

## Restoring Drakes Estero: A Journey Back to Eelgrass

by Allison G. Kidder



An excavator, precariously balanced on a floating barge, removes wood oyster racks from Drakes Estero in Point Reyes National Seashore, September 14, 2016.

The heavy excavator balanced precariously on the floating barge as it lowered its gaping maw over the edge and into the water, bringing up a dripping pile of algae- and mud-covered PVC pipe and pressure-treated wood from the bottom of Drakes Estero in Point Reyes National Seashore. This was part of a large-scale restoration of the estuary after the controversial departure of Drakes Bay Oyster Company, a business that began in 1932 when the Point Reyes peninsula was private land.

To say the departure of Drakes Bay Oyster Company was controversial is putting it mildly. The oyster farm was located smack dab in the middle of the largest part of Drakes Estero, an estuary in the 33,370-acre Phillip Burton Wilderness Area within the boundaries of Point Reyes National Seashore. The controversy revolved around whether the 80-year-old

commercial operation could renew their lease with the National Park Service and sparked lively debates about the meaning of wilderness and whether the oyster farm was negatively affecting the Drakes Estero ecosystem and its inhabitants.

Drakes Estero is one of only two federal marine wilderness areas in the United States (the other is in Alaska) and is also a California Marine Protected Area. The protected estuary supports about 1,000 acres of rare eelgrass (*Zostera marina*), some nine percent of all eelgrass found in California. Eelgrass beds serve as nurseries for many species of fish and actively sequester carbon from the atmosphere, especially important with the rising levels of atmospheric carbon dioxide and resulting ocean acidification. In addition to supporting eelgrass beds, the estuary provides habitat for leopard sharks (*Triakis semifasciata*),

coho salmon (*Oncorhynchus kisutch*), tens of thousands of shorebirds and waterfowl, and harbor seals (*Phoca vitulina*) that haul out to give birth to 300–500 pups every year.

Drakes Bay Oyster Company began life as the Coast Oyster Company that raised non-native Pacific oysters (*Crassostrea gigas*), which were introduced from Japan by the United States Fisheries Service (precursor to the National Marine Fisheries Service) and the California Division of Fish and Game (precursor to California Department of Fish and Game) to help reinvigorate the lackluster west coast oyster industry.

A man named Charley Johnson, who learned the oyster trade while employed by Coast Oyster Company, bought the company in 1957 and renamed it Johnson Oyster Company. Eventually he negotiated with the National Park Service for a 40-year lease and permits to continue growing and harvesting oysters and maintaining its packing facilities in Drakes Estero. His son Tom eventually inherited the Johnson Oyster Company, but it was plagued by poor finances, government code violations, and a resulting cease and desist order from the state. Flummoxed, in 2005 Tom sold the company to Kevin Lunny, a nearby rancher within the park, with a solid reputation for wise land management on land his family had ranched for multiple generations. Mr. Lunny changed the name to Drakes Bay Oyster Company and promised to improve the oyster farm operations and facilities to resolve the code violations, but the lease was still required to end in 2012.

Drakes Bay Oyster Company developed a large following and a thriving business and Mr. Lunny worked to renew the lease for another ten years to 2022. But the National Park Service had its hands tied: Drakes Estero comprised most of the 8,003 acres designated by the United States Congress as potential wilderness, a portion of the Phillip Burton Wilderness area that would become wilderness once non-conforming uses (such as commercial operations) were removed. The United States Congress expected the National Park Service to eventually designate Drakes Estero as wilderness, therefore renewing the oyster farm’s lease was not legal. Even so, because of the raging debate, the National Park Service initiated an environmental review of the lease renewal and received more than 4,000 comments during the seven-week initial



These two photos show an area of Drakes Estero where rectangular oyster racks were removed. The top photo was taken shortly after rack removal and the bottom photo is the same area one year later. The eelgrass has already begun repopulating the vacated floor of Drakes Estero.

Thomas W. Bell photos



comment period during fall of 2010. The renew versus not-renew controversy had passionate supporters on both sides, oftentimes forcing a division between both the environmental and the organic sustainable food communities, but ultimately the government decided to not renew the oyster farm’s lease. Once the farm ceased



Tom Bell, of Earth Research Institute at University of California Santa Barbara, flies a drone over Drakes Estero in Point Reyes National Seashore to document changes in eelgrass coverage after the removal of oyster racks.

operations and departed the site in December 2014, the Drakes Estero was ripe for a large-scale restoration project.

The goal of the \$4 million restoration project was pretty straightforward; remove the buildings and facilities from the shoreline and remove oyster racks and debris from the water in order to increase eelgrass cover, reduce invasive species, and help restore ecosystem processes, such as nutrient and tidal flows through the estuary. By the time the ten month restoration project was completed, in November 2017, more than five miles of pressure-treated wood from 95 oyster racks, 1.5 acres of plastic mesh that were buried in sediment beneath the oyster racks to prevent the oysters from burrowing, and over 1,300

tons of plastic debris, PVC pipe, metal rebar, cement blocks, and shell debris were removed from the estuary. Excavators perched on floating barges removed about 7,000 wooden posts buried five feet deep in the mud and retrieved debris from the bottom where there was no eelgrass. Divers removed the rest by hand in areas where eelgrass was growing.

The removal of the all the debris is obviously good for the estuary, but is the restoration considered a success ecologically? Like any restoration project, the budget for the project included monitoring, and much of that part of the project is still in the early stages so it's a bit too early to know. Monitoring harbor seal and bird populations can readily be accomplished using binoculars and spotting scopes, but how

does one monitor increases in the cover of eelgrass beds without disturbing the bottom full of fragile roots and shoots? Use drones!

Although flying “unmanned aircraft systems” by hobbyists is generally not allowed in national parks, the National Park Service allows researchers to apply for special permits to use drones in their research to monitor large areas of hard-to-reach terrain using various kinds of aerial imagery. The requirements to fly drones in national parks are many, and include an extensive permitting process and many signatures of approval, as well as a current drone-flying license with the Federal Aviation Administration.

Researchers Max Castorani of University of Virginia and Tom Bell of University of California Santa Barbara’s Earth Research Institute are working (NPS Permit PORE-2018-SCI-0005) to capture post-restoration

aerial imagery of Drakes Estero using a three-pound, four-propeller DJI Phantom 4 Pro drone. They flew several sets of flights over the restoration area during 2017 and 2018 and will complete at least one set of flights in 2019 with the goal of photographing the entire Estero once per year, and individual bays within the Estero two or three times per summer, one square kilometer at a time.

As long as the sun angle and tide and wind conditions cooperate, their imagery allows them to look at eelgrass recolonization into the restoration areas and document how the eelgrass populations change between years and within years. Making use of the fact that eelgrass reflects light differently and is more structurally complex than nearby wet sand and water, the researchers have just begun a painstaking pixel-by-pixel analysis of their images in order to develop a computer algorithm that will

Aerial view of Drakes Estero, February 12, 2015. Abbotts Lagoon is just left of upper center of photo.

Bobbi Simpson/National Park Service





A growing pile of French tubes and other debris removed from Drakes Estero in Point Reyes National Seashore sits in the foreground, with a large excavator in the background, (January 5, 2017).

automatically classify eelgrass habitat. (Each pixel represents about a 4 cm x 4 cm area.) This new approach to birds-eye-view imagery of the estuary will help the National Park Service—and people busily restoring eelgrass populations in other parts of the world, including San Francisco Bay—to easily monitor the recovery of this important, yet rare, aquatic habitat in years to come. 🌱

### For More Information:

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