



**Buzzards Bay Project
National Estuary Program**

Frank A. Tramontozzi, Chairman
Wareham Marine Resources Commission
Memorial Town Hall
Wareham, MA 02571

May 12, 2004

Mr. Tramontozzi:

In response to your telephone request on May 10, 2004, and follow up written request (attached), I have prepared the list of maps below showing eelgrass in Onset Bay in Wareham.

A few notes are worth making on eelgrass growth and colonization. Eelgrass is a flowering plant that grows and colonizes areas similar to the grass in your backyard. It grows and expands by both seed dispersal and vegetative growth of new runners. Eelgrass may disappear from an area due to physical disturbances such as ice scour, storms, dredging, boat prop wash, jet clamming, and sometimes other intensive shellfishing operations. Localized outbreaks of eelgrass wasting disease have also been postulated to occasionally occur in some areas. Eelgrass has also declined in many embayments due to water quality declines from nitrogen loading and sediment resuspension from boating and other activities. If eelgrass loss is due to a natural disturbance, eelgrass will naturally recolonize an area after 1 to three seasons. If eelgrass loss is due to declines in water quality (nitrogen loading or increased turbidity), eelgrass will generally not recover until the water quality improves.

With respect to mapping eelgrass distribution, these maps are based on interpretation of aerial photographs, supplemented by field validation for questionable sites. Generally, eelgrass maps are only as good as the aerial photography. The two limits of aerial photography is the degree of water turbidity, and the seasonal eelgrass coverage during the time of the photograph. Photographs during periods of high water turbidity (exacerbated if photographs are taken at high tide) result in underestimates of the maximum depth of eelgrass growth. It can also result in the omission of all but the shallowest beds during periods of high water turbidity.

Equally important is the fact that some eelgrass beds, especially shallow ones, may be functional annual beds, being destroyed by winter storms or ice scour. These annual beds can recover from seed recruitment or small surviving patches, but these annual beds might not become dense enough in aerial photographs until mid June. Similarly, perennial deep beds slough off most of their leaves during the fall and winter (that's why eelgrass wrack on beaches is so thick that time



of year), and the plants may not appear dense in photographs until May or June. In general, the most reliable eelgrass maps are based on September or October aerial photographs.

Maps attached and comments

Map 1: Mid 1980s eelgrass for Onset Bay from my 1998 report, and based principally on October 1981 aerial photographs. This study used USGS topographic maps as the base map, and positional accuracy was generally estimated to be +/- 20 meters. Only areas of relatively dense eelgrass cover were mapped as polygons. Areas where eelgrass was present in small beds, but not appreciably large in the photographs are indicated by a "+" symbol. Areas where eelgrass existed as a sparse or patchy cover over a large area were indicated by a "PA." Areas of attached algae (AA) and drift algae (DA) or other features are included in the 1980s database. In the area west of the Point Independence Yacht club, eelgrass was found, but the cover was not great enough to appear as mapable areas on the 1:30,000 scale photographs used.

Map 2. Eelgrass coverage in the mid 1990s developed by the Massachusetts Department of Environmental Protection based on March 1996 aerial photographs. Because the photographs were taken so early in the growing season, many beds are too sparse to appear as distinct features in the aerial photograph, and the absence of eelgrass mapped in an area may not be conclusive evidence of its absence. DEP randomly selected and investigated sites in Onset Bay to validate the photographs.

Map 3. Color orthophotograph taken April 1, 2001 showing detail of north central Onset Bay. The 2001 photograph series were of exceptional water transparency, and perhaps the best aerial photographs ever taken for the purposes of benthic features, but they were taken too early in the growing season, hence they do not show many shallow annual beds that appear in summer, and many of the deeper beds may be too sparse, and may not be characteristic of late summer distribution. The top photo shows normal color. The bottom photo is image contrasted to better show benthic features. It is unclear which features are algae or eelgrass.

Map 4. September 1994 color photograph of upper Onset Bay. Image is too dark to evaluate eelgrass.

