

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Sustainable Marine Aquaculture & Fisheries

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife			10%	
136	Conservation of Biological Diversity			9%	
201	Plant Genome, Genetics, and Genetic Mechanisms			9%	
204	Plant Product Quality and Utility (Preharvest)			8%	
301	Reproductive Performance of Animals			10%	
302	Nutrient Utilization in Animals			4%	
303	Genetic Improvement of Animals			5%	
305	Animal Physiological Processes			6%	
306	Environmental Stress in Animals			18%	
307	Animal Management Systems			6%	
308	Improved Animal Products (Before Harvest)			6%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			9%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	1.6	0.0
Actual	0.0	0.0	1.8	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	290375	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	299595	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Antifreeze protein induction was quantified and compared in different stocks of cod for application in site-specific stocks in netpen aquaculture enterprises having different water temperatures.

Continued long term sea urchin recruitment studies from New Hampshire to Eastport, Maine. Brought hatchery up to full operational level, including production of two cohorts of over 1 million juvenile urchins. These were used in out planting studies at lease sites and laboratory growth studies.

Conducted pilot-scale commercial and field studies on strategies to eliminate or reduce concentrations of *Vibrio parahaemolyticus* and *Vibrio vulnificus* from freshly harvested oysters in Maine and New Hampshire. Determined that natural relaying was the most effective method to reduce the concentrations of the vibrios. Detected *V. parahaemolyticus* genes associated with pathogenesis in temperature-abused oysters prior to treatment.

Documented extant populations and introduction events of the green alga *Codium fragile* (Oyster thief; deadman's fingers) and the red alga *Neosiphonia harveyi*, which are recognized as among the most serious invasive algae in marine habitats.

Collected and identified marine intertidal invertebrates. Sequenced cytochrome oxidase I genes of all specimens. Determined intra- and inter-specific variation. Identified potential barcode gap.

Collected "seed" stocks of the green seaweed *Ulva* and the red seaweeds *Gracilaria* and *Porphyra*. Species identities of collected and cultured specimens were confirmed by DNA sequencing of the *rbcL* gene and/or the ITS-1 spacer region. Grew cultures under a series of temperature and daylength regimes to determine conditions that promote progression through different life history stages. Examined nutrient kinetics of the *Ulva* and *Porphyra* species and its effect on protein, chlorophyll, carotenoid, and phycobilin (*Porphyra* only).

Began a controlled study to transplant clams without cancer to areas identified with high incidence of cancer. Assessed sediments for grain size, toxin load and continuous temperature readings to evaluate whether transfer of the cancer can occur from affected clams to those that are normal as we have demonstrated in the laboratory via injection of hemolymph alone, suggesting that a virus is involved.

Tracked lobsters of various types using ultrasonic telemetry, and monitored the activity of lobsters using a novel method involving accelerometers, with goal to learn more about factors that influence lobster

movements and determine if these influence the reproduction of lobsters in the Great Bay estuary.

2. Brief description of the target audience

The target audience for this program area includes finfish and shellfish farmers, members of the aquaculture and harvesting communities in New England, shellfish processors; local, state and federal agencies that deal with coastal and marine resources and food safety, scientists in related disciplines, biomedical researchers, conservation ecologists, marine invertebrate biologists and pathologists, conservation biologists, invasion biologists, and estuarine conservation managers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	200	1000	15	100
Actual	220	380	115	55

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010
 Plan: 0
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	7	
Actual	0	15	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of participants in the project (not including audience counts)

Year

Target

Actual

2010 16 36

Output #2

Output Measure

- Number of undergraduate students directly involved in the projects

Year	Target	Actual
2010	5	32

Output #3

Output Measure

- Number of graduate student directly involved in the projects

Year	Target	Actual
2010	4	20

Output #4

Output Measure

- Number of non-peer-reviewed publications (theses, abstracts, newsletters, fact sheets, articles, etc)

Year	Target	Actual
2010	8	15

Output #5

Output Measure

- Number of websites in which project results have been incorporated.
Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of peer-reviewed publications
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of graduate students involved and trained
2	Number of undergraduate students involved and trained
3	Increased knowledge through publications and other means
4	Identify mechanisms to reduce incidence of pathogenic disease outbreaks in oysters.

Outcome #1

1. Outcome Measures

Number of graduate students involved and trained

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of undergraduate students involved and trained

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Increased knowledge through publications and other means

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Identify mechanisms to reduce incidence of pathogenic disease outbreaks in oysters.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	2010

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Oysters naturally contaminated with pathogenic vibrios are causing increasingly more common disease outbreaks for consumers of raw or undercooked shellfish.

What has been done

Pilot-scale commercial and field experiments were tested to determine what post-harvest conditions for live oysters are most conducive to reducing concentrations of pathogenic vibrio species.

Results

The most effective strategy for reducing vibrio concentrations is natural relaying, or transferring freshly harvested oysters from a harvest area with vibrios to a relay site where they do not exist or are present at low concentrations. Finding new ways to safely harvest shellfish opens up more local commercial opportunities and provides a safer product to consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Government Regulations
- Other (None)

Brief Explanation

Not applicable

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Other (see below)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}