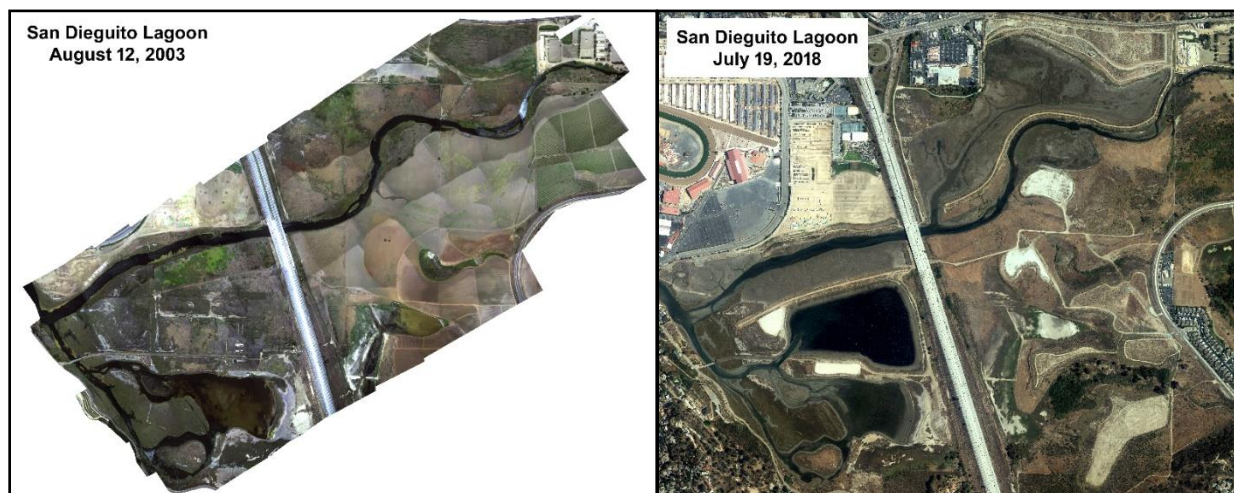


December 2018 - Ocean Imaging Marks 15 Years of an Environmental Monitoring Project to Help Restore California's Wetlands

The California Coastal Commission (CCC) in 1974 issued a coastal development permit to Southern California Edison Company for the now-inactive San Onofre Nuclear Generating Station. A condition of the permit required study of the impacts of the station's Units 2 and 3 on the marine environment offshore of the plant and mitigation of any adverse impacts - one of the primary negative impacts being losses to fish stocks due to entrainment of fish eggs and larvae in the station's water-cooling system. As a result, in 1991 the CCC added a few new conditions of the permit. Since wetlands act as breeding and nursery grounds for many offshore fish species, one of these conditions was the creation or restoration of Southern California Wetlands. One of these wetlands is the San Dieguito Lagoon roughly 20 miles north of San Diego, California.

Wetland restoration often involves the planting of native species with the goal of expediting plant establishment and the development of vegetative cover. However, success of these plantings can be problematic and factors influencing success are still being researched. Despite the cease of operations and the San Onofre Station in 2013, Southern California Edison continues to fund the process of restoring portions of San Dieguito Lagoon wetlands as part of the mitigation requirement. Now managed by the CCC in conjunction with Dr. Steven Schroeter and Mark Page of the University of California at Santa Barbara (UCSB), the team which includes Ocean Imaging continues to oversee and monitor the performance of extensive salt marsh plantings at the lagoon to ensure that restoration and construction proceeds according to plan and to identify opportunities for adaptive management.

