

Gulf of Maine Council/NOAA Habitat Restoration Partnership

Progress Report

I. A Community Effort to Restore Sea Clams to Cape Cod

II. Reporting Period (04/01/07 - 08/30/07)

III. Project Narrative (this section is required for the final comprehensive report only)

This project proposes to establish a natural and protected “sanctuary” for sea clam broodstock that will help regenerate local populations of commercial and recreational importance to Cape Cod. Illegal over-harvesting by the commercial fishery in the past has severely impacted shellfish resources in Cape Cod Bay and severely affected the recreational fishery in Truro and Provincetown. Studies of sea clam recruitment suggest that a critical abundance of mature broodstock and high settlement of larvae, and/or low predation of young-of-the-year clams are necessary for successful recruitment. This project aims to establish new broodstock by protecting young-of-the-year sea clams until they have reached sufficient size to avoid most predators and planting them in a sub-tidal zone that ensures their protection from harvest.

IV. Methodology

At the start of this period, all clams were in sand-filled trays protected by netting on the sea bottom near Provincetown Harbor or in an unprotected natural environment on the targeted near shore Truro sand flats. On June 16th we conducted a survey of the Truro site by snorkeling and sampling via quadrat along transects similar to those conducted last summer prior to stocking clam seed.

Dives were conducted in May and June to assess the survival of the clams over-wintered in the bottom trays in Provincetown.

We started the shellfish hatchery season with great promise because we were given a bigger and more suitable space by the MBL and hired a new hatchery manager with 6 years of commercial experience. We conducted our first spawn (April 26th) a full 6 weeks earlier than last year to try and take advantage of the natural growing season and get seed up to larger size for planting before the end of the project.

In lieu of planting hatchery seed this year our cooperators created artificial spawning sanctuaries in two locations in waters off the west and east ends of Provincetown. At those locations several hundred locally collected broodstock clams from deeper water were corralled in aggregations that facilitated an intense collective spawn with high-likelihood of egg fertilization. While it will be hard to document, we expect that the prevailing currents will likely entrain the resulting larvae and produce a large natural set of clams.

V. Results/Progress to Date

Project objectives and progress:

The project goal is to restore sea clam populations to historically important sites in Cape Cod Bay where they will remain as a spawning sanctuary for future population regeneration. The project has the following objectives:

- 1. Survey proposed planting sites and unplanted control sites for current abundance of marine bivalves and predators.**

This was covered in a previous report

- 2. Compare the effectiveness of East Harbor versus Cape Cod Bay sandflats to provide a nursery for sea clams protected from predators during their first growing season**

This was covered in a previous report

- 3. Transplant sea clams to sub-tidal sandflats in Truro and Provincetown and monitor growth and survival**

The results of our June snorkel survey were disappointing since the density of clams on both the planted and control sites was the same, and similar to last year's results. In retrospect, this is not surprising because considerable sand movement occurred over the winter and washed away our temperature recorder that was tethered to a deeply buried stake braced against a large rock near the sites. While we can't be certain of the fate of the clam seed, they are likely scattered to other sites. In fact, less than half a mile down the beach where eel grass grows prolifically there are new sand bars, and our sampling shows they bear 10 to 20 times the density of young-of-the-year sea clams this year as measured on our planted site. It's not known whether these are natural recruits or the result of our planting.

The dive surveys on the trays planted with clam seed near Provincetown Harbor produced more disappointment. The protective netting had been ripped or pulled off of the trays over the course of the winter, and in some trays sand had washed out as well. Crabs and starfish had infiltrated the trays and killed most of clams.

This spring we concluded our laboratory-based trials to determine what temperature (and thus time) is best to stock sea clams to avoid predatory pressure from green crabs (*C. maenas*). Repeated trials (n=10) at temperatures between 0C and 5C revealed a sharp increase in predation of the green crabs on clam seed between 2 and 3C which is much cooler than had been reported.

Unfortunately we had 3 successful clams spawns and 3 failed attempts to produce meaningful numbers of post-set seed between April and the end of July. We ascribe this failure to the unwitting use of copper air lines supplying our algae cultures which were fed to the larval shellfish. Having finally resolved that issue we are conducting growth trials of small numbers of sea clam larvae to eliminate the possibility that disease (*Vibrio* sp.) or food quality were also contributing factors. Now we have lost this hatchery season for producing sea clam seed and with this report, we are requesting a no-cost extension to complete our objective of planting another 100K seed.

We are also requesting that we change the site for planting seed in Provincetown from outside of Hatches Harbor to inside the protected Bay side of town (see attached map). This is to reduce a likely repeat of the problem we had over last winter with massive shifting sands at exposed sites like Hatches Harbor and the difficulty that poses for documenting survival of planted clams.

VI. Monitoring and Maintenance Activities

Monitoring of pre-restoration conditions was detailed in first progress report. Monitoring this summer post-planting last winter is summarized in the table below. As described in the text above, we can not document an increase in clams at the site.

Table 1. Summary of survey of 27 quarter meter quadrats per 30m x 120 m sites

6/16/2007 Survey Site	Numbers of organisms per 6.75 square metres				
	clam	shrimp	crab	worm	moon snail
Control	1	2	0	0	0
Planted	1	0	1	1	1

VII. Community Involvement

We continued to involve high school and college students, and an AmeriCorp volunteer in over XXX hours of volunteer activity for this project. The majority of the time this reporting period has been involved in our shellfish hatchery and conducting predation studies in the lab. Parker Small, our Field Manager, has expended more than XX hours of volunteer effort this period.

VIII. Outreach Activities

We have met with Massachusetts Division of Marine Fisheries and Cape Cod National Seashore staff who have continued to offer supportive advice for the project. We have a scientific research and collecting permit from CCNS. We have received support from the town and State to establish a fishing closure for the newly planted sites for 3 years as required. Press releases and more community involvement is planned as the seed is planted and monitoring of the sites is necessary. The PI met with local State Representative Sarah Peake and described the project and progress so far.

IX. Supporting Materials

X. Funding Information (Cash and In-kind)

1. Itemized Budget Table

Cost Categories	NOAA Actual	Match Actual	Total Expense	Nature of Match
Personnel				In Kind
Fringe				
Travel				
Supplies				
Contractual				In Kind
Other				
Total				

2. Budget Narrative

- a. Personnel – actual time and effort is below the projected expenditure (52% vs. 67%) due to the initial 2-month project delay. The actual personnel Match is as scheduled (see attached documentation).
- b. Fringe – spending in this account is just below the projected expenditure (53% vs 67%) although this budget line will be spend at a slightly advanced rate since the negotiated rate for MBL salaries has increased since the project start date.
- c. Travel – actual expenditures are below projections due to the initial 2-month project delay but will increase in the next report period.
- d. Supplies – purchases are below scheduled expenditures due to the initial 2-month project delay but will increase in the next report period.
- e. Contractual – the full amount of contractual cost sharing has been expended (see attached documentation).
- f. Other – the MBL wet lab space is currently being charged to this project (55% vs. 67%).

Report Prepared By: _____
Signature

Date