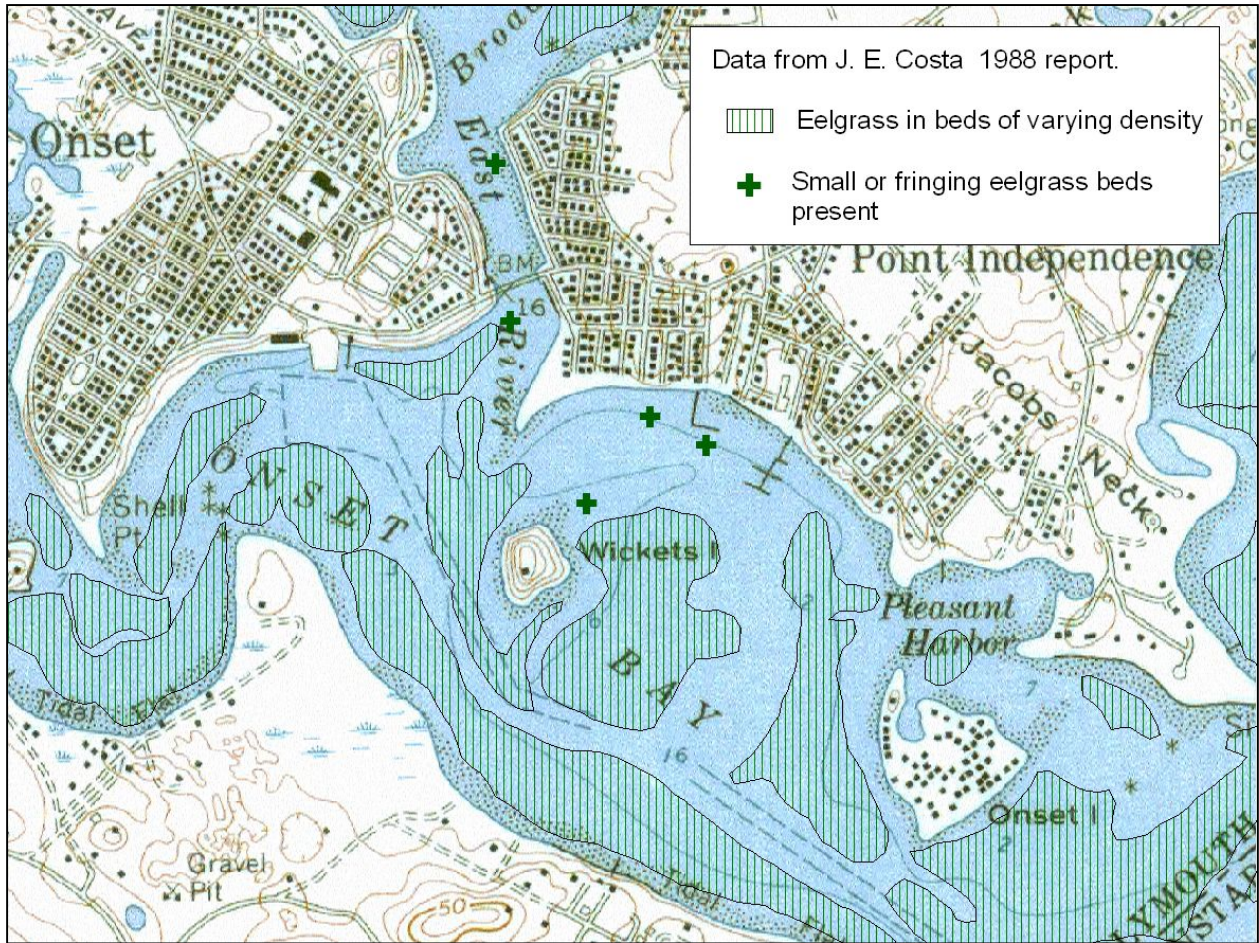
Map 5. Spring 1992 black and white photograph of upper Onset Bay. This image has poor water transparency, but may show the shallow boundary of the eelgrass beds.

I hope this information assists your agency with its deliberations.

