V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Climate Change

☑ 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
111	Conservation and Efficient Use of Water		20%		20%
112	Watershed Protection and Management		20%		15%
133	Pollution Prevention and Mitigation		15%		20%
134	Outdoor Recreation		10%		10%
204	Plant Product Quality and Utility (Preharvest)		20%		15%
403	Waste Disposal, Recycling, and Reuse		15%		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	0.0	0.5	0.0	0.5
Actual Paid Professional	0.0	1.6	0.0	1.1
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**
0	209300	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	61461	0	155944
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

There are several activities involved. Two statewide new articles concerning improved fishing were written. Those articles included fertilization and toxic algae presence and potential problems with toxic algae. Also a recreational fisheries management workshop was held (Hot Spring County Cattleman's Association), with 30 attending. Over 60 samples from agents, consultants, and farm pond owners were submitted to the lab.

Additionally, three sites were evaluated for individual want to build recreational fisheries. Two of the individual had sites which could be used. The other individual was advised not to construct the pond due to improper soil conditions.

Also conducted fishing derbies for youth at Ashley County Youth Day and UAPB Aquatic Sciences day.

Demonstration of ornamental pond construction methodologies

A major component is the identification of aquatic weeds for pond owners and then determining the appropriate methods to control the nuisance plants. This was done over 100 times. Often this was done in conjunction with county agents. Frequently we were able to identify the plant using digital photographs sent by email, but ponds in various counties were visited with county agents. After determining the plant ID, a course of action involving mechanical, physical, biological and/or chemical control methods was devised.

Arkansas has over 127,000 farm ponds that serve as important sources of water and recreation. In addition, ponds provide important ecosystem services by capturing sediment and sequestering carbon. Many of these water bodies are old, and have experienced sedimentation and nutrient enrichment, resulting in increased aquatic vegetation problems. Warmer weather has increased the northern range of several problematic aquatic weeds. Information on managing these resources was disseminated directly to the general public, through county offices, and through natural resource agencies. Proper identification of problematic aquatic plants is essential, and this service is provided to the general public. Activities include direct contacts with the general public, indirect contacts through county extension faculty, newsletter articles and presentations at meetings and workshops. News articles reached a wider audience across rural Arkansas. A wide variety of educational activities are utilized in this program, however, reaching a major segment of the target audience still requires individual contact for effective implementation.

This phase of the Arkansas River largemouth bass study was designed to 1) generate updated population parameters for largemouth bass, 2) examine possible relationships between bass growth and river hydrology, 3) assess the suitability of the current 381-mm (15-in), and 4) generate additional estimates of largemouth bass angler effort, catch, and harvest for other pools of the Arkansas River. 5)An evaluation of this research was conducted in September 2012 and completed in October. The 20-question survey (actually a census) used a scaled-response answer scheme (i.e., 5=strongly disagree to 3=neutral to 1=strongly agree) and contained two sections of questions. The first 14 questions pertained directly to the research, whereas the last six questions concerned broader, program-level items.

The long-term water quality associated with the effectiveness of a swine waste treatment lagoon was assessed by monitoring the water quality of the treatment lagoon on a weekly basis during the spring and

summer months. The mean phosphorus concentration at the lagoon surface was measured along with the total nitrogen, nitrate, nitrite and ammonia levels. Personnel associated with this program were able to present the research and demonstration findings at several conferences and at the UAPB Farm Field day where over 200 individuals received abstracts and a short presentation. Those in attendance at the most recent field day responded that the project or some aspect of it most interested them during visit. Over 90 elementary school children toured the facility and were exposed to farm animals and dealing with animal waste. The literature developed as part of this project was utilized by a student who placed first in their division and overall best of fair at the University of Arkansas at Pine Bluff Regional Science Fair Exposition. In 2012 a master's level student graduated and completed a thesis based on the swine waste treatment project.

2. Brief description of the target audience

The target audience includes but is not limited to small, limited resource landowners, underrepresented communities, and families.

The target audience is first the farm pond owners who want to improve fishing opportunity and quality on their own property. Additionally, consultants and Extension agents are targets to a lesser degree.

Arkansas has over 300,000 ponds. The owners and managers of these water bodies is the target audience for this program. Because of the convergence of water, nutrients and plants, at some time, every pond will have a nuisance aquatic plant problem. Most control methods can be upwards of $100 per acre*ft. Any mistakes in control method selection can lead to wasted effort, wasted money and rendering the pond unusable for the desired activity due to weeds. The goal is to determine the most effective, in terms of control and cost, methods to remedy the weed problem.

