

morro bay  
volunteer monitoring

# Morro Bay Volunteer Monitoring Program

## Eelgrass Monitoring Update

Spring 2005

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### Background

The Morro Bay National Estuary Program (NEP) has long recognized the importance of eelgrass as a vital bay habitat. Eelgrass is specifically called out in the NEP's management plan for continued protection and restoration. To aid these efforts, the NEP has been involved in eelgrass mapping.

Eelgrass is considered to be an important indicator of bay health because it serves so many important purposes in an aquatic ecosystem. It helps improve water clarity by dampening the wave effects give sediment time to settle out of the water column. It supports a rich array of invertebrate species and provides food and shelter for many species of juvenile fish, including the endangered steelhead trout. It serves as a primary food source for migratory black brant that over-winter in Morro Bay. Dead eelgrass decompose and contribute detritus to the marine food web.

Morro Bay's eelgrass is the largest and least impacted in southern California. However, it is predicted that as the bay grows shallower due to sedimentation, the area able to support eelgrass in Morro Bay may be significantly reduced. Eelgrass success is dependent on a water depth that is deep enough to allow the eelgrass to survive periodic open air exposure during low tides. However, if water is too deep, adequate sunlight cannot reach the eelgrass for photosynthesis.

### How do we monitor eelgrass?

The basics steps for our monitoring effort are:

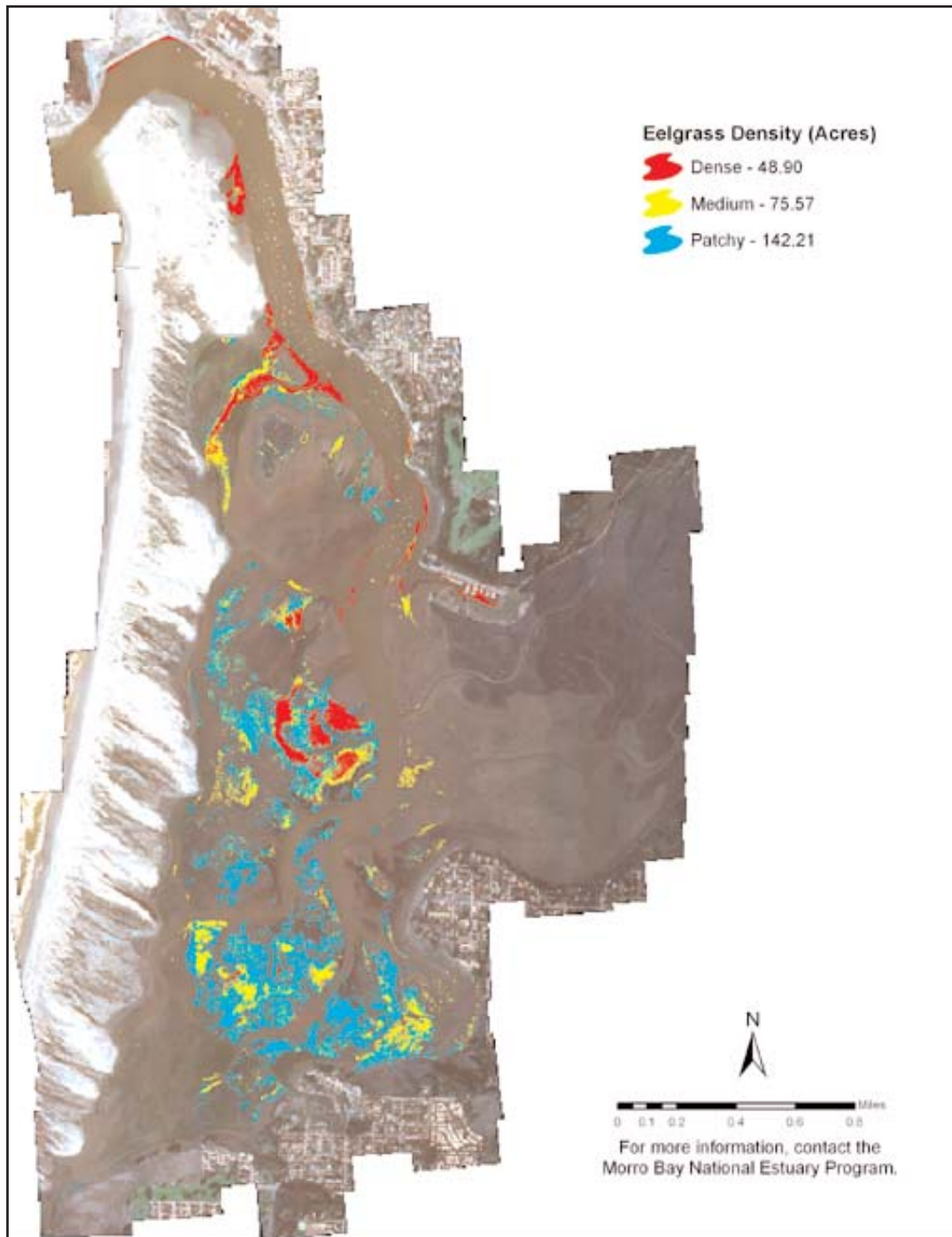
- Collect multi-spectral aerial imagery on a negative tide
- Identify eelgrass from photos using digital image analysis software
- Conduct fieldwork using a global positioning satellite (GPS) unit
- Create a Geographic Information System (GIS) layer showing the extent of eelgrass

Monitoring is conducted once a year in the fall, the time of peak eelgrass locally. Additional data is provided by National Marine Fisheries Service staff. They utilize a single-beam sonar unit to map the vegetation in the bay. This data, in combination with the aerial imagery, is used to create digital eelgrass maps.