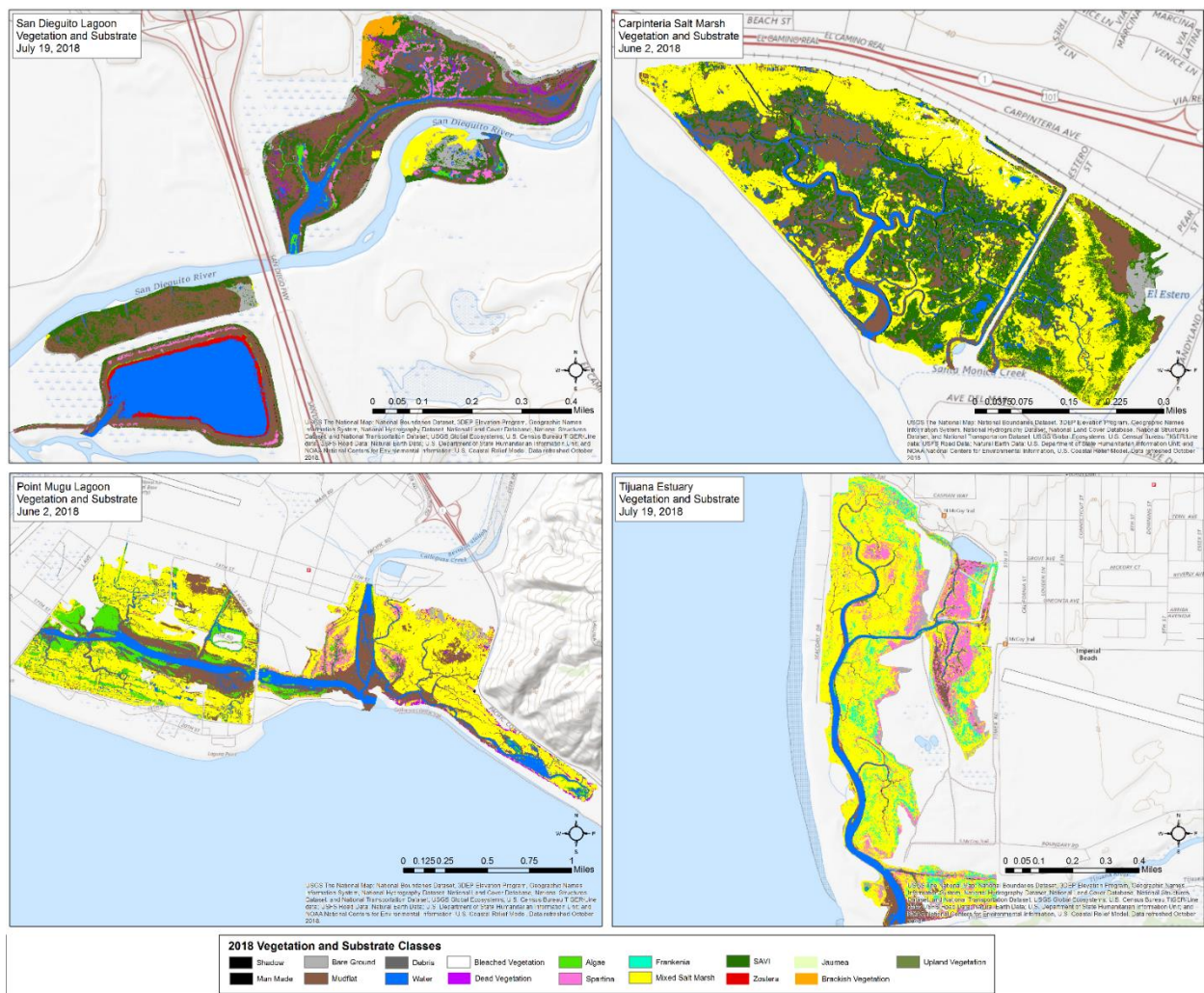


Aerial imagery of the San Dieguito Lagoon taken in August of 2003 (left) and July of 2018 (right)

Ocean Imaging (OI) began monitoring the lagoon for CCC and UCSB using remote sensing techniques in 2003. At that time, OI used digitized color aerial photographs to

generate thematic maps of San Dieguito to help the managers and researchers track the progress of the restoration. In 2010 UCSB and OI added classifications the Tijuana Estuary as a control wetland and in 2012 thematic maps of Carpinteria Salt Marsh and Point Mugu Lagoon were added as additional control sites to which the vegetation establishment of San Dieguito Lagoon could be compared. Now, in 2018, OI uses very high-resolution multispectral imagery to generate the detailed thematic maps of vegetation and substrate of all four wetlands to both track the reconfigurations being made to San Dieguito Lagoon over the years as well as help the project managers assess the reestablishment of native plants and vegetative ground cover.

OI and UCSB are also investigating the use of unmanned aircraft systems (UAS or drones) for future surveys to obtain super high-resolution data (as detailed as 5cm resolution) from which extremely accurate and detailed habitat maps can be generated.



2018 habitat classifications of the four study lagoons/estuaries: San Dieguito Lagoon (top left), Carpinteria Salt Marsh (top right), Point Mugu Lagoon (bottom left) and Tijuana Estuary (bottom right)