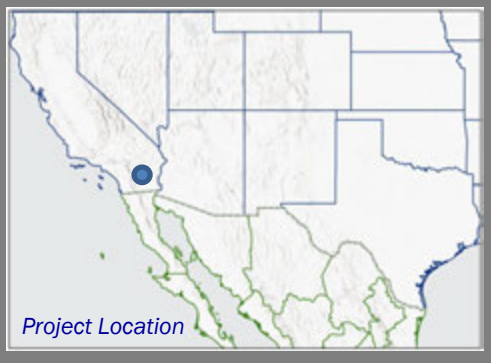
ACTIONABLE SCIENCE

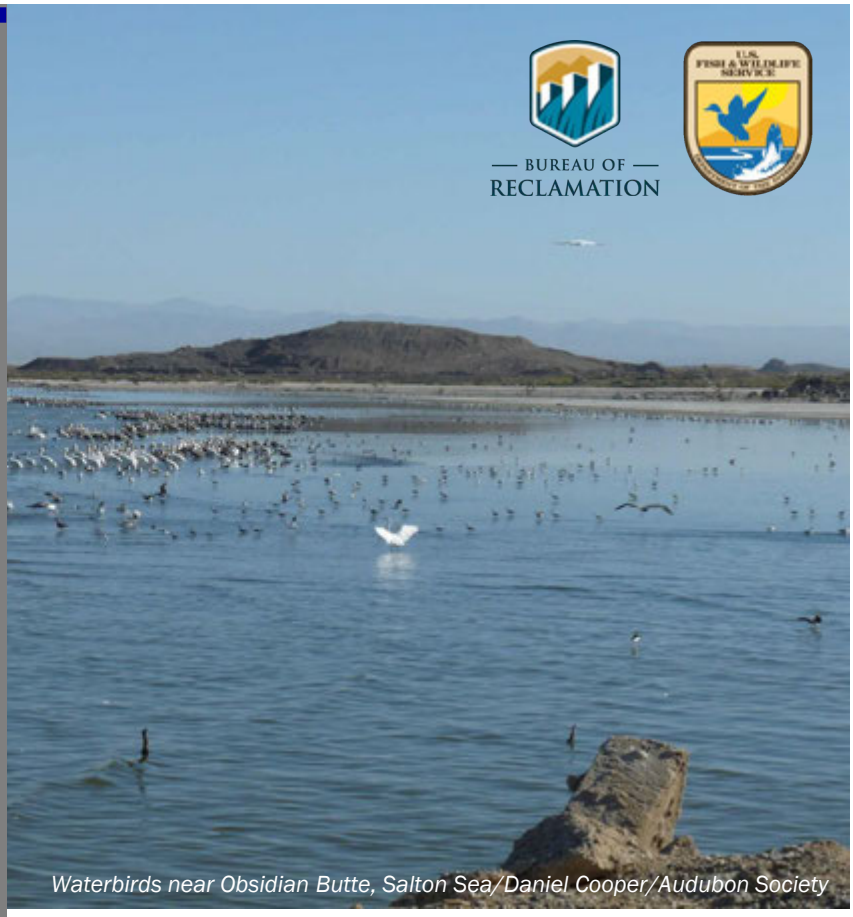
Constructing Shallow Saline Habitat Ponds at the Salton Sea to Mitigate Contaminant Risks

BUREAU OF RECLAMATION

USGS science for a changing world

Located in Imperial and Riverside counties in California, the Salton Sea (Sea) is the largest lake in California and is currently fed by agricultural drainage from the Whitewater, New, and Alamo Rivers. Because there are no outflowing rivers, salinity of the Sea increases over time as water evaporates. As a result, decreased habitat and increasing salinity levels in the Sea water and high selenium levels in agricultural drainage water threaten the many species at the Sea. In 2006, researchers evaluated the feasibility of creating shallow saline habitat ponds (SHP) using a mix of high-salinity Sea water and high-selenium agricultural drainwater to provide habitat for migratory birds.





