Community Based Eelgrass Restoration at Hadley Point

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Abstract:

Eelgrass abundance has been in decline over the past decade at Hadley Point in Bar Harbor, Maine. During the summers of 2007 and 2008, a diverse group of stakeholders in Frenchman Bay worked together in an effort to restore eelgrass at Hadley Point. Eelgrass was harvested from the Jordan River and transplanted into a restoration area at Hadley Point. Eelgrass growth was monitored for both coverage and growth rate. Water quality variables were assessed over time and restored areas were surveyed for recruitment of marine species. Within one year, eelgrass had spread within the restoration area. The growth rate of individual blades during the peak of the growth season was comparable to growth rates reported in the literature. Good water quality was sustained over the year. Preliminary studies indicate that the restored areas had recruited a diversity of marine species comparable to well-established naturally occurring eelgrass beds.

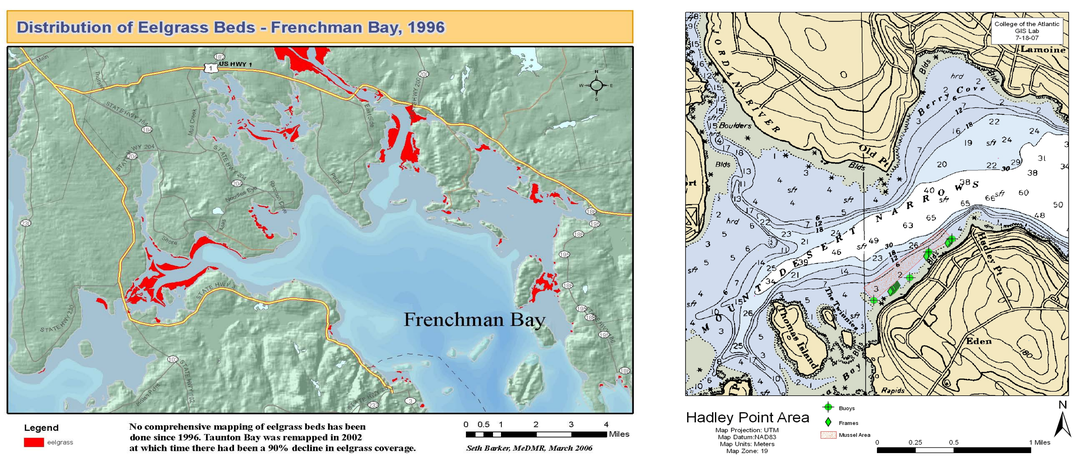

Figure 1: The map on the left depicts eelgrass coverage in Frenchman Bay in 1996. The map on the right depicts the eelgrass restoration area at Hadley Point relative to an off-shore mussel aquaculture site.

Background:

Eelgrass populations have been in decline over the past decade at Hadley Point. In 1996, aerial photography done by the Maine Department of Marine Resources revealed eelgrass coverage at Hadley Point to be in the range of 60-80%. Pre-restoration underwater videotaping revealed less than 1% coverage. Eelgrass decline can result from water quality issues or physical disturbances. Healthy eelgrass beds are important because they create a habitat for a diversity of marine organisms, including serving as a nursery for a variety of larval forms with economic significance. Among the species that find protection in eelgrass habitat are flounder, cod, larval lobsters, mussels, and crabs. Eelgrass also curbs erosion by stabilizing bottom sediments and may improve water quality by filtering excess nutrients from runoff.

Year	Approximate Eelgrass Coverage	Determination Method
1996	80%	Aerial photography
2005	12%	Underwater videography
2007	0.5%	Underwater videography
2008	4%	Underwater videography

Table 1: Eelgrass coverage is increasing after eelgrass restoration in 2007 and 2008.

References:

(1)Short, F.T., Short, C.A., and C.L. Burdick-Whitney. A Manual for Community-Based Eelgrass Restoration, 2002.

(2)Paul Bushmann, method described through personal communication, July 2008.

