

Agenda

Annual Public Workshop

San Onofre Nuclear Generating Station Wetland Mitigation Project

May 9, 2024

- 1:30 – 1:40** Introduction and Overview – Mark Page, UCSB
- 1:40 – 2:30** Performance of the San Dieguito Wetlands Restoration Project – Kat Beheshti, UCSB
- 2:30 – 3:00** Causes and consequences of habitat conversion at San Dieguito Wetlands – Rachel Smith, UCSB
- 3:00 – ?** General Discussion

For more information go to: <http://marinemitigation.msi.ucsb.edu/>

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Introduction

Annual Review Workshop for SONGS Wetland Mitigation



May 9, 2024

**SONGS Mitigation Monitoring Project
Marine Science Institute, University of California Santa Barbara**

SONGS Mitigation Monitoring team

Project Investigators



Mark Page
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Research Ecologist

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Assistant Researcher

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Denise Weisman
Data Scientist

David Huang
Deputy Director of Computing and Research

Andrew Daza
Wetland Field Research Supervisor

Science Advisory Panel



Edward Anderson
Professor and Director

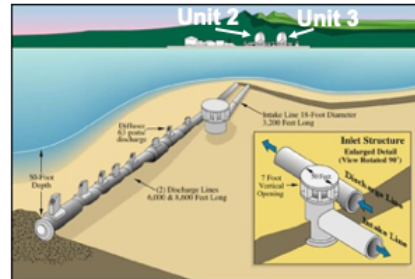
Peter Belmont
Professor and Chair

Russell J. Schmitt
Professor of Marine Ecology

Wetland Mitigation Linked to the Adverse Effects of the SONGS Cooling Water System

(San Onofre Nuclear Generating Station = SONGS)

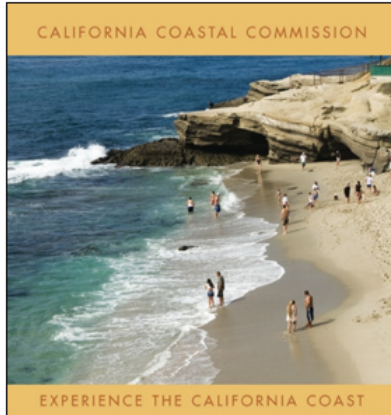
- **SONGS reactors were cooled by a single pass seawater system.**
- **Units 2 and 3 have separate intake lines located in about 30 feet of water offshore of the power plant.**
- **Power plant heated cooling water and turbulence kills fish eggs, larvae and small immature fish.**
- **SONGS operations projected to cause substantial reductions in populations of adult nearshore fish in the Southern California Bight.**



- To review the purpose and rationale beyond the SONGS wetland mitigation project.
- The SONGS reactors were cooled by a single pass seawater system.
- Units 2 and 3 had separate intake lines located in about 30 feet of water offshore of the power plant
- When operational, the water pumped into the plant was elevated about 19 degree F above ambient in the plant, and then discharged through an extensive diffuser system designed to dissipate the heat.
- Power plant heated cooling water and turbulence was found to kill fish eggs, larvae and small immature fish; these losses were projected to cause substantial reductions in populations of adult fish in the Southern California Bight.
- Construction of Units 2 and 3 was found to be consistent with the Coastal Act only if these significant adverse impacts to fish were mitigated.

The California Coastal Act Requires Mitigation of Impacts to the Marine Environment

California Coastal Commission (CCC) responsible for implementing the Coastal Act



As mitigation for the impacts to larval and juvenile fish caused by SONGS the CCC required SCE to:

- Create or substantially restore a minimum of 150 acres of wetlands, excluding buffer zone and upland transition area.
- Provide funding for scientific oversight and monitoring of the restoration project that is *independent* of SCE.

- The California Coastal Act requires the mitigation of impacts to the marine environment.
- Enforcement of the Coastal Act resides with the California Coastal Commission (CCC).
- As mitigation for the impacts to larval and juvenile fish caused by SONGS the CCC required SCE to:
 - Create or substantially restore a minimum of 150 acres of wetlands, excluding buffer zone and upland transition area.
 - Provide funding for scientific oversight and monitoring of the restoration project that is *independent* of SCE.

