Stakeholder Inputs on Priorities for Aquaculture

On a five year cycle, Agricultural Research Service (ARS) and the National Institute of Food and Agriculture (NIFA) have organized the USDA Aquaculture Research and Extension stakeholder workshop. In the past, the workshop has been held off-site and brought together 150-170 people across a broad spectrum of interested parties, including producers, industry supporting representatives, scientists from ARS and universities (research/extension), administrators etc. This year, in an effort to reduce the cost of the stakeholder workshops to USDA and to our stakeholders, and also to encourage participation from a broader group of people, most of the stakeholder workshops were held by web-conference. The catfish stakeholder meeting was the exception. The meeting was held in-person in Stoneville, Mississippi (***Appendix 1***; see Appendices at the end of this document).

Stakeholder workshop discussions are valuable to inform the USDA aquaculture program. ARS uses this input to inform the Research Action Plan that is written to outline the priorities of the ARS Aquaculture Program (National Program 106) and NIFA uses the information to assist in programming and directing research and extension activities.

Stakeholder meetings and web-conferences were held in July, August and September of 2013 to assess the needs of customers and stakeholders, and to get their input and recommendations on areas and problems for emphasis during the next program cycle 2015-2019. Based on one of the recommendations received from the USDA/ARS retrospective review team to organize the action plan and program by species, the stakeholder conferences were organized by species groupings. Participants were provided questions ahead of time, to either respond in writing or to prepare for the web-conference discussions. They were asked the following questions: 1) What is your business? 2) What is the largest constraint to growth and expansion of this sector of aquaculture? 3) What do you see as the greatest short-term, 1-4 years, research and extension needs? 4) Over the longer term, what do you see as the greatest research and extension needs over the next 5-10 years? 5) What is most effective communication strategy to reach and inform farmers of new solutions to problems or better technologies?

The crawfish web-conference had the fewest participants, yet subsequently detailed comments were provided and are attached as ***Appendix 2***.

At the end of each web-conference, a series of polling questions were asked. The results for each poll and the compilation of all polls are provided in ***Appendix 3*** following this document. The polling questions were intended to help us evaluate whether participants found the web format useful, and if they felt the webinar mode of doing conferences allowed broader participation and the opportunity to be heard. The polling results are included for each web-conference, and a summation with all conferences averaged is also presented. For each of the polling questions there were three choices, YES, NO and NO RESPONSE. The NO RESPONSE, in many cases was made up of employees involved in administering the questions, or who felt disqualified from answering for one reason or another. For example, on the question about extension capacity, an extension specialist might have refrained from answering in order to see what commercial producers and research scientists thought of the extension capacity. It is interesting to note that on the questions of: "Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.)?" and "Did you feel this format allowed you to get your thoughts and concerns across?" The responses were overwhelmingly positive; signaling there was perceived value to the web-conferences and to this format.

Yellow Perch and Walleye Web-conference
Wednesday 17 July 2013, 11:00AM to 1:00PM EDT

There were approximately 38-44 participants in this webinar split between people involved in production and associated industries (feed, health etc.) and scientists (federal, state and private, research and extension).

Unmet Needs:

- Revenue development from co-products
- Improve means to get fish to fish processors
- Access to processing-rural processing center-or mobile processing
- Market for small size walleye
- Regarding food fish production in intensive recirculating systems:
    - Improved broodstock was identified by many participants as a key need - definitely a long term solution, but need to start immediately (already ongoing.)
    - Methods for improving growth One overall comment is be consistent with upper and lower case words in bullets throughout document.
    - Disease resistance
    - Stress tolerance
    - Single sex
    - Bell stressed need for cryopreservation
- Reproduction
    - Control of timing
    - Survival and juvenile quality
- Work on diets
    - Larval (replace Otohime), juvenile and grow-out
    - Reduce phosphorus (P) discharge by reduction of P in diet
- Health tools
    - Disease resistant fish
    - Diagnostics, pathogen ID
    - Vaccines
    - Therapeutics
    - Key diseases-Flavobacterium columnare, Chryseobacter
- Production technology related
    - Phosphorus discharge removal-(maybe private companies with this technology)
    - Reduce energy required in reuse systems through engineering (lower head), variable drive technology
    - Optimum rotation speed, light intensity

Comments:
One participant stated that a major retailer has a deal in place to buy 80% of their tilapia from South American farms. How does the industry encourage locally grown fish?
One participant noted how informative the recent ARS Stuttgart (SNARC) newsletter was for familiarizing the aquaculture community about ongoing projects and results.

Shellfish (Oyster) Web-conference
Wednesday 17 July 2013, 3:00pm to 5:00pm EDT

There were approximately 38-44 participants in this webinar with a fairly even split between people involved in hatchery, production/harvesting and scientists (federal, state and private; research and extension). One comment relevant to all the input was the need for long term thinking and research.