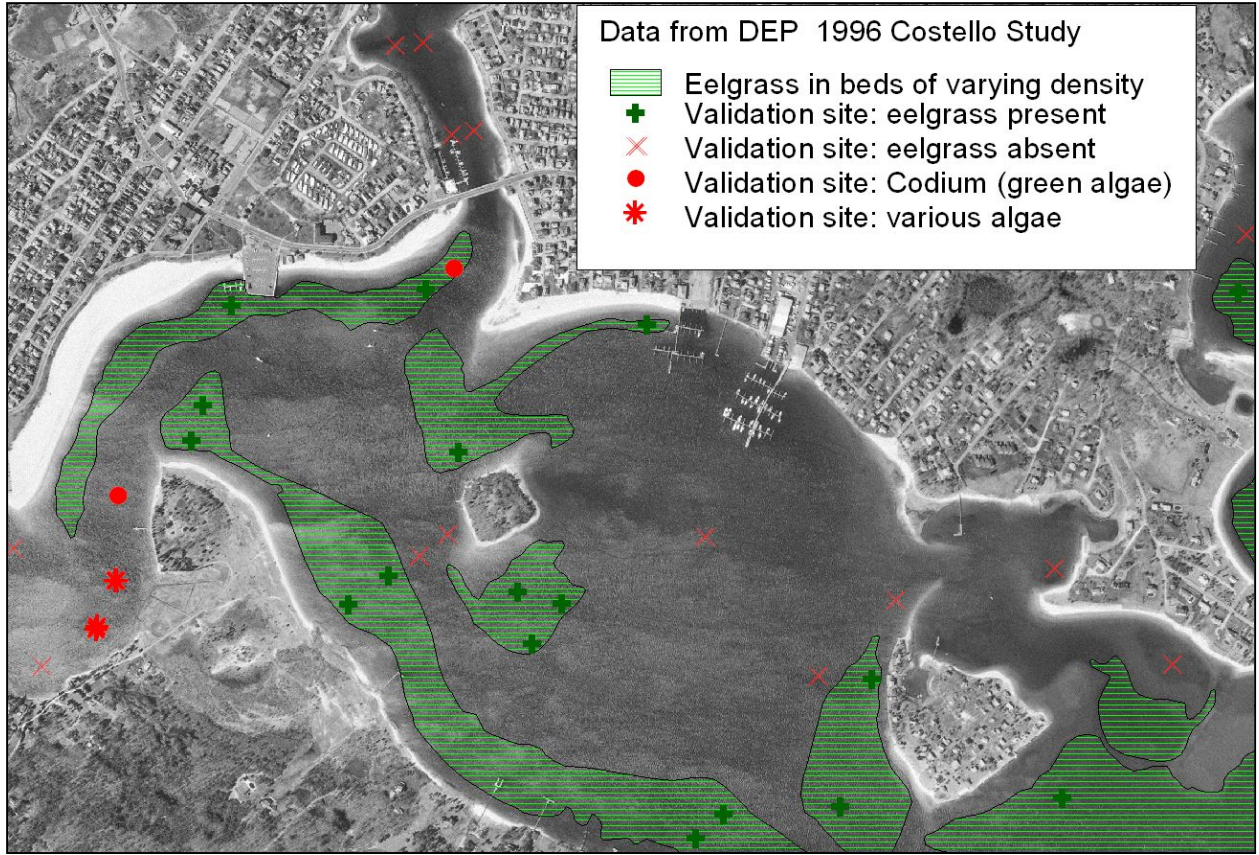
Sincerely,

Joseph E. Costa, Ph.D.
Executive Director

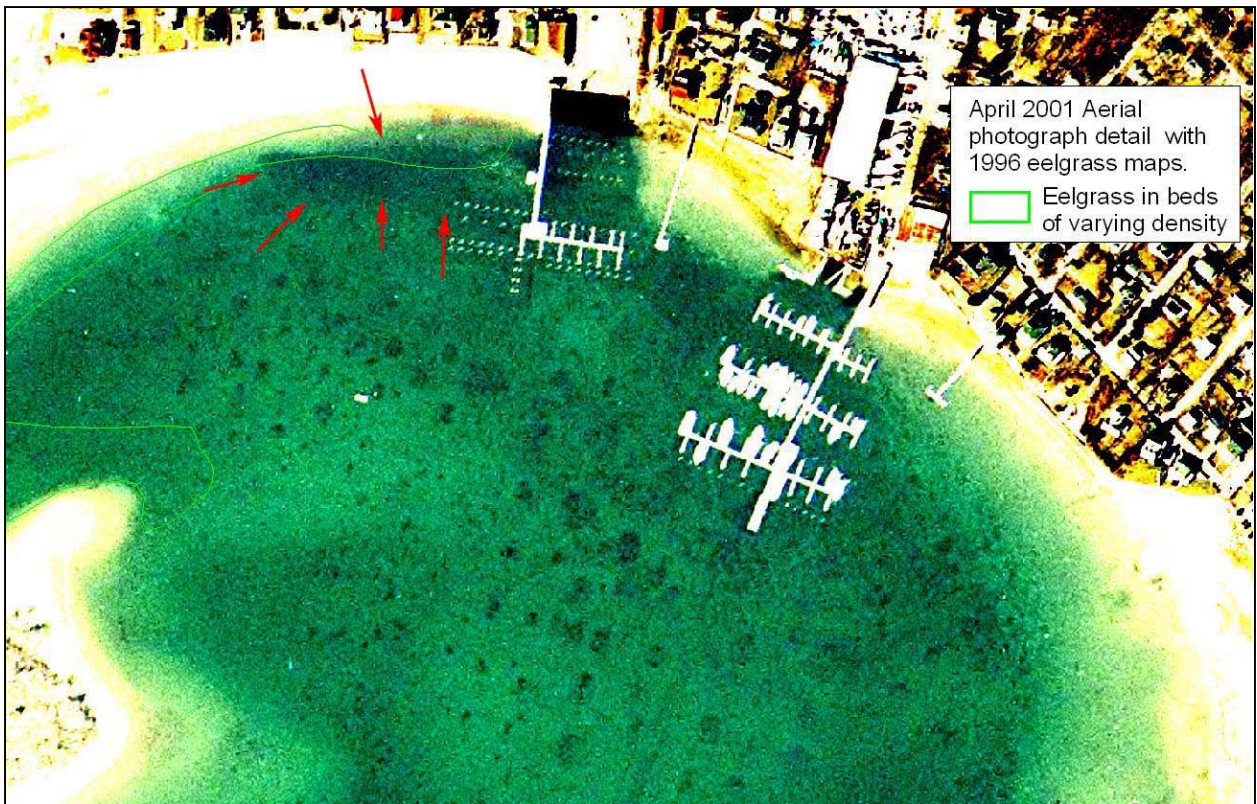
cc. David Pichette, Wareham Conservation