Key Elements of the SONGS Wetland Mitigation Project

- **Out-of-kind compensation for in-plant losses of larval and juvenile fish caused by the operation of SONGS Units 2 & 3.**
- **Physical and biological standards were established to evaluate the performance of the wetland restoration project.**
- **One year of mitigation credit is given for each year that the San Dieguito Wetlands Restoration Project meets the performance standards.**
- **Fulfillment of the SONGS wetland mitigation requirement occurs when the number of years of mitigation credit accrued by the San Dieguito Wetlands Restoration Project equals the 32 total years of operation of SONGS Units 2 & 3.**

- This slide summarizes the key elements of the SONGS Wetland Mitigation Project:
- The mitigation project is out-of-kind compensation for in-plant losses of larval and juvenile fish caused by the 32 years of operation of SONGS Units 2 & 3.
- Physical and biological standards were established to evaluate the performance of the wetland restoration project to ensure that the restored wetland provides ecosystem functions that are similar to relatively undisturbed tidal wetlands in the region.
- One year of mitigation credit is given for each year that the San Dieguito Wetlands Restoration Project meets the performance standards.
- Fulfillment of the SONGS wetland mitigation requirement occurs when the number of years of mitigation credit accrued by the San Dieguito Wetlands Restoration Project equals the 32 total years of operation of SONGS Units 2 & 3.



- This map shows the locations of SONGS, the impact site in red, the San Dieguito Lagoon, site of the San Dieguito Wetlands Restoration Project, and 3 wetlands that are used as reference sites to evaluate the performance of the restoration project: Carpinteria Salt Marsh, Mugu Lagoon, and Tijuana Estuary.

San Dieguito Wetlands before excavation and grading (2003)



- This slide shows a satellite view of the project site before excavation and grading.
- You can see the San Dieguito River and adjoining ruderal upland, including the site of an old WWII airfield, and old agricultural fields.
- You can also see a portion of a basin that was constructed in the 1980's termed the Fish and Game Basin.

San Dieguito Wetlands (2016)

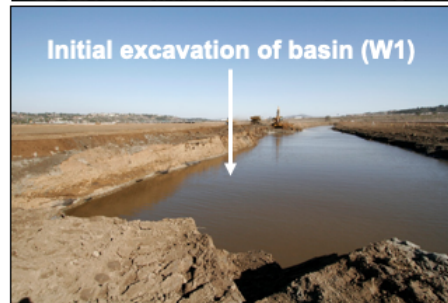


- During construction, the ruderal areas and old agricultural fields were excavated and graded to create the planned intertidal and subtidal wetland habitats of the restoration project visible in this image taken in 2016.
- In addition, you can see nesting sites that are not part of the mitigation requirement, and upland disposal sites that received the majority of the ~2.2 million yd³ of material excavated during construction.

Timeline

Construction start date **September 2006**

Project Task	Completion Date
Construction: All modules	November 2010
Additional wetland (Grand Ave)	February 2011
Re-grading of W2/W3	March 2014
Planting:	2008, 2009, 2011, 2016-2023
Inlet dredging:	September 2011 Nov/Dec 2015, 2017, 2019, 2022
Performance monitoring	January 2012 to present (12 years)



- This slide summarizes the project timeline.
- Construction began in September of 2006.
- Most excavation and grading was completed by 2008, with the addition of tidal creeks in W2/3 completed in November 2010, and re-grading of this area to lower elevations in March 2014.
- Large scale planting of salt marsh plants, including cordgrass, Spartina in the low marsh was completed in 2011, with additional planting of other species, initially in the higher elevations, but now more broadly that is on-going.
- Inlet channel dredging was completed in September 2011, with follow-up maintenance dredging in November/December of 2015, 2017, and 2019.
- Performance monitoring began in the year 2012, following the initial September 2011 dredging.
- We will be reporting on the twelfth year of performance monitoring.

Monitoring of Wetland Performance

- **Annual monitoring required to evaluate physical and biological performance standards provided in SONGS permit.**
- **Monitoring tracks ecosystem development and identifies adaptive management opportunities pertaining to physical and biological functioning of wetland.**
- **Independent monitoring is conducted by scientists from UCSB with advice from the Science Advisory Panel.**

