§200.322 Domestic preferences for procurements.

(a) As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.

(b) For purposes of this section:

(1) "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

(2) "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

§200.323 Procurement of recovered materials.

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

§200.324 Contract cost and price.

(a) The non-Federal entity must perform a cost or price analysis in connection with every procurement action in excess of the Simplified Acquisition Threshold including contract amendments. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, the non-Federal entity must make independent estimates before receiving bids or proposals.

(b) The non-Federal entity must negotiate profit as a separate element of the price for each contract in which there is no price competition and in all cases where cost analysis is performed. To establish a fair and reasonable profit, consideration must be given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.

(c) Costs or prices based on estimated costs for contracts under the Federal award are allowable only to the extent that costs incurred or cost estimates included in negotiated prices would be allowable for the non-Federal entity under subpart E of this part. The non-Federal entity may reference its own cost principles that comply with the Federal cost principles.

(d) The cost plus a percentage of cost and percentage of construction cost methods of contracting must not be used.

§200.325 Federal awarding agency or pass-through entity review.

(a) The non-Federal entity must make available, upon request of the Federal awarding agency or pass-through entity, technical specifications on proposed procurements where the Federal awarding agency or pass-through entity believes such review is needed to ensure that the item or service specified is the one being proposed for acquisition. This review generally will take place prior to the time the specification is incorporated into a solicitation document. However, if the non-Federal entity desires to have the review accomplished after a solicitation has been developed, the Federal awarding agency or pass-through entity may still review the specifications, with such review usually limited to the technical aspects of the proposed purchase.

(b) The non-Federal entity must make available upon request, for the Federal awarding agency or pass-through entity pre-procurement review, procurement documents, such as requests for proposals or invitations for bids, or independent cost estimates, when:

(1) The non-Federal entity's procurement procedures or operation fails to comply with the procurement standards in this part;

(2) The procurement is expected to exceed the Simplified Acquisition Threshold and is to be awarded without competition or only one bid or offer is received in response to a solicitation;

(3) The procurement, which is expected to exceed the Simplified Acquisition Threshold, specifies a “brand name” product;

(4) The proposed contract is more than the Simplified Acquisition Threshold and is to be awarded to other than the apparent low bidder under a sealed bid procurement; or

(5) A proposed contract amendment changes the scope of a contract or increases the contract amount by more than the Simplified Acquisition Threshold.

(c) The non-Federal entity is exempt from the pre-procurement review in paragraph (b) of this section if the Federal awarding agency or pass-through entity determines that its procurement systems comply with the standards of this part.

(1) The non-Federal entity may request that its procurement system be reviewed by the Federal awarding agency or pass-through entity to determine whether its system meets these standards in order for its system to be certified. Generally, these reviews must occur where there is continuous high-dollar funding, and third-party contracts are awarded on a regular basis;

(2) The non-Federal entity may self-certify its procurement system. Such self-certification must not limit the Federal awarding agency's right to survey the system. Under a self-certification procedure, the Federal awarding agency may rely on written assurances from the non-Federal entity that it is complying with these standards. The non-Federal entity must cite specific policies, procedures, regulations, or standards as being in compliance with these requirements and have its system available for review.

§200.326 Bonding requirements.

For construction or facility improvement contracts or subcontracts exceeding the Simplified Acquisition Threshold, the Federal awarding agency or pass-through entity may accept the bonding policy and requirements of the non-Federal entity provided that the Federal awarding agency or pass-through entity has made a determination that the Federal interest is adequately protected. If such a determination has not been made, the minimum requirements must be as follows:

(a) A bid guarantee from each bidder equivalent to five percent of the bid price. The “bid guarantee” must consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.

(b) A performance bond on the part of the contractor for 100 percent of the contract price. A “performance bond” is one executed in connection with a contract to secure fulfillment of all the contractor's requirements under such contract.

(c) A payment bond on the part of the contractor for 100 percent of the contract price. A “payment bond” is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

§200.327 Contract provisions.

The non-Federal entity's contracts must contain the applicable provisions described in appendix II to this part.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014, and 85 FR 49506]

4. EQUIPMENT (2 CFR 200.313)

See also 200.439 Equipment and other capital expenditures.

(a) Title. Subject to the obligations and conditions set forth in this section, title to equipment acquired under a Federal award will vest upon acquisition in the non-Federal entity. Unless a statute specifically authorizes the Federal agency to vest title in the non-Federal entity without further obligation to the Federal Government, and the Federal agency elects to do so, the title must be a conditional title. Title must vest in the non-Federal entity subject to the following conditions:

(1) Use the equipment for the authorized purposes of the project during the period of performance, or until the property is no longer needed for the purposes of the project.

(2) Not encumber the property without approval of the Federal awarding agency or pass-through entity.

(3) Use and dispose of the property in accordance with paragraphs (b), (c) and (e) of this section.

(b) A state must use, manage and dispose of equipment acquired under a Federal award by the state in accordance with state laws and procedures. Other non-Federal entities must follow paragraphs (c) through (e) of this section.

(c) Use.

(1) Equipment must be used by the non-Federal entity in the program or project for which it was acquired as long as needed, whether or not the project or program continues to be supported by the Federal award, and the non-Federal entity must not encumber the property without prior approval of the Federal awarding agency. When no longer needed for the original program or project, the equipment may be used in other activities supported by the Federal awarding agency, in the following order of priority:

(i) Activities under a Federal award from the Federal awarding agency which funded the original program or project, then

(ii) Activities under Federal awards from other Federal awarding agencies. This includes consolidated equipment for information technology systems.

(2) During the time that equipment is used on the project or program for which it was acquired, the non-Federal entity must also make equipment available for use on other projects or programs currently or previously supported by the Federal Government, provided that such use will not interfere with the work on the projects or program for

which it was originally acquired. First preference for other use must be given to other programs or projects supported by Federal awarding agency that financed the equipment and second preference must be given to programs or projects under Federal awards from other Federal awarding agencies. Use for non-federally-funded programs or projects is also permissible. User fees should be considered if appropriate.

