V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Aquaculture and Fisheries

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
303	Genetic Improvement of Animals	20%		0%	
304	Animal Genome	20%		0%	
307	Animal Management Systems	0%		40%	
311	Animal Diseases	40%		40%	
604	Marketing and Distribution Practices	20%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.8	0.0	2.0	0.0
Actual Paid Professional	1.3	0.0	2.0	0.0
Actual Volunteer	0.0	0.0	0.0	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**
110165	0	148596	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
10997	0	128604	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

The focus of this program is to: 1) investigate causes of diseases of shellfish and the mechanisms of innate immunity, particularly matrix metalloproteinases in hemocytes, 2) research genetic factors controlling muscle growth in rainbow trout, a model species for aquaculture, 3) investigate novel approaches for the development of vaccines for commercially cultured finfish and 4) develop and share strategies to enhance location of shellfish farms.

2. Brief description of the target audience

The target audience includes the aquaculture industry, the fishing industry, producers and distributors, scientists and researchers, the RI Dept. of Environmental Management and Coastal Resource Management Council, policy makers, and parties interested in entering the field.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	400	1700	0	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	2	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer Reviewed Publications

Year	Actual
2012	2

Output #2

Output Measure

- Abstracts

Year	Actual
2012	2

Output #3

Output Measure

- Scientific and Professional Presentations

Year	Actual
2012	3

Output #4

Output Measure

- Workshops

Year	Actual
2012	2

Output #5

Output Measure

- Student training

Year	Actual
2012	7

Output #6

Output Measure

- MS theses and PhD dissertations

Year	Actual

2012	1

Output #7

Output Measure

- Postdoctoral fellow training

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased aquaculture production in Rhode Island (both of current species and new species). An increase in technology and understanding of basic mechanisms of immunity and muscle growth that will ultimately enhance production.
2	Provide training to improve fisheries management.
3	Optimizing location of shellfish farms

Outcome #1

1. Outcome Measures

Increased aquaculture production in Rhode Island (both of current species and new species). An increase in technology and understanding of basic mechanisms of immunity and muscle growth that will ultimately enhance production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
An increasing share of the seafood consumed in the US is produced by aquaculture. Methods to enhance production are of interest to all commercial aquaculturists.

What has been done
Investigation of the immune response in shellfish and finfish was conducted. In shellfish, high throughput sequencing was used to assess genes that might be involved in the immune response. For finfish, a novel approach for production of vaccines is being tested. Transgenic trout were developed and used to investigate factors regulating muscle growth.

Results
Several target genes that may be important in the shellfish immune response have been identified and will be the basis for further investigations. Vaccines against Vibrio species in salmonids were developed using a bioinformatics approach and tested in fish. The results were ambiguous and further studies will be conducted. F2 transgenic trout have been generated and used in multiple studies to assess factors regulating growth rate.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
304	Animal Genome
311	Animal Diseases

Outcome #2

1. **Outcome Measures**

Provide training to improve fisheries management.

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Optimizing location of shellfish farms

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Shellfish aquaculture in RI is increasing yearly and farmers are seeking assistance in locating farms. The RI Dept. of Environmental Management which regulates leases is also interested in ensuring farms are located in locations that will both increase the opportunity for success and decrease pollution and user conflict.

What has been done
Surveys of the soil types at various oyster farms in the state are being investigated to determine the characteristics best for culture. Other environmental characteristics are being examined for locating oyster and mussel farms.

Results
Soil and water acidity at several farming locations was found to be below normal levels and could impact shell formation and viability. Dredging was found to markedly change the bottom structure and fauna, ultimately impacting oyster culture. Best management procedures are being assessed and determined for shellfish farms in RI at various locations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations

Brief Explanation

Hurricanes impacted oyster farms and test plots. The identification of a new pathogen in RI waters impacted the movement of oysters for several planned studies.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The projects under this program cover a range of topics that have the potential to benefit aquaculture locally, regionally, nationally and internationally. All of the projects have been successful in generating results of interest to the scientific community and commercial aquaculturists. Stakeholders are interested in seeing these type of projects continue in the state. Studies on the citing of oyster farms have the most direct impact and the results of these are being used by participants and regulators of this burgeoing industry.

Key Items of Evaluation