Monitoring tidal prism



Monitoring bird abundance

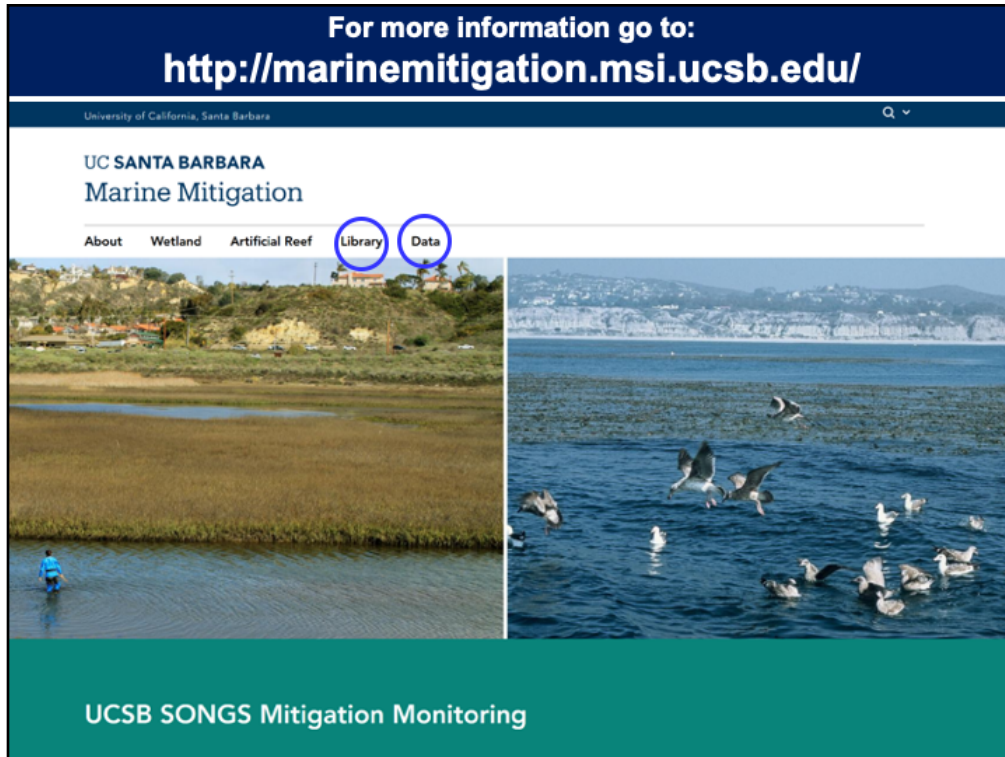


- Following construction, annual monitoring is required to evaluate the physical and biological performance standards provided in the SONGS coastal development permit.
- Monitoring also tracks ecosystem development and identifies adaptive management opportunities pertaining to the physical and biological functioning of the wetland.
- Independent monitoring is conducted by scientists from UCSB with advice from the Science Advisory Panel.

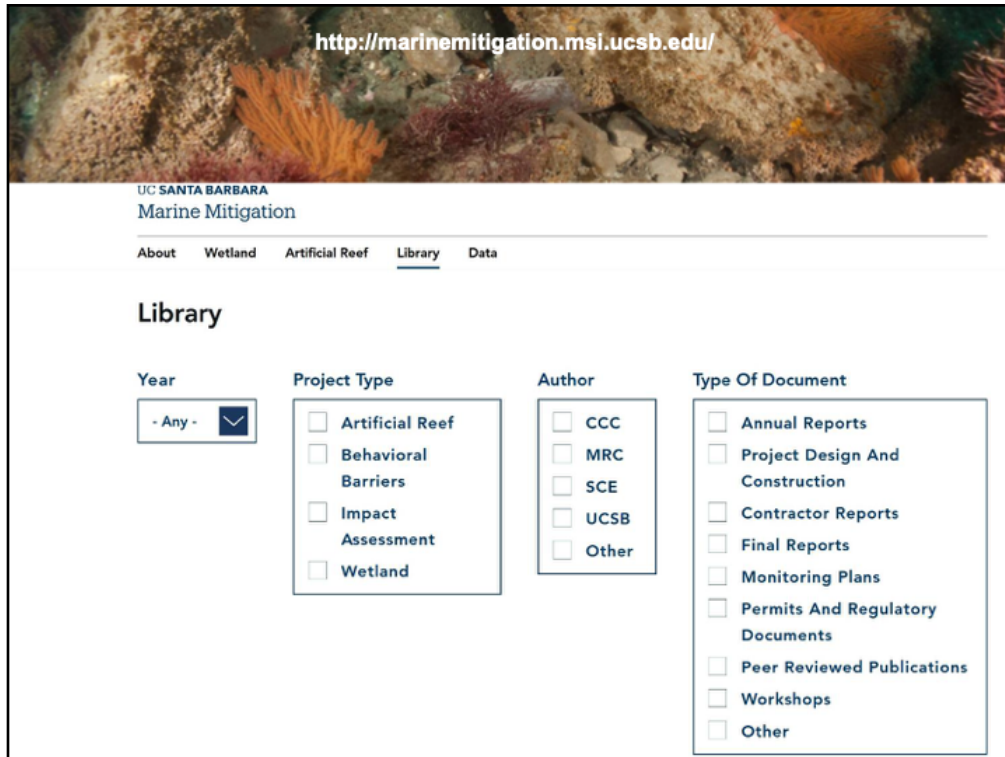
Restored wetland is providing habitat for invertebrates, fish, birds & plants



