

Drakes Estero eelgrass, oyster bag, and oyster rack assessment Trip Report - 3/20/2007

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Equipment: 13 ft Alumicraft skiff with 15 hp 4-stroke outboard motor.
Trimble GeoExplorer3 GPS with real-time differential correction.

03/13/2007

Oyster rack, bag, line and eelgrass assessment

Objectives

1. Map all oyster racks in the estero and categorize as active, inactive or dilapidated. Dilapidated racks were defined as those considered too deteriorated for use.
2. Document any apparently recent repair work done to racks.
3. Map all oyster bags and line systems.
4. Report eelgrass occurrence (dense/patchy/absent) both adjacent and beneath all racks, bags and lines.

Field Methods: We launched from Drakes Bay Oyster Company (DBO) at ~11 AM and a + 3 ft tide, and traveled from North to South visiting all racks in the Estero. At each rack, we recorded whether the rack was surrounded by dense or patchy eelgrass, if eelgrass was present beneath the rack, the percentage of the rack currently occupied with oysters (= percent active), and the percent of the racks dilapidated. We mapped all visible bag systems along the intertidal and investigated all marker poles that are often used to mark where bags are kept. Survey was completed at ~2:45 PM and tide appeared to be about 0 ft.

Summary Results: There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There were 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor

seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero.

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

03/20/2007

Eelgrass satellite imagery ground truthing

Objectives

1. Ground truth satellite imagery classification of eelgrass beds.
 - Imagery used for classification was one-meter color digital orthophoto taken August 2005 at low tide classified using Erdas Imagine software.
2. Document any additional racks, bag or line systems not seen on day 1.

Field Methods: Beginning at ~ 10:30AM on 03/20/2007 at about a 0 ft tide, we surveyed the estero to ground truth a draft eelgrass bed map derived from satellite imagery. We traveled the perimeter of the eelgrass beds to verify changes from eelgrass to bare substrate, as well as to verify that eelgrass was dense or patchy within beds. We defined dense as close to 100% cover, patchy was considered down to 40% cover. We also verified that vegetation classified as eelgrass was not *Sargassum muticum* (as happened near the mouth of the estero) or enteromorphic algae (as occurred near some of the seal haul out sand flats in the middle of the estero). We took a total of 243 points throughout the estero noting eelgrass presence/absence/ dense/patchy to reclassify the satellite derived map to reflect actual field conditions. The survey was completed at ~1:30 PM and tide appeared to be about +3 ft.

Summary Results: In the field, the vast majority of satellite derived eelgrass classification appeared correct. Two shortcomings were that (1) channels are too deep to see eelgrass, even at low tide and (2) that during high tide in waters > 4 ft deep with windy conditions, choppy waters, and low sunlight, it was often difficult to see past 3 ft from the surface. In these instances we traveled very slowly until we came to an area shallow or calm enough to see bare bottom or eelgrass.

After analyzing ground truth data, ~ 95% of ground observations appeared to match to satellite image classification. Discrepancies mostly occurred in the southern part of the bay because of misclassification of *Sargassum muticum* and enteromorphic algae, as mentioned previously.

We calculated that 740 acres of the estero are covered by eelgrass, 355 acres dense, and 385 acres patchy. Oyster operations in eelgrass represent ~ 8.5 acres. We calculate that 8 acres (some dilapidated racks have patchy regrowth) of eelgrass beds are lost in Drakes Estero due to mariculture. Another factor affecting eelgrass beds which was noticed was boat propellers. It can be seen from aerial and satellite photos where regular boat paths have cut paths through eelgrass; these calculations do not reflect this factor which will necessitate further study.

We also documented three additional intertidal oyster bag systems not identified during the first survey.

Summary Statistics

Total Oyster Racks	93
Usable Oyster Racks	66
Dilapidated racks	27
Percentage of racks in eelgrass beds	96% (89 of 93)
Percentage of usable racks with eelgrass underneath	0%
Percentage of dilapidated racks with eelgrass regrowth	26% (7 of 27)
Acres of eelgrass lost to racks	8 acres
Number of intertidal oyster bag areas	12
Acreege of intertidal oyster bag sites	10 acres
Total eelgrass acreage in the Estero	740 acres

Images



Active oyster racks in Drakes Estero.



Non-native tunicates (*Didemnum* spp. A) growing on oysters.



Floating bag system tethered by ropes.



Tethered oyster bags on intertidal sand/mudflats



Hanging bag array