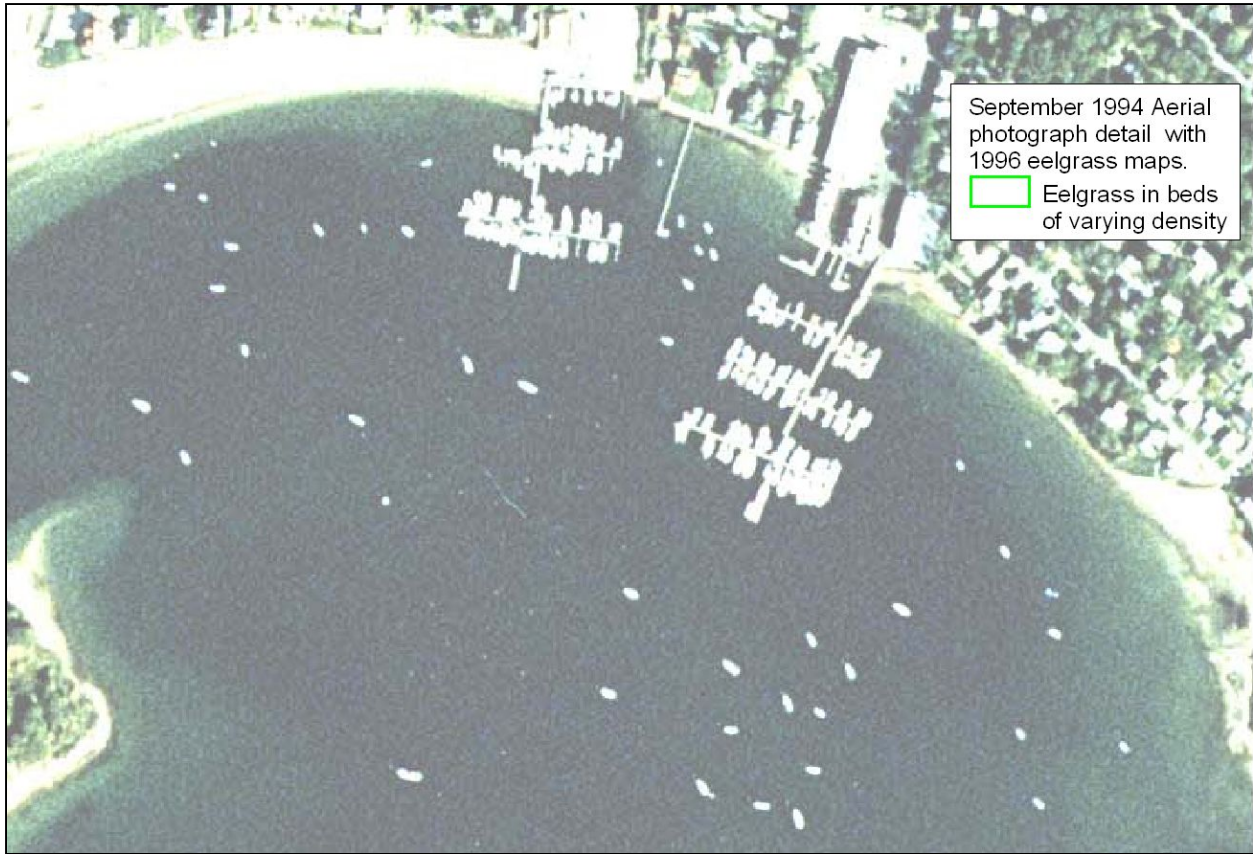
Map 1. Eelgrass in Onset Bay based on Costa 1988 report.