The target audience is county Extension faculty. We also directly reach some small impoundment owners and natural resource managers. Many of the impoundments are less than ½-acre, are located in rural areas, and are owned by a broad cross-section of the general public in terms of income, education and other socio-economic factors.

Fisheries managers of Arkansas: Arkansas Game and Fish Commission, AGFC fisheries biologists and managers, Tournament largemouth bass anglers, Recreational anglers of Arkansas

3. How was eXtension used?

eXtension made pond owners aware that the services were available through UAPB personnel.

Various documents and identification resources are available.

General information on farm pond management is available through the Freshwater Aquaculture Community of Practice. Our main focus is supporting county agents with their farm pond educational efforts, and most agent requests for specialist assistance are for help with specific situations and problems, rather than for general information.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1142	61444	1055	11000

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	1	2	3

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Complete one peer reviewed research article every two years.

Year	Actual
2012	2

Output #2

Output Measure

- Document the number of small, local and limited resource farmers that have been assisted with swine waste treatment, odor and/or water quality issues each year.

Year	Actual
2012	3

Output #3

Output Measure

- Complete one fact sheet regarding water quality, swine waste management or environmental stewardship each year.

Year	Actual
2012	0

Output #4

Output Measure

- Number of project annual and final reports

Year	Actual
2012	0

Output #5

Output Measure

- Number of presenations and scientific meetings

Year	Actual
2012	3

Output #6

Output Measure

- Number of abstracts published

Year	Actual
2012	3

Output #7

Output Measure

- Number of refereed journal articles

Year	Actual
2012	0

Output #8

Output Measure

- Number of research reports submitted to stakeholders

Year	Actual
2012	0

Output #9

Output Measure

- Number of non-peer reviewed pubications

Year	Actual
2012	0

Output #10

Output Measure

- Number of presentations at both local community meetings and national scientific meetings

Year	Actual
2012	5

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	The number of conservation practices utilized by swine farmers as a result of this project is an outcome measure.
2	Increase awareness of environmental issues and policies that pertain to operating small swine farms.
3	Number of research recommendations transferred to AGFC staff
4	Increase in ponds that are designed, stocked, and managed correctly
5	The percent of AGFC fisheries biologists and managers that are informed about use of retenone samples for scientific research topics through scientific meetings and conferences
6	Percent of AGFC fisheries biologists and managers who use the study results to solve management issues
7	Number of recreational anglers that learned what we know
8	Number of non-agency fisheries biologists that use what we know
9	Percent reduction in complaints to the AGFC regarding largemouth bass in the Arkansas River
10	Percent increase in largemouth bass tournaments on the Arkansas River
11	Number of AGFC personnel that learned what we know
12	Number of non-agency fisheries biologists that learned what we know
13	Number of AGFC personnel that use what we know
14	Number of tournament largemouth bass anglers that learned what we know
15	Proper fertilization programs drastically increase fish production in farm ponds
16	Determining effect control plan as early as possible will reduce the amount of time, effort and money required to bring an aquatic plant problem under control
17	Reduce number in pond problems

Outcome #1

1. Outcome Measures

The number of conservation practices utilized by swine farmers as a result of this project is an outcome measure.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Both small swine farmers and their neighbors care about water quality and odors near their property. Degraded water quality is of concern, especially if the water is contaminated with swine manure. High levels of nitrogen, phosphorus and colifom bacteria are of particular concern.

What has been done
Water quality measurements have been collected analyzed and published. A Field day has been held and a calendar was published and disseminated. Information in fact-sheets have been developed and shared with the target community.

Results
Interest has been expressed regarding swine waste treatment and the knowledge of the participants has been expanded by the conservation practices that were shared. The water quality of the swine waste treatment system was greatly improved by the treatment lagoon and the constructed wetland. The field day generated a great deal of interest in the swine wastetreatment system among the participants.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

133	Pollution Prevention and Mitigation
204	Plant Product Quality and Utility (Preharvest)
403	Waste Disposal, Recycling, and Reuse

Outcome #2

1. Outcome Measures

Increase awareness of environmental issues and policies that pertain to operating small swine farms.