(3) Notwithstanding the encouragement in 200.307 Program income to earn program income, the non-Federal entity must not use equipment acquired with the Federal award to provide services for a fee that is less than private companies charge for equivalent services unless specifically authorized by Federal statute for as long as the Federal Government retains an interest in the equipment.

(4) When acquiring replacement equipment, the non-Federal entity may use the equipment to be replaced as a trade-in or sell the property and use the proceeds to offset the cost of the replacement property.

(d) Management requirements. Procedures for managing equipment (including replacement equipment), whether acquired in whole or in part under a Federal award, until disposition takes place will, as a minimum, meet the following requirements:

(1) Property records must be maintained that include a description of the property, a serial number or other identification number, the source of funding for the property (including the FAIN), who holds title, the acquisition date, and cost of the property, percentage of Federal participation in the project costs for the Federal award under which the property was acquired, the location, use and condition of the property, and any ultimate disposition data including the date of disposal and sale price of the property.

(2) A physical inventory of the property must be taken and the results reconciled with the property records at least once every two years.

(3) A control system must be developed to ensure adequate safeguards to prevent loss, damage, or theft of the property. Any loss, damage, or theft must be investigated.

(4) Adequate maintenance procedures must be developed to keep the property in good condition.

(5) If the non-Federal entity is authorized or required to sell the property, proper sales procedures must be established to ensure the highest possible return.

(e) Disposition. When original or replacement equipment acquired under a Federal award is no longer needed for the original project or program or for other activities currently or previously supported by a Federal awarding agency, except as otherwise provided in Federal statutes, regulations, or Federal awarding agency disposition instructions, the non-Federal entity must request disposition instructions from the Federal awarding agency if required by the terms and conditions of the Federal award. Disposition of the equipment will be made as follows, in accordance with Federal awarding agency disposition instructions:

(1) Items of equipment with a current per unit fair market value of $5,000 or less may be retained, sold or otherwise disposed of with no further obligation to the Federal awarding agency.

(2) Except as provided in 200.312 Federally-owned and exempt property, paragraph (b), or if the Federal awarding agency fails to provide requested disposition instructions within 120 days, items of equipment with a current per-unit fair-market value in excess of $5,000 may be retained by the non-Federal entity or sold. The Federal awarding agency is entitled to an amount calculated by multiplying the current market value or proceeds from sale by the Federal awarding agency's percentage of participation in the cost of the original purchase. If the equipment is sold, the Federal awarding agency may permit the non-Federal entity to deduct and retain from the Federal share $500 or ten percent of the proceeds, whichever is less, for its selling and handling expenses.

(3) The non-Federal entity may transfer title to the property to the Federal Government or to an eligible third party provided that, in such cases, the non-Federal entity must be entitled to compensation for its attributable percentage of the current fair market value of the property.

(4) In cases where a non-Federal entity fails to take appropriate disposition actions, the Federal awarding agency may direct the non-Federal entity to take disposition actions.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75884, Dec. 19, 2014]

5. SUPPLIES (2 CFR 200.314)

See also 200.453 Materials and supplies costs, including costs of computing devices.

(a) Title to supplies will vest in the non-Federal entity upon acquisition. If there is a residual inventory of unused supplies exceeding $5,000 in total aggregate value upon termination or completion of the project or program and the supplies are not needed for any other Federal award, the non-Federal entity must retain the supplies for use on other activities or sell them, but must, in either case, compensate the Federal Government for its share. The amount of compensation must be computed in the same manner as for equipment. See 200.313 Equipment, paragraph (e)(2) for the calculation methodology.

(b) As long as the Federal Government retains an interest in the supplies, the non-Federal entity must not use supplies acquired under a Federal award to provide services to other organizations for a fee that is less than private companies charge for equivalent services, unless specifically authorized by Federal statute.

6. INSPECTION

Reclamation has the right to inspect and evaluate the work performed or being performed under this Agreement, and the premises where the work is being performed, at all reasonable times and in a manner that will not unduly delay the work. If Reclamation performs inspection or evaluation on the premises of the Recipient or a sub-Recipient, the Recipient shall furnish and shall require sub-recipients to furnish all reasonable facilities and assistance for the safe and convenient performance of these duties.

7. AUDIT REQUIREMENTS (2 CFR 200.501)

(a) Audit required. A non-Federal entity that expends $750,000 or more during the non-Federal entity's fiscal year in Federal awards must have a single or program-specific audit conducted for that year in accordance with the provisions of this part.

(b) Single audit. A non-Federal entity that expends $750,000 or more during the non-Federal entity's fiscal year in Federal awards must have a single audit conducted in accordance with 200.514 Scope of audit except when it elects to have a program-specific audit conducted in accordance with paragraph (c) of this section.

(c) Program-specific audit election. When an auditee expends Federal awards under only one Federal program (excluding R&D) and the Federal program's statutes, regulations, or the terms and conditions of the Federal award do not require a financial statement audit of the auditee, the auditee may elect to have a program-specific audit conducted in accordance with 200.507 Program-specific audits. A program-specific audit may not be elected for R&D unless all of the Federal awards expended were received from the same Federal agency, or the same Federal agency and the same pass-through entity, and that Federal agency, or pass-through entity in the case of a subrecipient, approves in advance a program-specific audit.

(d) Exemption when Federal awards expended are less than $750,000. A non-Federal entity that expends less than $750,000 during the non-Federal entity's fiscal year in Federal awards is exempt from Federal audit requirements for that year, except as noted in 200.503 Relation to other audit requirements, but records must be available for review or audit by appropriate officials of the Federal agency, pass-through entity, and Government Accountability Office (GAO).

(e) Federally Funded Research and Development Centers (FFRDC). Management of an auditee that owns or operates a FFRDC may elect to treat the FFRDC as a separate entity for purposes of this part.