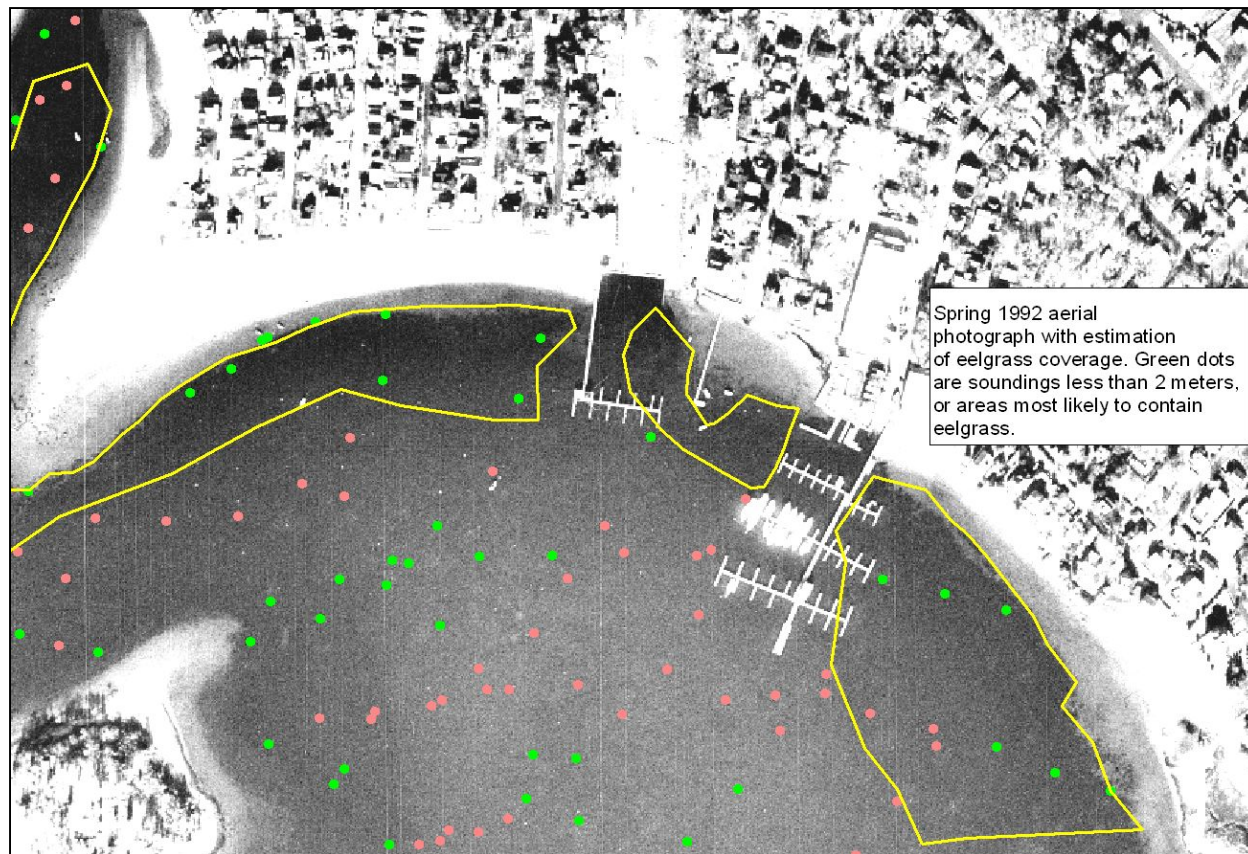
Map 2. Eelgrass in Onset Bay based on Massachusetts DEP 1996 study by Charles Costello.



Map 3. April 1 2001 aerial photograph (normal color top, image enhance bottom) showing patches of vegetation. It is likely that much of the vegetation is patches of algae associated with depressions around boat moorings (note alignment of features). The darkened patch west of the Point Independence Yacht Club (red arrows) likely includes eelgrass.



Map 4. 1994 aerial photograph with 1996 eelgrass beds shown for north central Onset Bay. The digital image was of too poor of a quality and developed too darkly for use in eelgrass mapping. The photograph does illustrate the placement of moorings at the time.



Map 5. 1992 aerial photograph with possible eelgrass coverage for north central Onset Bay. Estimated boundaries based on bathymetry (dots), and gray shades on the image.