2. Associated Institution Types

- 1890 Extension
- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural and natural resource professionals as well as landowners and livestock farmers care deeply about this issue. They are concerned about the resource both as a means of livelihood for producers and as an inheritance.

What has been done
Both the swine waste treatment system has been demonstrated and related information has been shared at field days and tour groups.

Results
Interest has been expressed and a desire for additional information (knowledge) has been expressed regarding conservation practices. It would be helpful if Federal incentive policies existed to help give financial encouragement to farmers to use these demonstrated best management practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

204	Plant Product Quality and Utility (Preharvest)
403	Waste Disposal, Recycling, and Reuse

Outcome #3

1. Outcome Measures

Number of research recommendations transferred to AGFC staff

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Arkansas Game and Fish Commission (AGFC) became concerned about bass fishing in the Arkansas River during the early 2000s. Concerns focused on perceived declines in the fishery (mostly a reduction in size) being reported by some anglers, and a large increase in the effort required to catch a 5-lb bass being reported by bass tournaments. This decline in the abundance of larger bass was largely believed to be related to an outbreak of largemouth bass virus that was first detected in the river around 2000. A few years following the outbreak, angler perception about the fishery improved. However, angler perception had changed again by 2008 in that fishery had declined in quality and contained few large fish of harvestable size. It was generally believed that abnormally high flows that occurred in the Arkansas River during 2007-2009 might have been the causal agent, though little data existed.

Largemouth bass Micropterus salmoides are among the most popular sport fishes in the United States. The AGFC largemouth bass stocking program is based mostly on zooplankton-reared bass. However, some pellet-reared fish are used for stocking. Advanced-fingerling largemouth bass are commonly reared using commercially available feed to reduce hatchery expense. However, they demonstrate poorer survival than largemouth bass reared on live forage when stocked into natural systems.

What has been done
UAPB addressed the issue by characterizing two important components of the fishery for which little information existed ? the biological aspects of the largemouth bass population and its population of anglers. During the period 2004-2010, UAPB conducted extensive stock

assessments of largemouth bass and spotted bass populations throughout the Arkansas portion of the Arkansas River. Additionally, a series of 12-month creel surveys done in conjunction with tag-reward studies were completed during 2007-2010 in several Arkansas River pools. Intensive simulation modeling also was conducted to compare the likely effectiveness of the current 381-mm TL minimum-length (MLL) regulation for largemouth bass against several alternative MLL regulations, including one that simulated no length limit. These studies have been reported in detail in previous year?s reports.

We investigated the effects of pellet-reared advanced-fingerling largemouth bass prestocking exposure to live forage on competitive ability using pairwise competitions with wild largemouth bass in a hatchery setting.

Results

The largemouth bass assessment completed in the Arkansas River during 2010 indicated that the current population exhibited lower overall abundance (CPUE only 55% of previous estimates) and slower growth (decreased lengths at age 3) compared to 2004-2005. Growth models indicated the population in 2010 needed one full year longer to attain 381-mm total length, which is the legal minimum length for harvest, compared to the population in 2004-2005. Strong indications existed that the size and growth declines in the largemouth bass population had occurred between 2005 and 2010. Hydrologic extremes occurring in the Arkansas River during 2007-2009 were strongly suspected as having negatively affected recent growth of largemouth bass. Indications were that largemouth bass were significantly smaller than average in recent years, which was consistent with angler perceptions about the state of the fishery (as of 2010).

Simulation modeling conducted that assessed the current 381-mm minimum-length limit (MLL) regulation was done in comparison to several alternative MLLs (255 mm, 330 mm, and 430 mm). Using the Fishery Analyses and Simulation Tools (FAST), the yield-per-recruit model predicted that at the relatively low levels of fishing mortality (μ~0.12) and moderate levels of natural mortality (cm~30%) present in the Arkansas River, fishery yield would be improved with a lower or no MLL. Conversely, the current 381-mm MLL and larger 430-mm MLL had equal potential to produce preferred-size fish and similar potential to increase mean size of harvested fish. Under present fishery conditions, the current 381-mm MLL regulation appeared to be the most appropriate management strategy for the Arkansas River largemouth bass fishery. This MLL was predicted to provide the best overall balance among fishery yield and population size structure. Alternatively, a 330-mm or 356-mm MLL might be acceptable to accommodate competitive tournament anglers that are only interested in weighing in more fish during tournaments and not additional harvest.