Past surveys have been conducted in Morro Bay for almost every year from 1994 through the present, and methodologies have evolved significantly during that time. The earliest available maps are from 1960 and 1988.

The surveys show that while the location of the large eelgrass beds in the bay has been remarkably stable over the last 50 years, there have been extreme changes in the abundance of eelgrass over the last decade. Eelgrass acreage underwent a steady decline in the mid- 1990s, with a return to pre-decline levels towards the late 1990s. This decline was associated with an intense storm event in the winter of 1994-5 that followed an extensive watershed fire. The heavy rains carried ash from the fire into the bay, smothering the eelgrass.

The MBNEP is working to standardize the protocol for photo interpretation so that future acreage estimates will be comparable and repeatable.

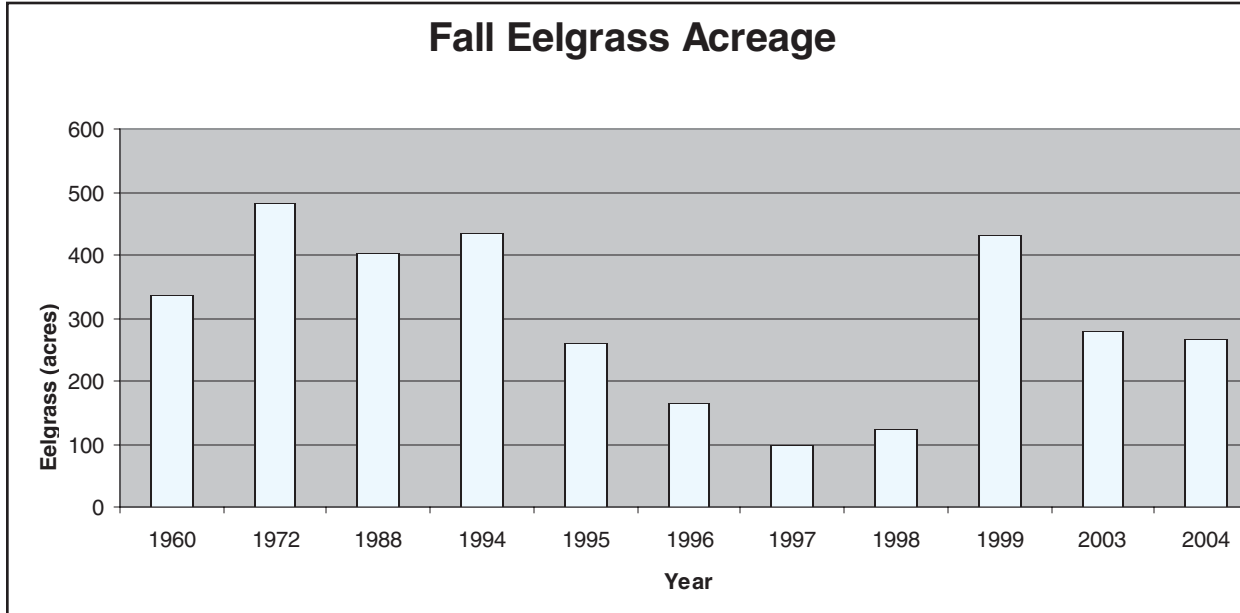


The figure shows the eelgrass map created by the MBNEP for the fall of 2004. The flight was flown on November 25, 2004 at around 1:15 p.m. (the low tide was -0.4' at 3:41p.m.). The plane flew at an altitude of 3,500 feet to collect multi-spectral imagery.

The California Conservation Corps provided the fieldwork for the effort. The survey sites were identified with a Trimble GPS unit which has submeter accuracy. They identified the location of eelgrass and other vegetation and substrate types in the bay. Staff from the National Marine Fisheries Service collected single-beam sonar data which provided additional information on eelgrass locations.

Ocean Imaging consultants used classification software to interpret the photos and create polygons representing the eelgrass beds in the bay. They incorporated the field data into this classification to verify locations and densities. The colored areas on the map show 267 acres of eelgrass identified by the 2004 survey.

# Summary of Eelgrass Acreages Over Time



The plot shows the acreages of eelgrass in each of the different years that surveys were conducted. Numerous methods have been used for surveying, as noted below:

**1960 and 1972:** CA Fish & Game created the maps using a combination of aerial photos (non-digital) and groundtruthing.

**1988 through 1999:** Local biologist John Chesnut conducted the surveying, relying on extensive fieldwork.

**2003:** The NEP hired a local aerial company to collect true color photos and orthorectify the

images to create a single, undistorted image of the bay. The NEP used image classification software to identify eelgrass throughout the bay and create an eelgrass map.

**2004:** The NEP hired Ocean Imaging, a consultant, to collect multi-spectral imagery of the bay, orthorectify the images and then use their library of eelgrass 'signatures' to create a bay-wide map of eelgrass. The mapping effort was supported by fieldwork by the California Conservation Corps and the National Marine Fisheries Service.

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