

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Aquaculture, freshwater, and marine resources

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	5%	15%		
112	Watershed Protection and Management	10%	20%		
134	Outdoor Recreation	15%	20%		
135	Aquatic and Terrestrial Wildlife	10%	5%		
136	Conservation of Biological Diversity	5%	5%		
302	Nutrient Utilization in Animals	5%	0%		
303	Genetic Improvement of Animals	5%	0%		
307	Animal Management Systems	15%	0%		
311	Animal Diseases	10%	0%		
601	Economics of Agricultural Production and Farm Management	5%	0%		
605	Natural Resource and Environmental Economics	5%	5%		
806	Youth Development	10%	30%		
	Total	100%	100%		

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2011	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	0.0	0.0	0.0
Actual Paid Professional	4.4	0.1	0.0	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
71220	2940	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
154527	2940	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
464655	4160	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The primary activities in this area are associated with 5 statewide focus areas and general activities of our Program Area. These are:

Aquaculture/Aquascience Education designed to support school teachers, administrators and others to establish and improve aquaculture/aquatic science programs within Alabama schools.

- maintain education section of www.alearn.info web site
 - Conduct school visits
 - Conduct field days and exhibitions of aquaculture and its potential as a career
 - Provide intensive training for teachers from AL, GA, and CT on recirculating aquaculture systems as tool to teach math and science
 - Conduct activities and camps for students interested in fisheries, aquaculture and aquatic ecology
 - Support K-12 programs with fish, supplies and equipment with funded grants

Management of recreational sportfishing ponds designed to provide training and support to pond owners

- public workshops and presentations involving pond management
- Newspaper articles, radio spots, and television appearances
- Maintain pond management section of www.alearn.info web site
- Conduct surveys of pond owners to provide feedback to extension

- Weed and water quality analyses and recommendations

Coastal resources and mariculture program designed to address environmental and economic issues in the coastal zone.

- Support for the oyster gardening program
- Develop a working demonstration off-bottom oyster culture system
 - analysis of working waterfronts
 - educational support for the clean marina program
 - Maintenance of the Auburn University Marine Extension and Research Center web site

Aquaculture extension to increase the viability and profitability of producers.

- Development of and multiple training sessions involving intensive aquaculture systems
- Maintenance of the aquaculture portion of the www.alearn.info web site
- Responses to fish kills in aquaculture
- Provide reactive services
- Provide economic analyses and projections to the industry

General Activities of this team:

- Training of agents in basic fish biology
- Cooperation and participation with other agencies concerning timely aquatic resource issues
- Provide angler education presentations
- Collaboration with Forestry and Natural Resources in support of the Alabama Water Watch volunteer water quality monitoring program

2. Brief description of the target audience

While our activities potentially impact everyone given the importance of water and water management, our focused audiences include: high school math and science teachers and students, recreational anglers, commercial fishers, recreational fish pond owners, aquaculture producers, aquatic conservation organizations, 4Hers involved in aquatic programs.

3. How was eXtension used?

Specialists from this extension team contributed to the eXtension COP for freshwater aquaculture as experts available to answer submitted questions. Dr. David Cline, and Area Specialist in this program, was instrumental in forming this COP. The freshwater aquaculture COP covers production

aquaculture, fish pond management, and ornamental culture and management.

V(E). Planned Program (Outputs)

1. Standard output measures

2011	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	9532	2136796	780	0

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

Patent Applications Submitted

Year: 2011

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2011	Extension	Research	Total
Actual	12	1	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- pond management workshops