(f) Subrecipients and Contractors. An auditee may simultaneously be a recipient, a subrecipient, and a contractor. Federal awards expended as a recipient or a subrecipient are subject to audit under this part. The payments received for goods or services provided as a contractor are not Federal awards. Section 200.331 Subrecipient and contractor determinations sets forth the considerations in determining whether payments constitute a Federal award or a payment for goods or services provided as a contractor.

(g) Compliance responsibility for contractors. In most cases, the auditee's compliance responsibility for contractors is only to ensure that the procurement, receipt, and payment for goods and services comply with Federal statutes, regulations, and the terms and conditions of Federal awards. Federal award compliance requirements normally do not pass through to contractors. However, the auditee is responsible for ensuring compliance for procurement transactions which are structured such that the contractor is responsible for program compliance or the contractor's records must be reviewed to determine program compliance. Also, when these procurement transactions relate to a major program, the scope of the audit must include determining whether these transactions are in compliance with Federal statutes, regulations, and the terms and conditions of Federal awards.

(h) For-profit subrecipient. Since this part does not apply to for-profit subrecipients, the pass-through entity is responsible for establishing requirements, as necessary, to ensure compliance by for-profit subrecipients. The agreement with the for-profit subrecipient must describe applicable compliance requirements and the for-profit subrecipient's compliance responsibility. Methods to ensure compliance for Federal awards made to for-profit subrecipients may include pre-award audits, monitoring during the agreement, and post-award audits. See also 200.332 Requirements for pass-through entities.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75887, Dec. 19, 2014; 85 FR 49571, Aug. 13, 2020]

8. REMEDIES FOR NONCOMPLIANCE (2 CFR 200.339)

200.339 Remedies for noncompliance.

If a non-Federal entity fails to comply with Federal statutes, regulations or the terms and conditions of a Federal award, the Federal awarding agency or pass-through entity may impose additional conditions, as described in 200.207 Specific conditions. If the Federal awarding agency or pass-through entity determines that noncompliance cannot be remedied by imposing additional conditions, the Federal awarding agency or pass-through entity may take one or more of the following actions, as appropriate in the circumstances.

(a) Temporarily withhold cash payments pending correction of the deficiency by the non-Federal entity or more severe enforcement action by the Federal awarding agency or pass-through entity.

(b) Disallow (that is, deny both use of funds and any applicable matching credit for) all or part of the cost of the activity or action not in compliance.

(c) Wholly or partly suspend or terminate the Federal award.

(d) Initiate suspension or debarment proceedings as authorized under 2 CFR part 180 and Federal awarding agency regulations (or in the case of a pass-through entity, recommend such a proceeding be initiated by a Federal awarding agency).

(e) Withhold further Federal awards for the project or program.

(f) Take other remedies that may be legally available.

9. TERMINATION (2 CFR 200.340)

(a) The Federal award may be terminated in whole or in part as follows:

(1) By the Federal awarding agency or pass-through entity, if a non-Federal entity fails to comply with the terms and conditions of a Federal award;

(2) By the Federal awarding agency or pass-through entity, to the greatest extent authorized by law, if an award no longer effectuates the program goals or agency priorities;

(3) By the Federal awarding agency or pass-through entity with the consent of the non-Federal entity, in which case the two parties must agree upon the termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated;

(4) By the non-Federal entity upon sending to the Federal awarding agency or pass-through entity written notification setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated. However, if the Federal awarding agency or pass-through entity determines in the case of partial termination that the reduced or modified portion of the Federal award or subaward will not accomplish the purposes for which the Federal award was made, the Federal awarding agency or pass-through entity may terminate the Federal award in its entirety; or

(5) By the Federal awarding agency or pass-through entity pursuant to termination provisions included in the Federal award.

(b) When a Federal award is terminated or partially terminated, both the Federal awarding agency or pass-through entity and the non-Federal entity remain responsible for compliance with the requirements in 200.344 Closeout and 200.345 Post-closeout adjustments and continuing responsibilities.

10. DEBARMENT AND SUSPENSION (2 CFR 1400)

The Department of the Interior regulations at 2 CFR 1400—Governmentwide Debarment and Suspension (Nonprocurement), which adopt the common rule for the governmentwide system of debarment and suspension for nonprocurement activities, are hereby incorporated by reference and made a part of this Agreement. By entering into this grant or cooperative Agreement with the Bureau of Reclamation, the Recipient agrees to comply with 2 CFR 1400, Subpart C, and agrees to include a similar term or condition in all lower-tier covered transactions. These regulations are available at http://www.gpoaccess.gov/ecfr/.

11. DRUG-FREE WORKPLACE (2 CFR 182 and 1401)

The Department of the Interior regulations at 2 CFR 1401—Governmentwide Requirements for Drug-Free Workplace (Financial Assistance), which adopt the portion of the Drug-Free Workplace Act of 1988 (41 U.S.C. 701 et seq, as amended) applicable to grants and cooperative agreements, are hereby incorporated by reference and made a part of this agreement. By entering into this grant or cooperative agreement with the Bureau of Reclamation, the Recipient agrees to comply with 2 CFR 182.

12. ASSURANCES AND CERTIFICATIONS INCORPORATED BY REFERENCE

The provisions of the Assurances, SF 424B or SF 424D as applicable, executed by the Recipient in connection with this Agreement shall apply with full force and effect to this Agreement. All anti-discrimination and equal opportunity statutes, regulations, and Executive Orders that apply to the expenditure of funds under Federal contracts, grants, and cooperative Agreements, loans,

and other forms of Federal assistance. The Recipient shall comply with Title VI or the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and any program-specific statutes with anti-discrimination requirements. The Recipient shall comply with civil rights laws including, but not limited to, the Fair Housing Act, the Fair Credit Reporting Act, the Americans with Disabilities Act, Title VII of the Civil Rights Act of 1964, the Equal Educational Opportunities Act, the Age Discrimination in Employment Act, and the Uniform Relocation Act.