Waterbirds near Obsidian Butte, Salton Sea/Daniel Cooper/Audubon Society

KEY ISSUES ADDRESSED

Over the past several decades, changes in agricultural water use have gradually diminished inflow into the Sea. The Sea is a terminal lake with no outlet to the ocean, so water that enters can only depart through evaporation, leaving salts behind. High salinity and selenium in the agricultural runoff water can be toxic and harm wildlife. As Sea levels lower, it is anticipated that dust will contribute to poor air quality, human health impacts, and loss of economic development opportunities, resulting in the loss of habitat for birds, fish, and other wildlife. A new landscape, including managed wetlands, must be engineered that provides dust mitigation and habitat for migratory birds.

PROJECT GOALS

- Assess chemical, nutrient, and contaminant characteristics in water and sediment for created shallow saline wetlands and explore management options
- Determine community composition and contaminants in avian food sources
- Determine contaminant concentration, especially for selenium, in black-necked stilt eggs and post-hatch habitat use and survival

FUTURE PLANNING

Increased human-health and ecological hazards are predicted as inflow reduces over time. Current restoration planning alternatives are based on mitigating these future hazards.

Shallow Pond Construction/Bureau of Reclamation

PROJECT HIGHLIGHTS

Quality Bird Habitat: Bird use of the SHP site was not significantly different than reference sites across all guilds of birds. Foraging accounted for the most common (62%) activity documented, demonstrating that the SHP provides food resources for migratory birds.

Black-Necked Stilt Chick Survival: Survival of 132 newly hatched stilt chicks was monitored using telemetry radio tags. Mortality was approximately 2.5 times higher for chicks hatched at the SHP compared to reference sites. Selenium concentrations determined from sibling eggs probably had no effect on survival. The most frequent cause of mortality at the SHP was predation followed by unknown deaths, canals, and crack entrapment.

Chick Use of Habitat: Post-hatch stilt chicks left the SHP within 3 days for surrounding freshwater habitats. The search for lower salinity and/or increased vegetation (for cover from predators) influenced chick-movement during the pre-fledgling life stage.

LESSONS LEARNED

Using blended agricultural tailwater (Alamo River) and Sea water reduced selenium concentrations from the levels found in the Alamo River; however, concentrations in all samples are potentially causes for concern. These selenium levels were higher than those at reference sites maintained with Colorado River water and similar to concentrations at reference sites on the Sea. For mitigation purposes, habitats using the blended water approach are expected to perform similarly to Sea habitats being lost as the lake recedes. Additional, long-term selenium monitoring would be required to monitor risks to wildlife.

Although the study did not evaluate logistical or mechanical requirements necessary to sustain the ponds, water delivery challenges and flow into and between ponds contributed to seasonal variation in biological and physical parameters measured at the ponds. Maintenance of water delivery infrastructure should be addressed in future efforts. Avian communities that inhabit built wetlands should be monitored for contaminants. It may be necessary to determine the sources of contaminants, which may include local or distant foraging as well as site use.

NEXT STEPS

- Use lessons learned for habitat creation around the Salton Sea

Collaborators

- U.S. Fish and Wildlife Service, Sonny Bono Salton Sea National Wildlife Refuge
- Bureau of Reclamation
- U.S. Geological Survey Salton Sea Science Office

Funding Partners

- Proposition 50 Agricultural Water Quality Grant Program, California State Water Resources Control Board

Lead Author: Deanna Morrell, Bureau of Reclamation, September 2020.
For more information on CCAST, contact Genevieve Johnson (gjohnson@usbr.gov) or Matt Grabau (matthew_grabau@fws.gov).

Visit CCAST:

PROJECT RESOURCES

For more information on this project, contact Tom Anderson: tom_w_anderson@fws.gov

For additional project resources and case studies, scan the QR code below or visit the CCAST website: WWW.DESERTLCC.ORG/RESOURCE/CCAST

Pond Flooding/Bureau of Reclamation