Year	Actual
2011	20

Output #2

Output Measure

- Aquaculture workshops

Year	Actual
2011	0

Output #3

Output Measure

- Number of teacher trainings

Year	Actual
2011	6

Output #4

Output Measure

- Number of visits to our extension website www.ALEARN.info

Year	Actual
2011	130826

Output #5

Output Measure

- Number of Aquatic Natural Resource and Oyster Gardening events

Year	Actual
2011	13

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Aquaculture/Aquascience Education Short-term * Improve attendance and performance of students in school * Increase appreciation of both aquaculture and aquatic natural resources by students and teachers Long-term * Increase graduation rates * Produce better trained labor for aquaculture
2	Improving the Survival of Live Bait in Bait Shops Short-term * Train bait dealer in basic water quality and proper handling techniques * Increase profitability of bait dealers
3	Management of recreational sportfishing ponds Short-term * Increase the understanding of pond function and management by owners Long-term * Reduce improper management by consultants * Increase satisfaction and enjoyment of ponds by owners * Increase profitability of pay-to-fish operations
4	Coastal resources program Short-term * Increase public awareness of coastal environmental issues * Increase public awareness of loss of working waterfront Long-term * Establish a viable mariculture industry in Alabama
5	Aquaculture Short-term * Increase the knowledge of producers in more efficient practices * Expand the use of hybrid catfish in production Long-term * Diversify species produced in Alabama * Improve marketing of Alabama aquaculture products * Cause a shift in the industry to more efficient intensive production methods
6	General Activities * Increase the public understanding of water conservation * Increase public appreciation for watershed and wetland conservation and management * Improve angler education to increase understanding of fisheries management and increase enjoyment of angling

Outcome #1

1. Outcome Measures

Aquaculture/Aquascience Education Short-term * Improve attendance and performance of students in school * Increase appreciation of both aquaculture and aquatic natural resources by students and teachers Long-term * Increase graduation rates * Produce better trained labor for aquaculture

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Using aquaculture in the classroom provides K-12 teachers with a tool to reach students in a way different from in-class lectures. This is a hands-on experiential learning tool that can be used in all areas of science, math, and in fact other areas including marketing, design, computer science, etc.

What has been done

Training events have provided teachers with the tools needed to establish and maintain limited aquaculture facilities. These facilities are primarily at high schools but a few are located at middle schools.

Results

The most significant training was a 5 day event where Extension Specialists and other faculty worked with 22 teachers to provide them detailed information and curricula on the use of aquaculture in the classroom. Teachers in the training rated the experience as excellent. Scores on tests increased from 61% pre-training to 94% correct post-training.

The teacher resources section of our Extension website (www.ALEARN.info) remains one of the most visting parts of the site providing resources to educators across the world.

Aquaculture in the high schools has remained a viable program in spite of declining funding.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
806	Youth Development

Outcome #2

1. Outcome Measures

Improving the Survival of Live Bait in Bait Shops Short-term * Train bait dealer in basic water quality and proper handling techniques * Increase profitability of bait dealers

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Management of recreational sportfishing ponds Short-term * Increase the understanding of pond function and management by owners Long-term * Reduce improper management by consultants * Increase satisfaction and enjoyment of ponds by owners * Increase profitability of pay-to-fish operations

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Recreational fishing ponds are important fisheries resources across the US and particularly in Alabama. Phone call and site visits to these ponds can dominate the reactive portion of the time of several Regional Agents, Area Specialists, and Statewide Specialists in Alabama during the spring and early summer. Ponds provide recreational and economic opportunities for landowners.

What has been done

Our team provides reactive services and programic development in the area of pond

management. The primary modes of program delivery (other than reaction to individual pond owners' problems) are county/regional workshops and maintenance of internet information resources.

Results

Approximately 20 workshops were held during 2011. Of those 7 were evaluated with pre vs post testing of knowledge. These tests revealed a significant increase in knowledge (approximately 80% improvement in scores). Discussion with our state agency indicates that our efforts in Extension may be resulting in fewer pond related calls and requests coming to them.

Research in the area of pond enhancement through the use of pelleted feeds was completed in 2011 demonstrating the effect of attraction, increased growth in bluegill, and somewhat increased growth in juvenile largemouth bass.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
307	Animal Management Systems
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Coastal resources program Short-term * Increase public awareness of coastal environmental issues
* Increase public awareness of loss of working waterfront Long-term * Establish a viable mariculture industry in Alabama

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

While our coastline is small, the 2 counties that make up this region of the state are critical

economic engines for all of Alabama. Development in this region, industrial impacts, and changes in both social and economic climate threaten to impact the environment, and reduce the sustainability and viability of tourism, fisheries, and mariculture.

What has been done

Our team has worked with community leaders to provide training the area of community resilience. Our specialists provided workshops, training, and help with proposal writing and submission to local city planners to help these communities maintain sustainable working waterfronts. The oyster gardening program coordinated the efforts of more than 100 participants. A demonstration farm for off-bottom culture of oysters was established and tests of culture approaches conducted.

