# A Return to Restoration: Species Coming Back to the Bay

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For decades the San Francisco Bay estuary was the dumping grounds of unwanted items: everything from tires and trash to raw sewage were dropped into the “useless” wetlands and waters. A 1959 study recommended filling most of the Bay in order to accommodate future growth. While this may have reduced our housing prices, it would have been disastrous in terms of water quality, flood protection, and species diversity. However, beginning in the 1960’s - 1970’s, grass roots actions and subsequent legislation helped to establish our now very robust restoration community. Literally dozens of wetlands are now being restored and improved around the estuary, in projects from small to enormous. These improvements have helped encourage some of our scaled, furred, and feathered friends to return to the Bay. The return of large, top level predators such as sharks, otters, and osprey signal cleaner waters, increased prey availability, and overall improved wetland habitats. While major issues such as reduced funding and impending sea level rise may cause us to lose sleep at night, let’s not forget the progress that has been made in just 50 years. Let's celebrate these accomplishments, enjoy the return of porpoises, black rails, and Point Reyes bird's beak even as we look forward to new challenges.

**Keywords:** restoration, wetlands, estuary, river otters, leopard sharks, osprey, predators, endangered

**Session Title**: Responses to a Changing Bay

**Speaker Biography:** Cheryl M. Strong is a wildlife biologist with the Don Edwards San Francisco Bay National Wildlife Refuge where she focuses on managed pond and tidal marsh restoration as part of the South Bay Salt Pond Restoration Project, with an emphasis on waterfowl and shorebird conservation, endangered species, and adaptive management. One of Cheryl’s main objectives regarding this restoration effort is to balance the needs of endangered species such as the marsh-loving Ridgway’s rail and the dry salt-panne loving western snowy plover with the tens of thousands of waterfowl and shorebirds that utilize the ponds during the winter and migratory months.

# Mystery Goo: An Investigation of Unknown Pollutants and Wildlife Losses

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The investigation of pollution and resulting wildlife losses is a continuing challenge. The diversity of potential inputs into natural systems and high environmental consciousness make this task uniquely complex in industrialized regions of California's coast. This case study will discuss investigation of a reported "mystery goo", an unknown contaminant that impacted more than 500 seabirds in East San Francisco Bay in January 2015. Multidisciplinary and interagency techniques including necropsies, histopathology, chemical analyses and public outreach were used to guide the investigation. Cooperative agreements and volunteer efforts by local, state, and federal agency, domestic and international academic, and industry scientists were essential to testing. Chemical analyses indicate the "mystery goo" is a complex mixture containing non-petroleum oils. Laboratory results suggest the polymers have a molecular mass greater than 1500 Daltons and are likely to consist of linked fatty acids and triglycerides of plant origin. The size distribution of the polymeric material and the source of the contaminant have not been determined. As this case demonstrates clear communication, continued partnerships between law enforcement and scientific staff, coordination and open sharing among agencies, rapid availability of resources, and a spirit of volunteerism are essential for successful resource protection in complex pollution events.

**Keywords:** pollution, chemical, wildlife, investigation, unknown

**Session Title**: Responses to a Changing Bay

**Speaker Biography:** Daniel Orr is a Senior Environmental Scientist (Specialist) with the California Department of Fish and Wildlife (CDFW) Office of Spill Prevention and Response. Daniel received his master's degree in analytical chemistry at the University of California, Riverside and bachelor's degrees in chemistry and biology from the University of Redlands. His analytical methods have been published in Plant Chemical Genomics and the Journal of Analytical and Bioanalytical Chemistry. Daniel joined CDFW in 2011 and spent three years working with the Habitat Conservation and Water Quality programs, he then embraced his incurable chemical curiosity and transferred to the Water Pollution Control Laboratory. He currently serves as the Inland Spill Scientific Coordinator for statewide spill response and focuses on improving methods for algal toxins, pesticides, and other pollutants in the laboratory. He can be reached at daniel.orr@wildlife.ca.gov.