Such Assurances also include, but are not limited to, the promise to comply with all applicable Federal statutes and orders relating to nondiscrimination in employment, assistance, and housing; the Hatch Act; Federal wage and hour laws and regulations and work place safety standards; Federal environmental laws and regulations and the Endangered Species Act; and Federal protection of rivers and waterways and historic and archeological preservation.

13. COVENANT AGAINST CONTINGENT FEES

The Recipient warrants that no person or agency has been employed or retained to solicit or secure this Agreement upon an Agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide offices established and maintained by the Recipient for the purpose of securing Agreements or business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability or, in its discretion, to deduct from the Agreement amount, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

14. TRAFFICKING VICTIMS PROTECTION ACT OF 2000 (2 CFR 175.15)

Trafficking in persons.

(a) *Provisions applicable to a recipient that is a private entity.* You as the recipient, your employees, subrecipients under this award, and subrecipients' employees may not

  (1) Engage in severe forms of trafficking in persons during the period of time that the award is in effect;

  (2) Procure a commercial sex act during the period of time that the award is in effect; or

  (3) Use forced labor in the performance of the award or subawards under the award.

(b) We as the Federal awarding agency may unilaterally terminate this award, without penalty, if you or a subrecipient that is a private entity —

  (1) Is determined to have violated a prohibition in paragraph a.1 of this award term; or

  (2) Has an employee who is determined by the agency official authorized to terminate the award to have violated a prohibition in paragraph a.1 of this award term through conduct that is either:

    (i) Associated with performance under this award; or

(ii) Imputed to you or the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, "OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)," as implemented by our agency at *2 CFR part 1400*.

(c) *Provision applicable to a recipient other than a private entity*. We as the Federal awarding agency may unilaterally terminate this award, without penalty, if a subrecipient that is a private entity—

(1) Is determined to have violated an applicable prohibition in paragraph a.1 of this award term; or

(2) Has an employee who is determined by the agency official authorized to terminate the award to have violated an applicable prohibition in paragraph a.1 of this award term through conduct that is either:

(i) Associated with performance under this award; or

(ii) Imputed to the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, "OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)," as implemented by our agency at *2 CFR part 1400*.

(d) *Provisions applicable to any recipient*.

(1) You must inform us immediately of any information you receive from any source alleging a violation of a prohibition in paragraph a.1 of this award term.

(2) Our right to terminate unilaterally that is described in paragraph a.2 or b of this section:

(i) Implements section 106(g) of the Trafficking Victims Protection Act of 2000 (TVPA), as amended (22 U.S.C. 7104(g)), and

(ii) Is in addition to all other remedies for noncompliance that are available to us under this award.

(3) You must include the requirements of paragraph a.1 of this award term in any subaward you make to a private entity.

(e) *Definitions*. For purposes of this award term:

(1) "Employee" means either:

(i) An individual employed by you or a subrecipient who is engaged in the performance of the project or program under this award; or

(ii) Another person engaged in the performance of the project or program under this award and not compensated by you including, but not limited to, a volunteer or individual whose services are contributed by a third party as an in-kind contribution toward cost sharing or matching requirements.

(2) "Forced labor" means labor obtained by any of the following methods: the recruitment, harboring, transportation, provision, or obtaining of a person for labor or services,

through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.

(3) "Private entity":

(i) Means any entity other than a state, local government, Indian tribe, or foreign public entity, as those terms are defined in 2 CFR 175.25.

(ii) Includes:

(A) A nonprofit organization, including any nonprofit institution of higher education, hospital, or tribal organization other than one included in the definition of Indian tribe at 2 CFR 175.25(b).

(B) A for-profit organization.

(4) "Severe forms of trafficking in persons," "commercial sex act," and "coercion" have the meanings given at section 103 of the TVPA, as amended (22 U.S.C. 7102).

15. NEW RESTRICTIONS ON LOBBYING (43 CFR 18)

The Recipient agrees to comply with 43 CFR 18, New Restrictions on Lobbying, including the following certification:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Recipient, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or amendment of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.

(c) The Recipient shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

16. UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970 (URA) (42 USC 4601 *et seq.)*

(a) The Uniform Relocation Assistance Act (URA), 42 U.S.C. 4601 *et seq.*, as amended, requires certain assurances for Reclamation funded land acquisition projects conducted by a Recipient that cause the displacement of persons, businesses, or farm operations. Because Reclamation funds only support acquisition of property or interests in property from willing sellers, it is not anticipated that Reclamation funds will result in any "displaced persons," as defined under the URA.

(b) However, if Reclamation funds are used for the acquisition of real property that results in displacement, the URA requires Recipients to ensure that reasonable relocation payments and other remedies will be provided to any displaced person. Further, when acquiring real property, Recipients must be guided, to the greatest extent practicable, by the land acquisition policies in 42 U.S.C. 4651.

(c) Exemptions to the URA and 49 CFR Part 24

(1) The URA provides for an exemption to the appraisal, review and certification rules for those land acquisitions classified as "voluntary transactions." Such "voluntary transactions" are classified as those that do not involve an exercise of eminent domain authority on behalf of a Recipient, and must meet the conditions specified at 49 CFR 24.101(b)(1)(i)-(iv).

(2) For any land acquisition undertaken by a Recipient that receives Reclamation funds, but does not have authority to acquire the real property by eminent domain, to be exempt from the requirements of 49 CFR Part 24 the Recipient must:

(i) provide written notification to the owner that it will not acquire the property in the event negotiations fail to result in an amicable agreement, and;

(ii) inform the owner in writing of what it believes to be the market value of the property

(d) Review of Land Acquisition Appraisals. Reclamation reserves the right to review any land appraisal whether or not such review is required under the URA or 49 CFR 24.104. Such reviews may be conducted by the Department of the Interior's Appraisal Services Directorate or a Reclamation authorized designee. When Reclamation determines that a review of the original appraisal is necessary, Reclamation will notify the Recipient and provide an estimated completion date of the initial appraisal review.