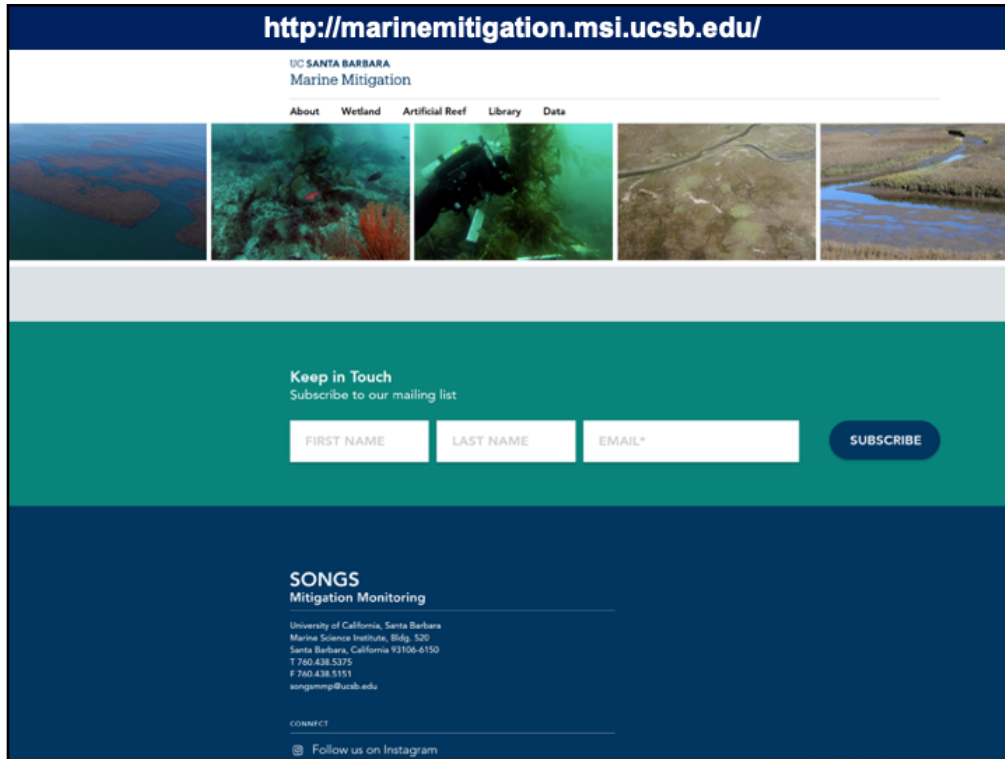
- In the twelfth year of performance monitoring, the restored wetland continues to provide habitat for an array of invertebrates, fish, and birds, and wetland plants, some of which are regionally rare and/or of fishery and conservation interest.
- Although the wetland is providing resource value it has not met the performance criteria required for successful mitigation, which will be discussed in the next presentation that reviews the results from performance monitoring in 2023.



- We want to bring to your attention to our UCSB SONGS Mitigation Monitoring website that can be found at the url on the slide and is easily searchable on web browsers by typing in ucsb msi songs or something similar.
- The website contains useful content on the history of SONGS coastal impacts, the rationale and requirements for SONGS mitigation, and descriptions and status of the artificial reef and wetland mitigation projects.
- Importantly, all of the project's monitoring data are being made publicly available through a data portal of the U.S. National Science Foundation's Environmental Data Initiative, which can be easily accessed through the UCSB SONGS Mitigation Monitoring Website.



- The website also has a library of project related documents that includes the workshop presentations, annual reports, construction reports and various regulatory documents.
- The library can be browsed by year, project type, author and type of document to assist users in finding what they are looking for



- Lastly, on the homepage of the website you can subscribe to our mailing list, follow us on Instagram or contact us by phone or email.

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