# The Forgotten Habitats: Re-envisioning the Bay's Urban Edge

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The State Coastal Conservancy and our partners are implementing several experimental restoration projects to reconnect shorelines with the hidden and often forgotten subtidal and intertidal habitats of the bay. This shoreline-bay interface is an active edge zone that contributes to habitat and food resources as well as shoreline protection- which is increasingly important in light of climate changes such as sea level rise. The 2010 Subtidal Habitat Goals Report recommended integration of multiple habitat types to improve linkages and promote synergistic effects of habitat features on each other as well as on associated fauna. There is a critical need to get started early on pilot projects which test new integrative design concepts and adaptive approaches. In 2011, the Conservancy and USFWS established a five-year program to implement rapid intensive revegetation to enhance habitat for California Ridgway's rails and other species. In 2012, the Conservancy constructed the SF Bay Living Shorelines Project, a multi-objective habitat restoration project with the overarching goal to create biologically rich and diverse subtidal and low intertidal habitats, including eelgrass and oyster reefs, that is resilient to changing environmental conditions. Phase two planning for living shorelines is currently underway and includes a focus on integration of tidal marshes and mudflats with oyster and eelgrass beds across the tidal frame in order to promote and increase habitat connectivity, native species habitat and foraging opportunities, high tide refugia, and wave attenuation. In 2014, the Conservancy and the National Fish and Wildlife Foundation began to plan for removal of two derelict creosote wharfs and replace the lost physical structure with native habitats that will benefit Pacific herring and improve the shoreline. This presentation will focus on sharing key values of forgotten habitats, preliminary results to date, permitting considerations, and lessons learned that can be applied to additional habitat integration efforts.

**Keywords:** shoreline, subtidal, wetlands, climate adaptation, eelgrass, oyster, creosote, integrated restoration

**Session Title**: Responses to a Changing Bay

**Speaker Biography:** Marilyn Latta is a Project Manager at the California State Coastal Conservancy. She manages the SF Bay Living Shorelines Project, Invasive Spartina Project, and additional regional projects and collaborative planning efforts in San Francisco Bay. She studied Marine Biology/Zoology at Humboldt State University, and prior to joining the Conservancy she worked for a variety of non-profit organizations to educate and involve the public in the protection and restoration of ocean and estuarine resources.

# Invasive Spartina Project Update and the Case for Active Restoration

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In 2011, the California Coastal Conservancy's San Francisco Estuary Invasive *Spartina* Project (ISP) implemented a five-year program to rapidly enhance habitat for California Ridgway's rail in areas impacted by the invasion and removal of non-native *Spartina*. To date, ISP has planted over 300,000 plants in 40 restoration sites. This project provided an opportunity to study factors that limit plant establishment in saltmarsh. The reintroduction of Pacific cordgrass, *Spartina foliosa*, was a particularly complex component of ISP's effort. Challenges to restoration included grazing pressure by herbivores, highly variable restoration sites, limited restoration literature for native cordgrass, and the continued presence of non-native hybrid *Spartina* in the estuary. To address challenges, ISP, in partnership with researchers at San Francisco State's Romberg Tiburon Center, implemented replicated planting designs that tested multiple restoration techniques across different sites and habitat types. Experimentation helped to develop methods that promoted successful restoration under the varying environmental conditions at any given site. We have concluded that: 1) our early focus on testing restoration methods has likely improved project success; 2) our research partnerships have helped us to understand variability in success of planting efforts; 3) our findings from one site should not be generalized to all sites-survivorship varies greatly by year and site, and; 4) even common baywide species such as *Grindelia stricta* and *Spartina foliosa* are recruitment limited. We contend that that active restoration efforts should be expanded to include other marsh species. A study with RTC partners found that that some marsh species are common to natural marshes, but absent in restoration marshes (*i.e., Triglochin coccinna/maritima, Plantago maritima, and Chloropyron maritima)*. It may be that these plants are recruitment limited. Expanding planting palettes such that a diversity of desired species are outplanted has the potential to both speed up restoration trajectories and create diverse healthy marshes.

**Keywords:** Active restoration, Spartina, cordgrass, Ridgeway's Rail, Gumplant, saltmarsh, planting,

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**Speaker Biography:** Whitney Thornton has extensive field work experience in salt marshes, fresh water wetlands, and intertidal zones throughout the San Francisco Estuary. Her knowledge and interest in marsh plant ecology and restoration history has led to a co-authored UC Press book chapter that looks at differences between natural and restored marshes in the San Francisco Bay. Ms. Thornton is happiest designing an experiment, planning restoration, and keying out plants. For her master's thesis under Kathy Boyer at San Francisco State University Romberg Tiburon Center, she developed methods for native cordgrass restoration, Spartina foliosa, to areas of San Francisco Bay where it has been extirpated. Over a period of four planting seasons, Ms. Thornton designed studies to test different environmental variables on restoration success.