Results

Over 60 facilitators were trained in the use of the "Resiliency Index for Communities". Two communities are participating in a multi-year evaluation of the index as a planning/evaluation tool. External funding was sought for the City of Gulf Shores to help them incorporate working waterfronts into city planning. Oyster Gardeners continue to produce oysters to help restore reefs in Mobile Bay and adjoining waters. In 2011 more than 55,000 oysters were produced; enough to restore nearly 3 acres of reef. Our Specialist has worked with 3 coastal residents to start off-bottom oyster farms in Alabama's coastal waters, including one farm (Point aux Pins Oyster Farm in Bayou la Batre) that has surpassed \$15,000 in annual gross sales. Further expansion of sustainable oyster production continues.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #5

1. Outcome Measures

Aquaculture Short-term * Increase the knowledge of producers in more efficient practices * Expand the use of hybrid catfish in production Long-term * Diversify species produced in Alabama * Improve marketing of Alabama aquaculture products * Cause a shift in the industry to more efficient intensive production methods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Alabama is one of the largest producers of warm water aquaculture products in the US. In freshwater, channel catfish (and hybrids) are the dominant species produced in Alabama. The downturn in the economy, increased costs, and competition from both domestic and imported seafood and other meat has resulted in a dramatic decline in catfish aquaculture.

What has been done

Our Extension team in coordination with other Extension professionals and research faculty from multiple institutions has focused on 3 areas. First, development of new species for culture to diversify the industry. Second, develop new intensive culture techniques to reduce cost. Third, to increase the efficiency of the entire production and marketing cycle via a lean manufacturing and business approach. Workshops and trainings involving labor, suppliers, marketers, producers, and processors have been done.

Results

While the catfish industry has declined across the Southeast, Alabama has experienced less decline than neighboring states. New quality control efforts have been developed based on the color of the catfish fillet that will improve marketability. Both striped mullet and blue crabs have been shown to be able to be grown in the saline groundwater of West Alabama. The number of intensive in-pond raceway systems continues to increase in Alabama.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

General Activities * Increase the public understanding of water conservation * Increase public appreciation for watershed and wetland conservation and management * Improve angler education to increase understanding of fisheries management and increase enjoyment of angling

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2011	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Protection and management of aquatic resources is critical to the long term sustainability of ecosystems and human society. Anglers, home owners, city planners, farmers, ranchers, and many other interest groups are direct consumers of the information we provide. Indirectly, everyone is a constituent of this program due to the need for sustainable clean water.

What has been done

Youth fishing and aquatic resource information activities involving several of our Specialists have been conducted reaching over 300 school age children. A Specialist on the team is actively involved in a stream restoration demonstration project. Workshops on the construction of rain barrel collection systems and rain gardens for water conservation have successfully trained many in the public.

Results

While some of this general response work is difficult to evaluate, we have clearly reached a significant population through or mass media efforts, workshops, and website development. Efforts in water conservation and watershed management resulted in the following: 1,000 linear feet of stream stabilized, 0.5 acres of floodplain enhanced, construction of 50 rain barrels for water conservation, and the installation of 5 low impact development stormwater practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
----------------	-----------------------

111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
605	Natural Resource and Environmental Economics
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Other (competing imports for seafood)

Brief Explanation

The downturn in the economy continues to strongly limit program delivery. Given the reductions in funding to higher education in general and Cooperative Extension in particular, we have not been able to replace personnel that are important throughout the state.

Competition from imported seafood created a real opportunity for education and evolution in the aquaculture industry. Clearly the industry needed to become more efficient and responsive to the market if it was to remain viable.

The BP oil spill in the Gulf of Mexico in 2010 continues to impact the regional economy and focus the efforts of Extension personnel. The oil spill caused a shift in efforts to deal with this issue along the coast.

Drought was severe in 2010-2011. This created both problems and opportunities. In some cases the drought eliminated ponds reducing the interest in pond management; however, the drought refocused many in the public concerning the importance of available clean water.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Pond management

Evaluations of pond management workshops have indicated that the participants

valued the information they received. A pre vs post test at 7 of the workshops produced an average increased score from 35% to 79% correct indicating an increase in knowledge of the area.