(3) Colletti, Sarah L., George W. Kidder and Jane Disney. Growth rate of eelgrass (*Zostera marina*) in Frenchman Bay. (in review, Bull. Mount Desert Island Biological Laboratory)

Methods:

A preliminary transplant suitability index map was generated in order to determine an optimum site for restoration of eelgrass. Water quality was tested near the restoration site for turbidity, salinity, dissolved oxygen, biological oxygen demand, nitrogen, phosphate, total suspended solids, and temperature to document the state of the environment prior to transplantation.

Plants were harvested from the Jordan River located between the towns of Trenton and Lamoine and transplanted to Hadley Point using an adaptation of the TERFS (transplanting eelgrass with remote frame systems) developed by Fred Short at the University of New Hampshire (1).

The restoration site was monitored by underwater videotaping of the area at various points in time after transplant.

A year after restoration, pop-nets were deployed in the restoration area to examine species diversity and abundance in the restored eelgrass beds (2). Species counts were compared with those from near-by established beds.

Plant growth rates in restored and natural eelgrass plants were documented a year after restoration as well. A needle was poked through the youngest blade and an older blade that had stopped growing. Measurements between the two threads were recorded every few days, showing the amount of growth that had occurred since the initial set-up.

Results:

We have enhanced the eelgrass populations at Hadley Point with two years of restoration efforts (Table 1). Studies of shoot growth in transplanted and natural eelgrass areas show that recently restored plants have similar growth rates to natural neighboring plants, a 3.04% vs 3.31% growth rate per day (3). In addition, our studies demonstrate that restored eelgrass beds are more heavily populated with organisms than are non-vegetated areas. For example, on one day of sampling, 2,847 total organisms were collected from a restored eelgrass bed, while only 60 were recovered from a nearby non-vegetated area using identical collection methods. The species composition of restored beds was comparable to that of natural eelgrass beds in Frenchman Bay, both in terms of the water column and the eelgrass blades themselves. Mussel larvae were the prevalent organisms on blades (Figure 2).

Some of the most significant impacts of our restoration are the results of our public outreach and education programs. Local students have contributed to restoration and monitoring. In addition, we have educated hundreds of visitors to the Myers Marine Aquarium at MDI Biological Laboratory about the importance of eelgrass conservation and restoration.

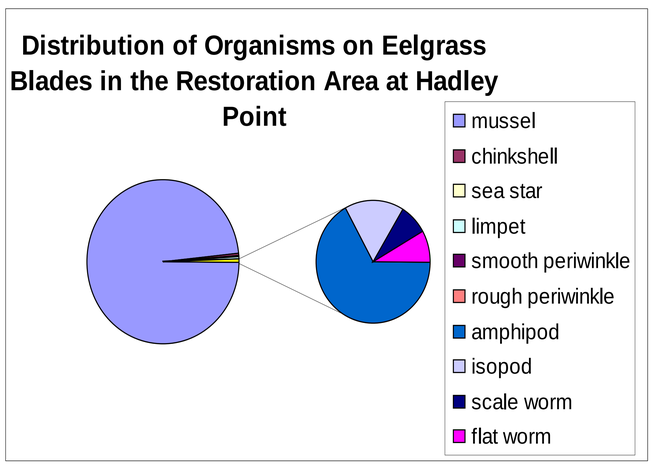

Figure 2: A variety of types of organisms were found associated with eelgrass in restoration areas. A similar distribution of species was found in natural eelgrass areas.

Future Work:

Next steps include continued monitoring of water quality and eelgrass growth in the restoration area. Near-by areas are producing eelgrass, suggesting that eelgrass seeds are traveling on currents from the restoration area to other locations in the bay. In addition, a study is now underway to examine genetic diversity in restored eelgrass populations. In the upcoming years, we plan to map the currents in upper Frenchman Bay in order to make predictions about best sites for transplantation, based on where seed will travel after transplant. Public outreach and education will be an important follow-up component of the project. We plan to meet with representatives from towns around the bay and help them identify areas for conservation and plan restoration projects.

Acknowledgements:

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