Pellet-reared largemouth bass without exposure to live forage did not compete well ($P < 0.05$) against wild fish. Pellet-reared largemouth bass with exposure to live forage before competitions did not significantly differ from wild largemouth bass in competitive ability. Regression analysis predicted pellet-reared largemouth bass with 9 d of prestocking live forage exposure would have a similar ability to compete for food as wild largemouth bass. Providing pellet-reared largemouth bass with live forage for 9 d before stocking may provide the benefits of both pellet and live-forage rearing.

Although competition for food resources can be a factor affecting poststocking mortality, other biotic interactions warrant consideration. Conditioning hatchery fish to structurally complex habitat and predators could improve overall competitive ability. Stocking program managers should consider fitness of the hatchery fish being stocked as well as interactions between stocked fish and native biota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #4

1. Outcome Measures

Increase in ponds that are designed, stocked, and managed correctly

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Persons interested in ornamental and farm ponds need training in pond construction and management to avoid costly mistakes and improve aesthetics and fishing opportunities.

What has been done
A demonstration pond has been developed to give interested persons a hands-on learning tool that allows participants to build an actual pond.

Results
Participants learn pond construction and proper management of ornamental ponds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #5

1. Outcome Measures

The percent of AGFC fisheries biologists and managers that are informed about use of retenone samples for scientific research topics through scientific meetings and conferences

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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What has been done
UAPB addressed the issue by characterizing two important components of the fishery for which little information existed ? the biological aspects of the largemouth bass population and its population of anglers. During the period 2004-2010, UAPB conducted extensive stock assessments of largemouth bass and spotted bass populations throughout the Arkansas portion of the Arkansas River. Additionally, a series of 12-month creel surveys done in conjunction with tag-reward studies were completed during 2007-2010 in several Arkansas River pools. Intensive

simulation modeling also was conducted to compare the likely effectiveness of the current 381-mm TL minimum-length (MLL) regulation for largemouth bass against several alternative MLL regulations, including one that simulated no length limit. These studies have been reported in detail in previous year?s reports.

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Although competition for food resources can be a factor affecting poststocking mortality, other biotic interactions warrant consideration. Conditioning hatchery fish to structurally complex habitat and predators could improve overall competitive ability. Stocking program managers should consider fitness of the hatchery fish being stocked as well as interactions between stocked fish and native biota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #6

1. Outcome Measures

Percent of AGFC fisheries biologists and managers who use the study results to solve management issues

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #7

1. Outcome Measures

Number of recreational anglers that learned what we know

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

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Although competition for food resources can be a factor affecting poststocking mortality, other biotic interactions warrant consideration. Conditioning hatchery fish to structurally complex habitat and predators could improve overall competitive ability. Stocking program managers should consider fitness of the hatchery fish being stocked as well as interactions between stocked fish and native biota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #8

1. Outcome Measures

Number of non-agency fisheries biologists that use what we know

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Arkansas Game and Fish Commission (AGFC) became concerned about bass fishing in the Arkansas River during the early 2000s. Concerns focused on perceived declines in the fishery (mostly a reduction in size) being reported by some anglers, and a large increase in the effort required to catch a 5-lb bass being reported by bass tournaments. This decline in the abundance of larger bass was largely believed to be related to an outbreak of largemouth bass virus that was first detected in the river around 2000. A few years following the outbreak, angler perception about the fishery improved. However, angler perception had changed again by 2008 in that fishery had declined in quality and contained few large fish of harvestable size. It was generally believed that abnormally high flows that occurred in the Arkansas River during 2007-2009 might have been the causal agent, though little data existed.

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What has been done

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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #9

1. Outcome Measures

Percent reduction in complaints to the AGFC regarding largemouth bass in the Arkansas River

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #10

1. Outcome Measures

Percent increase in largemouth bass tournaments on the Arkansas River

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #11

1. Outcome Measures

Number of AGFC personnel that learned what we know

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Arkansas Game and Fish Commission (AGFC) became concerned about bass fishing in the Arkansas River during the early 2000s. Concerns focused on perceived declines in the fishery (mostly a reduction in size) being reported by some anglers, and a large increase in the effort required to catch a 5-lb bass being reported by bass tournaments. This decline in the abundance of larger bass was largely believed to be related to an outbreak of largemouth bass virus that was first detected in the river around 2000. A few years following the outbreak, angler perception