Aquaculture/ Aquascience in the classroom

A 1-day teacher workshop focused on using aquaculture in K-12 curricula produced a significant increase in correct score (18% increasing to 82%) in a pre vs post test of subject matter knowledge. (See further impacts in the next section)

Youth development

Our youth fishing events featuring skills such as casting, tackle crafting, and actual angling as well presentations about aquaculture, natural resources, and associated career opportunities continue to be well received and requested by the agents and the youth groups involved. For example our contribution to the Chambers County outdoor field day for high school students sponsored by the local forestry commission was rated as excellent and among the most interesting of the subjects presented by the students involved.

Coastal programs

Thanks to training by our team, 2 coastal communities are participating in a multi-year evaluation of the "Resiliency Index for Communities" as a planning/evaluation tool indicating the value of the training to the community. External funding was sought for the City of Gulf Shores to help them incorporate working waterfronts into city planning. (See further impacts in the next section)

Aquaculture

Our team continues to evaluate and develop new tools that are helpful and supportive of the aquaculture industry including new evaluation of a color scale to rate the market quality of catfish fillets and new intensive in-pond raceway systems. Adoption of these practices by increasing numbers of producers and processors represents successful impact in the industry. (See further impacts in the next section)

Watershed and water conservation

Efforts in water conservation and watershed management resulted in the following: 1,000 linear feet of stream stabilized, 0.5 acres of floodplain enhanced, construction of 50 rain barrels for water conservation, and the installation of 5 low impact development stormwater practices. The absolute impact of these effort on the quality and quantity of available water is virtually impossible to determine; however, the adoption of practice does indicates an increase in knowledge by the participants.

Key Items of Evaluation

Aquaculture/ Aquascience in the classroom

An intensive 5-day workshop was conducted to train K-12 teachers in the techniques for using aquaculture and aquatic sciences in the classroom. Twenty two teachers participated in the training. Teachers were asked to rank various measures of their satisfaction with the training(1 as dissatisfied and 5 as completely satisfied); the average score was 4.8. Pre vs. post training testing showed an increase from 61% to 94% correct answers indicating a strong increase in subject-matter knowledge. This training plus other support has helped maintain aquaculture/aquascience in approximately 60 active aquaculture/aquascience programs in schools in Alabama.

Aquaculture

Our ACES team continues to lead efforts to help the Alabama catfish industry to modernize and remain competitive. The Pond-to-Plate program has emphasized LEAN

manufacturing and continuous improvement practices in training workshops and facilitated meetings. While the industry has seen declines Alabama's catfish production has declined less than 20% while the other major catfish producing states has dropped more than 50% in the past 5 years. The Pond-to-Plate program has contributed to improving the efficiency of Alabama's catfish aquaculture industry. The program has evolved to form a new business-oriented institute at Auburn University that will initially be led by Specialists from our team. This institute will bring together expertise from all relevant disciplines (aquaculture, business, engineering, food science, etc.) to help advise and analyze the catfish culture industry.

Oyster Gardening and Culture

In the Oyster Gardening Program, individual participants from around Mobile Bay grow out baskets of oysters over the summer. These oysters are then stocked to help restore the reefs that are vitally important to the ecology and commercial fisheries. In the process the participants contribute to restoration and learn about the ecology of the ecosystem. Over the 11 years of the program, participants have produced about 486,000 oysters, enough to restore 24 acres of reef. In 2011, more than 100 participants from 49 sites produced more than 57,000 oysters enough to restore nearly 3 acres of reef.

Development of sustainable culture of valuable fish and shellfish in our marine waters could provide a positive economic impact to the region and help diversify the local seafood industry. Off-bottom oyster culture is example of an approach that could have positive economic impact while causing little negative and in some ways positive effects in the environment. Our ACES team has worked with 3 residents to start off-bottom oyster farms in Alabama's coastal waters, including a farm that has surpassed \$15,000 in annual gross sales. This farm is planning to double production in the coming year, and the other two farms expect to begin harvest this year. ACES has worked with Organized Seafood Association of Alabama to permit a nearly 60-acre off-bottom oyster farm. Beginning production of at least 1 million oysters will generate initial economic impact of nearly \$0.5 million to the area.