17. SYSTEM FOR AWARD MANAGEMENT and Universal Identifier Requirements (2 CFR 25, Appendix A)

A. Requirement for System for Award Management

Unless you are exempted from this requirement under 2 CFR 25.110, you as the recipient must maintain current information in the SAM. This includes information on your immediate and highest level owner and subsidiaries, as well as on all of your predecessors that have been awarded a Federal contract or Federal financial assistance within the last three years, if applicable, until you submit the final financial report required under this Federal award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another Federal award term.

B. Requirement for unique entity identifier

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its unique entity identifier to you.
2. May not make a subaward to an entity unless the entity has provided its Unique Entity Identifier to you. Subrecipients are not required to obtain an active SAM registration, but must obtain a Unique Entity Identifier.

C. Definitions

For purposes of this award term:

1. System for Award Management (SAM) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the SAM Internet site (currently at http://www.sam.gov).
2. Unique entity identifier means the identifier required for SAM registration to uniquely identify business entities.
3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR part 25, subpart C:
    a. A Governmental organization, which is a State, local government, or Indian Tribe;
    b. A foreign public entity;
    c. A domestic or foreign nonprofit organization;
    d. A domestic or foreign for-profit organization; and
    e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.
4. Subaward has the meaning given in 2 CFR 200.1.
5. Subrecipient has the meaning given in 2 CFR 200.1.

18. PROHIBITION ON TEXT MESSAGING AND USING ELECTRONIC EQUIPMENT SUPPLIED BY THE GOVERNMENT WHILE DRIVING

Executive Order 13513, *Federal Leadership On Reducing Text Messaging While Driving*, was signed by President Barack Obama on October 1, 2009 (ref: http://edocket.access.gpo.gov/2009/pdf/E9-24203.pdf). This Executive Order introduces a Federal Government-wide prohibition on the use of text messaging while driving on official business or while using Government-supplied equipment. Additional guidance enforcing the ban will be issued at a later date. In the meantime, please adopt and enforce policies that immediately ban text messaging while driving company-owned or rented vehicles, government-owned or leased vehicles, or while driving privately owned vehicles when on official government business or when performing any work for or on behalf of the government.

19. REPORTING SUBAWARDS AND EXECUTIVE COMPENSATION (2 CFR 170 APPENDIX A)

I. Reporting Subawards and Executive Compensation.

a. Reporting of first-tier subawards.

1. Applicability. Unless you are exempt as provided in paragraph d. of this award term, you must report each action that equals or exceeds $30,000 in Federal funds for a subaward to a non-Federal entity or Federal agency (see definitions in paragraph e. of this award term).

2. Where and when to report.

i. The non-Federal entity or Federal agency must report each obligating action described in paragraph a.1. of this award term to http://www.fsrs.gov.

ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. What to report. You must report the information about each obligating action that the submission instructions posted at http://www.fsrs.gov specify.

b. Reporting total compensation of recipient executives for non-Federal entities.

1. Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if—

i. The total Federal funding authorized to date under this Federal award equals or exceeds $30,000 as defined in 2 CFR 170.320;

ii. in the preceding fiscal year, you received—

(A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards), and

(B) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and,

iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.)

2. Where and when to report. You must report executive total compensation described in paragraph b.1. of this award term:

i. As part of your registration profile at https://www.sam.gov.

ii. By the end of the month following the month in which this award is made, and annually thereafter.

c. Reporting of Total Compensation of Subrecipient Executives.

1. Applicability and what to report. Unless you are exempt as provided in paragraph d. of this award term, for each first-tier non-Federal entity subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if—

i. in the subrecipient's preceding fiscal year, the subrecipient received—

(A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards) and,

(B) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.)

2. Where and when to report. You must report subrecipient executive total compensation described in paragraph c.1. of this award term:

i. To the recipient.

ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any

required compensation information of the subrecipient by November 30 of that year.

d. Exemptions.

If, in the previous tax year, you had gross income, from all sources, under $300,000, you are exempt from the requirements to report:

i. Subawards, and

ii. The total compensation of the five most highly compensated executives of any subrecipient.

e. Definitions. For purposes of this award term:

1. Federal Agency means a Federal agency as defined at 5 U.S.C. 551(1) and further clarified by 5 U.S.C. 552(f).
2. Non-Federal entity means all of the following, as defined in 2 CFR part 25:
   i. A Governmental organization, which is a State, local government, or Indian tribe;
   ii. A foreign public entity;
   iii. A domestic or foreign nonprofit organization; and,
   iv. A domestic or foreign for-profit organization
3. Executive means officers, managing partners, or any other employees in management positions.
4. Subaward:
   i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
   ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see 2 CFR 200.331).
   iii. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.
5. Subrecipient means a non-Federal entity or Federal agency that:
   i. Receives a subaward from you (the recipient) under this award; and
   ii. Is accountable to you for the use of the Federal funds provided by the subaward.
6. Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)).

[85 FR 49526, Aug. 13, 2020]

20. RECIPIENT EMPLOYEE WHISTLEBLOWER RIGHTS AND REQUIREMENT TO INFORM EMPLOYEES OF WHISTLEBLOWER RIGHTS (SEP 2013)

(a) This award and employees working on this financial assistance agreement will be subject to the whistleblower rights and remedies in the pilot program on Award Recipient employee whistleblower protections established at 41 U.S.C. 4712 by section 828 of the National Defense Authorization Act for Fiscal Year 2013 (Pub.L. 112-239).

(b) The Award Recipient shall inform its employees in writing, in the predominant language of the workforce, of employee whistleblower rights and protections under 41 U.S.C 4712.

(c) The Award Recipient shall insert the substance of this clause, including this paragraph (c), in all subawards or subcontracts over the simplified acquisition threshold. 48 CFR 52.203-17 (as referenced in 48 CFR 3.908-9).

21. REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (APPENDIX XII to 2 CFR Part 200)

1. General Reporting Requirement

If the total value of your currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of this Federal award, then you as the recipient during that period of time must maintain the currency of information reported to the System for Award Management (SAM) that is made available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)) about civil, criminal, or administrative proceedings described in paragraph 2 of this award term and condition. This is a statutory requirement under section 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by section 3010 of Public Law 111-212, all information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

2. Proceedings About Which You Must Report

Submit the information required about each proceeding that:

a. Is in connection with the award or performance of a grant, cooperative agreement, or procurement contract from the Federal Government;

b. Reached its final disposition during the most recent five-year period; and

c. Is one of the following:

(1) A criminal proceeding that resulted in a conviction, as defined in paragraph 5 of this award term and condition;

(2) A civil proceeding that resulted in a finding of fault and liability and payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more;

(3) An administrative proceeding, as defined in paragraph 5. of this award term and condition, that resulted in a finding of fault and liability and your payment of either a monetary fine or penalty of $5,000 or more or reimbursement, restitution, or damages in excess of $100,000; or

(4) Any other criminal, civil, or administrative proceeding if:

(i) It could have led to an outcome described in paragraph 2.c.(1), (2), or (3) of this award term and condition;

(ii) It had a different disposition arrived at by consent or compromise with an acknowledgment of fault on your part; and

(iii) The requirement in this award term and condition to disclose information about the proceeding does not conflict with applicable laws and regulations.

3. Reporting Procedures

Enter in the SAM Entity Management area the information that SAM requires about each proceeding described in paragraph 2 of this award term and condition. You do not need to submit the information a second time under assistance awards that you received if you already provided the information through SAM because you were required to do so under Federal procurement contracts that you were awarded.

4. Reporting Frequency

During any period of time when you are subject to the requirement in paragraph 1 of this award term and condition, you must report proceedings information through SAM for the most recent five year period, either to report new information about any proceeding(s) that you have not reported previously or affirm that there is no new information to report. Recipients that have Federal contract, grant, and cooperative agreement awards with a cumulative total value greater than $10,000,000 must disclose semiannually any information about the criminal, civil, and administrative proceedings.

5. Definitions

For purposes of this award term and condition:

a. Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative proceedings, Civilian Board of Contract Appeals proceedings, and Armed Services Board of Contract Appeals proceedings). This includes proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include audits, site visits, corrective plans, or inspection of deliverables.

b. Conviction, for purposes of this award term and condition, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere.

c. Total value of currently active grants, cooperative agreements, and procurement contracts includes—

(1) Only the Federal share of the funding under any Federal award with a recipient cost share or match; and

(2) The value of all expected funding increments under a Federal award and options, even if not yet exercised.

[80 FR 43310, July 22, 2015, as amended at 85 FR 49582, Aug. 13, 2020]

22. CONFLICTS OF INTEREST

(a) Applicability.

(1) This section intends to ensure that non-Federal entities and their employees take appropriate steps to avoid conflicts of interest in their responsibilities under or with respect to Federal financial assistance agreements.

(2) In the procurement of supplies, equipment, construction, and services by recipients and by subrecipients, the conflict of interest provisions in 2 CFR 200.318 apply.

(b) Requirements.

(1) Non-Federal entities must avoid prohibited conflicts of interest, including any significant financial interests that could cause a reasonable person to question the recipient's ability to provide impartial, technically sound, and objective performance under or with respect to a Federal financial assistance agreement.

(2) In addition to any other prohibitions that may apply with respect to conflicts of interest, no key official of an actual or proposed recipient or subrecipient, who is substantially involved in the proposal or project, may have been a former Federal employee who, within the last one (1) year, participated personally and substantially in the evaluation, award, or administration of an award with respect to that recipient or subrecipient or in development of the requirement leading to the funding announcement.

(3) No actual or prospective recipient or subrecipient may solicit, obtain, or use non-public information regarding the evaluation, award, or administration of an award to that recipient or subrecipient or the development of a Federal financial assistance opportunity that may be of competitive interest to that recipient or subrecipient.

(c) Notification.

(1) Non-Federal entities, including applicants for financial assistance awards, must disclose in writing any conflict of interest to the DOI awarding agency or pass-through entity in accordance with 2 CFR 200.112, Conflicts of Interest.

(2) Recipients must establish internal controls that include, at a minimum, procedures to identify, disclose, and mitigate or eliminate identified conflicts of interest. The recipient is responsible for notifying the Financial Assistance Officer in writing of any conflicts of interest that may arise during the life of the award, including those that have been reported by subrecipients.

(d) Restrictions on Lobbying. Non-Federal entities are strictly prohibited from using funds under this grant or cooperative agreement for lobbying activities and must provide the required certifications and disclosures pursuant to 4 3 CFR Part 18 and 31 USC 13 52.

(e) Review Procedures. The Financial Assistance Officer will examine each conflict of interest disclosure on the basis of its particular facts and the nature of the proposed grant or cooperative agreement, and will determine whether a significant potential conflict exists and, if it does, develop an appropriate means for resolving it.

(f) Enforcement. Failure to resolve conflicts of interest in a manner that satisfies the Government may be cause for termination of the award. Failure to make required disclosures may result in any of the remedies described in 2 CFR 200.338, Remedies for Noncompliance, including suspension or debarment (see also 2 CFR Part 180).

23. DATA AVAILABILITY

(a) Applicability. The Department of the Interior is committed to basing its decisions on the best available science and providing the American people with enough information to thoughtfully and substantively evaluate the data, methodology, and analysis used by the Department to inform its decisions.

(b) Use of Data. The regulations at 2 CFR 200.315 apply to data produced under a Federal award, including the provision that the Federal Government has the right to obtain, reproduce, publish, or otherwise use the data produced under a Federal award as well as authorize others to receive, reproduce, publish, or otherwise use such data for Federal purposes.

(c) Availability of Data. The recipient shall make the data produced under this award and any subaward(s) available to the Government for public release, consistent with applicable law, to allow meaningful third party evaluation and reproduction of the following:

(i) The scientific data relied upon;

(ii) The analysis relied upon; and

(iii) The methodology, including models, used to gather and analyze data.