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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #12

1. Outcome Measures

Number of non-agency fisheries biologists that learned what we know

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
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4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #13

1. Outcome Measures

Number of AGFC personnel that use what we know

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

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Although competition for food resources can be a factor affecting poststocking mortality, other biotic interactions warrant consideration. Conditioning hatchery fish to structurally complex habitat and predators could improve overall competitive ability. Stocking program managers should consider fitness of the hatchery fish being stocked as well as interactions between stocked fish and native biota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #14

1. Outcome Measures

Number of tournament largemouth bass anglers that learned what we know

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Arkansas Game and Fish Commission (AGFC) became concerned about bass fishing in the Arkansas River during the early 2000s. Concerns focused on perceived declines in the fishery (mostly a reduction in size) being reported by some anglers, and a large increase in the effort required to catch a 5-lb bass being reported by bass tournaments. This decline in the abundance of larger bass was largely believed to be related to an outbreak of largemouth bass virus that was first detected in the river around 2000. A few years following the outbreak, angler perception about the fishery improved. However, angler perception had changed again by 2008 in that fishery had declined in quality and contained few large fish of harvestable size. It was generally believed that abnormally high flows that occurred in the Arkansas River during 2007-2009 might have been the causal agent, though little data existed.

Largemouth bass Micropterus salmoides are among the most popular sport fishes in the United States. The AGFC largemouth bass stocking program is based mostly on zooplankton-reared bass. However, some pellet-reared fish are used for stocking. Advanced-fingerling largemouth bass are commonly reared using commercially available feed to reduce hatchery expense. However, they demonstrate poorer survival than largemouth bass reared on live forage when stocked into natural systems.

What has been done

UAPB addressed the issue by characterizing two important components of the fishery for which little information existed ? the biological aspects of the largemouth bass population and its population of anglers. During the period 2004-2010, UAPB conducted extensive stock assessments of largemouth bass and spotted bass populations throughout the Arkansas portion of the Arkansas River. Additionally, a series of 12-month creel surveys done in conjunction with tag-reward studies were completed during 2007-2010 in several Arkansas River pools. Intensive simulation modeling also was conducted to compare the likely effectiveness of the current 381-mm TL minimum-length (MLL) regulation for largemouth bass against several alternative MLL regulations, including one that simulated no length limit. These studies have been reported in detail in previous year?s reports.

We investigated the effects of pellet-reared advanced-fingerling largemouth bass prestocking exposure to live forage on competitive ability using pairwise competitions with wild largemouth bass in a hatchery setting.

Results

The largemouth bass assessment completed in the Arkansas River during 2010 indicated that the current population exhibited lower overall abundance (CPUE only 55% of previous estimates) and slower growth (decreased lengths at age 3) compared to 2004-2005. Growth models indicated the population in 2010 needed one full year longer to attain 381-mm total length, which is the legal minimum length for harvest, compared to the population in 2004-2005. Strong indications existed that the size and growth declines in the largemouth bass population had occurred between 2005 and 2010. Hydrologic extremes occurring in the Arkansas River during 2007-2009 were strongly suspected as having negatively affected recent growth of largemouth bass. Indications were that largemouth bass were significantly smaller than average in recent years, which was consistent with angler perceptions about the state of the fishery (as of 2010).

Simulation modeling conducted that assessed the current 381-mm minimum-length limit (MLL) regulation was done in comparison to several alternative MLLs (255 mm, 330 mm, and 430 mm). Using the Fishery Analyses and Simulation Tools (FAST), the yield-per-recruit model predicted that at the relatively low levels of fishing mortality (μ~0.12) and moderate levels of natural mortality (cm~30%) present in the Arkansas River, fishery yield would be improved with a lower or no MLL. Conversely, the current 381-mm MLL and larger 430-mm MLL had equal potential to produce preferred-size fish and similar potential to increase mean size of harvested fish. Under present fishery conditions, the current 381-mm MLL regulation appeared to be the most appropriate management strategy for the Arkansas River largemouth bass fishery. This MLL was predicted to provide the best overall balance among fishery yield and population size structure. Alternatively, a 330-mm or 356-mm MLL might be acceptable to accommodate competitive tournament anglers that are only interested in weighing in more fish during tournaments and not additional harvest.