24. PROHIBITION ON PROVIDING FUNDS TO THE ENEMY

(a) The recipient must—

(1) Exercise due diligence to ensure that none of the funds, including supplies and services, received under this grant or cooperative agreement are provided directly or indirectly (including through subawards or contracts) to a person or entity who is actively opposing the United States or coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities, which must be completed through 2 CFR 180.300 prior to issuing a subaward or contract and;

(2) Terminate or void in whole or in part any subaward or contract with a person or entity listed in SAM as a prohibited or restricted source pursuant to subtitle E of Title VIII of the NDAA for FY 2015, unless the Federal awarding agency provides written approval to continue the subaward or contract.

(b) The recipient may include the substance of this clause, including paragraph (a) of this clause, in subawards under this grant or cooperative agreement that have an estimated value over $50,000 and will be performed outside the United States, including its outlying areas.

(c) The Federal awarding agency has the authority to terminate or void this grant or cooperative agreement, in whole or in part, if the Federal awarding agency becomes aware that the recipient failed to exercise due diligence as required by paragraph (a) of this clause or if the Federal awarding agency becomes aware that any funds received under this grant or cooperative agreement have been provided directly or indirectly to a person or entity who is actively opposing coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities.

25. ADDITIONAL ACCESS TO RECIPIENT RECORDS

(a) In addition to any other existing examination-of-records authority, the Federal Government is authorized to examine any records of the recipient and its subawards or contracts to the extent necessary to ensure that funds, including supplies and services, available under this grant or cooperative agreement are not provided, directly or indirectly, to a person or entity that is actively opposing United States or coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities, except for awards awarded by the Department of Defense on or before Dec 19, 2017 that will be performed in the United States Central Command (USCENTCOM) theater of operations.

(b) The substance of this clause, including this paragraph (b), is required to be included in subawards or contracts under this grant or cooperative agreement that have an estimated value over $50,000 and will be performed outside the United States, including its outlying areas.

26. PROHIBITION ON CERTAIN TELECOMMUNICATION AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Federal award recipients are prohibited from using government funds to enter contracts (or extend or renew contracts) with entities that use covered telecommunications equipment or services as described in section 889 of the 2019 National Defense Authorization Act. This prohibition applies even if the contract is not intended to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services.

III. DEPARTMENT OF THE INTERIOR STANDARD AWARD TERMS AND CONDITIONS

The Department of the Interior (DOI) Standard Award Terms and Conditions found at https://www.doi.gov/sites/doi.gov/files/uploads/doi-standard-award-terms-and-conditions-effective-december-2-2019-revised-june-19-2020.pdf are hereby incorporated by reference as though set forth in full text. These terms and conditions are in addition to the assurances and certifications made as part of the award and terms, conditions or restrictions reflected on this Agreement. Recipient acceptance of this Agreement carries with it the responsibility to be aware of and comply with all DOI terms and conditions applicable to this Agreement. The Recipient is responsible for ensuring their subrecipients and contractors are aware of and comply with applicable statutes, regulations, and agency requirements.

Recipient and subrecipient failure to comply with the general terms and conditions outlined below and those directly reflected in this Agreement can result in the DOI taking one or more of remedies described in 2 Code of Federal Regulations parts 200.338 and 200.339. The DOI will notify the recipient whenever terms and conditions are updated to accommodate instances in the passage of a regulation or statute that requires compliance. Also, DOI will inform the Recipient of revised terms and conditions in the action of an Agreement amendment adding additional Federal funds. Reclamation will make such changes by issuing a Notice of Award amendment that describes the change and provides the effective date. Revised terms and conditions do not apply to the Recipient's expenditures of funds or activities the Recipient carries out before the effective date of the revised DOI terms and conditions.

Cultivating Conservation

MEMO

TO: Salton Sea Authority Board of Directors and G. Patrick O'Dowd
FROM: Lisa Moore
RE: Federal Report
DATE: February 14, 2024

Executive Director O'Dowd will be visiting D.C. for the Association of California Water Agencies (ACWA) meeting this coming February 27 and 28. We are in the process of scheduling meetings with our delegation to discuss Authority matters.

As we discussed in our prior board meeting, our delegation has reached out to us to request updates concerning: (1) the Army Corps of Engineers feasibility study, including to ask whether additional appropriations may be needed to undertake the Corps and local sponsors' preferred course of action 2 (COA 2); (2) whether there may be existing funding within agency budgets to direct to the feasibility study, given the fact that FY25 appropriations will likely not come to pass quickly; and (3) the Authority's Water Resources Development Act (WRDA) requests that were submitted with the support of CNRA Secretary Crowfoot to also ensure full funding of the feasibility study.

In preparation for the meetings, we prepared the attached draft fact sheet regarding the Corps feasibility study, which is attached.

DRAFT

Imperial Streams and Salton Sea Aquatic Ecosystem Restoration Study
U.S. Army Corps of Engineers, California Department of Water Resources
Salton Sea Authority

Study Description: The Salton Sea Authority (Authority) worked with the California Congressional delegation to secure new authority in the Water Resources Development Act (WRDA) of 2020 to enable the Army Corps of Engineers to develop and fund projects at a 65% federal cost-share to facilitate long-range Salton Sea management. Congress subsequently provided $1.5 million in funding for the prerequisite study via the Infrastructure Investment and Jobs Act (IIJA) to launch the work.

Status: The Corps, the Authority and the California Department of Water Resources (DWR) developed a cost-sharing agreement for the study which was signed in December 2022. Since that time, the parties have developed and evaluated distinct courses of action (COAs) in order to scope the study.

Preferred Course of Action: The parties evaluated multiple COAs for their effectiveness and ability to address the purpose of the study, to meet the Corps mission objectives, to meet state and local needs, to be scientifically sound, and to meet Corps and Biden administration environmental justice policies. That evaluation lead the Corps Los Angeles District, the Corps Pacific Division and the local sponsors to select COA 2 as the preferred course of action as it satisfies the above criteria.

COA2 will investigate the feasibility of alternatives identified in the State of California's Salton Sea Long-Range Plan for restoring the degraded ecosystem structure, function, and dynamic processes at the Salton Sea, as well as improving air quality, in conjunction with ecosystem restoration, that adversely affects residents. Fourteen (14) alternatives were identified in the initial array of alternatives, with six (6) alternatives being screened out. The remaining alternatives, which include Sea importation, will be evaluated to identify the tentatively selected plan. Through the study process, additional alternatives may be identified or dropped from consideration.

Water Resources Development Act Request

Corps policy reflects an administrative preference that this study be completed at a $3 million cost (divided equally between the Corps and local sponsors) and within 3 years. All parties recognized at the outset that given the purpose of the study, it would require a larger budget. The parties estimate that an additional $6.5 million in federal funds will be required to implement a COA 2 study.

In working to secure additional funds, the Corps interpreted language in the legislation which provided the Corps' initial $1.5 million to begin the study to restrict its ability to add additional funds to the study. The Corps advised removing this limitation in the upcoming WRDA legislation.

Accordingly, the Authority (supported by DWR) are seeking language in WRDA to simply make clear that the Salton Sea study may receive additional funds, whether through the Corps administratively or through future appropriations. The language also seeks to clarify that in determining the right course of action in the study, that the Corps consider benefits to public health and federal lands.

Federal Interests at the Salton Sea

Over 400 fish and wildlife species rely the Salton Sea, including numerous federally protected threatened and endangered species, and it is a critical stopover on the Pacific Flyway. Further, the U.S. Department of the Interior (Interior) owns roughly 40% of the Salton Sea. Interior also has tribal trust responsibilities to the Torres Martinez Tribe, whose reservation occupies 26,000 acres at the sea's north end, and Interior manages the 35,000-acre Sonny Bono National Wildlife Refuge at the sea's south end.

In its FY2020 budget submission to Congress, Interior conservatively estimated that, if left unabated, continued exposure of Salton Sea playa will cost the Department roughly $330 million to address its environmental mitigation responsibilities as a landowner. Interior further estimated an annual operations and maintenance cost of $4.5 million for such mitigation.

The Department of Defense manages the 357-square mile Chocolate Mountain Aerial Gunnery Range located directly to the east of the Salton Sea, a critical national security asset used by the Marines and Navy.

The Salton Sea is also a nationally significant source of renewable energy, harboring the largest known source of geothermal energy in the nation. The geothermal extraction process at the Salton Sea is now being modified to produce critical stores of lithium to facilitate the nation's transition to electric vehicles and the Biden administration's climate agenda.

TO: Salton Sea Authority Board of Directors

FROM: Oracio Gonzalez, Ollin Strategies

DATE: February 2024

SUBJECT: California State Advocacy

This memorandum provides a summary of state legislative and fiscal developments related to the Authority's state advocacy.

Fiscal

As noted in last month's report, the Governor proposed an investment of $65.2m for the Salton Sea as part of his 2024-25 budget proposal. Investments proposed in the budget, much like legislation proposed by legislators, is assigned to specific committees of jurisdiction for consideration and approval. The proposed investment for the Salton Sea will be assigned to Assembly Budget Subcommittee 4 on Climate Crisis, Resources, Energy and Transportation and Senate Budget Subcommittee 2 on Resources, Environmental Protection and Energy. As of the writing of this memoranda, Assembly Budget Sub 4 has noticed a hearing for consideration of the proposed investment on March 6, 2024, at 9:30am. The Senate has not yet scheduled the item for a hearing.

Legislative

General Obligation Bonds:

As the Board recalls, in June 2023, the legislature reduced the magnitude of Salton Sea restoration funds that the Governor proposed to "shift" to a climate obligation bond. The final budget signed by the governor reduced the magnitude of shifted funds from $169 million to $119 million.

While it was expected that both Assemblymember Garcia and Senator Allen would reintroduce their respective climate bond proposals from last year, that will no longer be the case. Instead, both of last year's measures, which were stopped by the Senate and Assembly Appropriations Committees, will be allowed to move forward this year. That being the case, it is likely both authors will propose amendments lowering the overall size of their respective bond proposals. It is unclear when those amendments will take place. For reference, below are the current amounts each proposal includes for the Salton Sea.

- AB 1567 (Garcia), would have placed a $15.9 billion general obligation bond before voters on March 5, 2024. Of this amount, $400 million was proposed for the Salton Sea, consisting of $119 million in "shifted" funds and $281 million in new dollars for Salton Sea restoration. Of the new dollars, the bond would set aside $30 million for the Salton Sea Authority and $15 million for a Salton Sea conservancy.

- SB 867(Allen), would have placed a $15.5 billion general obligation bond before voters on March 5, 2024. The measure included $100 million for Salton Sea restoration activities.

Air Quality

Both Assemblymember Garcia and Senator Padilla have introduced legislation to address air quality concerns in the Salton Sea region.

- AB 1834 (Garcia), is a spot ("intent") bill that would authorize the public health agencies of Imperial County and Riverside County to conduct an assessment to identify the specific communities or neighborhoods of the Salton Sea region that are most likely to be negatively affected by degrading air quality and increasing heat stress.

- SB 967 (Padilla), would require the University of California to develop and implement a pilot project in the County of Imperial and the Coachella Valley designed to develop a 3-day wintertime regional dust forecast capability and a dust storm early warning system for the monsoon season. In developing the project, the University would be directed to identify community strategies and focus on providing actional information to historically underserved communities.

With respect to AB 1834, the measure will have to be amended with substantive language by March 11, 2024, in order for it to be referred to a policy committee for consideration. SB 967, as introduced, is likely substantive enough to be referred to policy committee without the need for additional amendments.

In addition to policy considerations, the primary hurdle both measures will face as they progress through the legislative process will be cost. With the state facing a significant budget shortfall, the cost of each measure will be heavily scrutinized when they are heard before each house's appropriations committee.