Pellet-reared largemouth bass without exposure to live forage did not compete well ($P < 0.05$) against wild fish. Pellet-reared largemouth bass with exposure to live forage before competitions did not significantly differ from wild largemouth bass in competitive ability. Regression analysis predicted pellet-reared largemouth bass with 9 d of prestocking live forage exposure would have a similar ability to compete for food as wild largemouth bass. Providing pellet-reared largemouth bass with live forage for 9 d before stocking may provide the benefits of both pellet and live-forage rearing.

Although competition for food resources can be a factor affecting poststocking mortality, other biotic interactions warrant consideration. Conditioning hatchery fish to structurally complex habitat and predators could improve overall competitive ability. Stocking program managers should consider fitness of the hatchery fish being stocked as well as interactions between stocked fish and native biota.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #15

1. Outcome Measures

Proper fertilization programs drastically increase fish production in farm ponds

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Pond owners care because recreation and family time spent fishing are invaluable

What has been done
Some 60 water samples from pond owners and consultants were submitted to the laboratory to determine fertilization program would be beneficial, two new articles and one workshop on the subject

Results
Improved fishing environment in recreational pond

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #16

1. Outcome Measures

Determining effect control plan as early as possible will reduce the amount of time, effort and money required to bring an aquatic plant problem under control

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A pond with a weed problem might be unusable for boating, fishing, swimming, irrigation, livestock watering or any other use to the pond owner or manager. Eliminating can be expensive and time consuming. Mistakes in determining a plan can make control even more expensive.

What has been done
Multiple trips to ponds state-wide; updating the aquatic herbicide section of the cooperative extension publication; MP44 Recommended Chemicals for Weed and Brush Control; an annual in-service for Aquatic Plants and Ponds for county extension agents; testing water samples; answering emails and calls from pond owners.

Results
Increased calls from county agents indicate that they are becoming comfortable with referring problems to use. Positive feedback from stakeholders.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

Outcome #17

1. Outcome Measures

Reduce number in pond problems

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Educational programs on proper pond management techniques provide pond owners with the knowledge to enhance both their quality of life and the environmental benefits of farm ponds.

What has been done
County agents are our primary audience, as they reach many pond owners. In-service training was provided on farm pond management, and specialists responded to individual inquiries from agents and the general public. News releases were disseminated on the effects of both drought and heavy rains on farm ponds. Farm pond presentations were made to diverse audiences. A

book chapter on managing the pond environment was published. Planning for a revision of our joint farm pond management bulletin was conducted in collaboration with the Arkansas Game and Fish Commission.

Results
As county agents are our major target audience, results of 1890 specialist support for farm pond programs are integrated within county agent accomplishments as reported through the 1862 Cooperative Extension Service.

4. Associated Knowledge Areas

KA Code	Knowledge Area
134	Outdoor Recreation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes

Brief Explanation

Increased prices of inputs may have producer debating if the treatment is economically justified. Each household has only so many dollars that can be spent.

Herbicide prices continue to be high, with little prospect of reductions. Difficult economic times limit the willingness of pond owners to pay for expensive treatments.

Drought resulted in reduced water volume in many farm ponds, and some dried up altogether. Weed growth was exacerbated by increased area of shallow water. Then, heavy rains were forecast together with the potential for dam failure from neglected spillway structures. Program content was modified to include information on coping with these events, and news releases addressed these two weather extremes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Continued number of samples that come in from pond owners, agent, and consultants

Participants gained knowledge and confidence in the methods of pond construction and management

In-services continue to be at capacity. Positive results on surveys sent to county agents. Feedback from stakeholders favorable

Evaluations of our 2012 Aquatic Weed and Farm Pond Management In-Service Training were done both internally by the 1890 Extension Program and by 1862

Cooperative Extension Service. On the CES evaluation, the overall value of the training was rated as 9.6 out of 10 (with 10 being the best) and on recommending others to take this in-service, 9.9 out of 10. On our internal evaluation, the overall usefulness of our presentations was rated at 9.5 out of 10.

Key Items of Evaluation

We need to look at the number of pond owners who will continually submit the samples to the lab for analysis.

Surveys and feedback from county agents is very important for evaluation.

Our indirect target audience for this program is scattered across the state, and program delivery is primarily through our target audience, county extension faculty. A key item in evaluating the program is whether we are meeting county agent needs. Evaluations indicate that agents find our training useful and of value, and would recommend it to other agents.