- Domestication of oysters-critical short supply on West Coast-seed and larval production moving to Hawaii
    - Larval survival
    - Larval conditioning
    - Broodstock conditioning
    - Disease resistance
    - Develop well pedigreed populations
- Reproduction
    - Control of spawn timing
    - Survival and juvenile quality
- Health tools
    - Epidemiology
    - Pathogen detection/identification
    - Biosecurity
- Production technology related
    - Off-bottom technologies in South Atlantic, compare various production technologies
    - Storage of harvested product-recirculating technology, bacteria (vibrio) reduction in storage
    - Important to work in field with farmers to introduce and transfer technologies developed-include economic analyses
    - Mechanization
- Ecosystem services
    - This was identified as research mostly done-education/extension issue
    - Ecological impacts still need research
        - No net loss of eel grass vs. no net loss of ecosystem services
    - Control of shellfish pests a concern (expiration of carbaryl)
- Human health issues
    - Norovirus
    - Vibrios
- Social issues
    - Who is the opposition to shellfish production?
    - Training entry level business, need to expand and attract new entrants.

Comment:
One participant commented regarding NIFA having new authority for funding research lasting as long as ten years. NIFA is in the process of developing procedures to implement this new authority. To date, no 10 year grant awards have been made.

Salmon web-conference
Tuesday 30 July 2013, 11am to 1pm EDT

There were approximately 38-44 participants in this webinar, people involved in production and associated industries (feed, health etc.) and scientists (federal state and private; research and extension). Comments received from stakeholders: topics such as genetic improvements are long term; resources are limited; it is important not to lose a long term focus.

Genetic improvement targets:

- growth
- color
- fat
- fillet yield
- superchill (temperature tolerance)
- parasite resistance
- meat quality
- application of genomics to genetic improvement (lower or upper case?)

Recirculating aquaculture system needs:

- off-flavor control
- feeds that are super green, good n-3 levels, RAS friendly diets (lower metals)
- development of lower head RAS,
- more efficient water use,
- create valuable products from waste stream.

Integrated Multitrophic Aquaculture (IMTA):

- IMTA may be important for production of algae that produces n-3 fatty acids. Microalgae produce n-3's but are typically low in total fat concentration.
- Business plans for multiple species, species choice and develop models of profitability.

Integrated Pest Management

- need for lice control-bio-control agents, treatments, vaccines, eradication strategies

Benchmarking

- East Coast/West Coast/Norway/Chile-compare industry productivity, efficiencies etc.; could combine benchmarking with extension education studies (reach banking communities).

Topics discussed:

- Support is needed for more research projects in cooperation with companies, public and private partnership.
- Work on offshore technologies would be especially appropriate - especially moving into high energy sites offshore.
- There is opportunity for USDA and NOAA to work together.
- Research on impacts of salmon farming are not well published, access to sites could be improved.
- Could there be a project to reach out to seafood consumers, not just producers?
- Develop a federally funded marketing research for US aquaculture targeting end-consumers.
- Outreach:
    - need better newsletters and use of social media: expand and extend workshops through webinars, and short courses. Providing direct extension to farmers is best, but it is expensive and time consuming.

Warmwater Fish (Hybrid Striped Bass, Bass, Sunfish and Tilapia) Web conference
Tuesday 30 July 2013, 3pm to 5pm EDT

There were approximately 38-44 participants in this webinar evenly split between people involved in production and associated industries (feed, health etc.) and scientists (federal, state and private; research and extension).

Unmet needs:

- Business models that outline successful operations
    - Right now can't compete with South and Central American prices for tilapia and other white meat species, due to lower costs of production and better marketing strategies
- Vaccines, biosecurity, therapeutics, disease management strategies
    - There is a great need for approved drugs to treat disease, for example, copper sulphate
- Improved Feeds
    - reducing feed costs
    - what percentage of fat is acceptable and how much vegetable and saturated fat is acceptable?
    - Need improved feed conversion
- Research to identify the cause of recent problems with winter kill-bluegill, baitfish
- genetic improvement
    - all-male blue gill production.
- Troublesome issues with regulations, which are inconsistent across state lines, especially the Lacey Act
    - Legislative changes to the Lacey Act have so far been unsuccessful.

Outreach:

- need better communication, i.e., newsletters
- need means to get scientists to meetings and conferences
- Need to improve linkages among scientists and with producers
    - There seems to be a disconnect between farmer problems and scientist's research.
    - Support is needed for research extension to farmer's facilities. There should be more field studies and more public/private partnership.
- The state aquaculture associations provide an excellent forum to reach farmers.
- Need to make talks from scientists (research and extension) on specific topics available and provide contact information for follow up questions.
- Need to address the problems of competition from overseas, the lack of funding for research and the problems of regulation adding to the financial risks of aquaculture businesses.

Trout and Charr Web-conference
Wednesday 31 July 2013, 11am to 1pm EDT
There were approximately 38-44 participants in this webinar evenly split between people involved in production and associated industries (feed, health, etc.) and scientists (federal, state and private; research and extension).

Unmet Needs:
Feeds and Nutrition:

- Feed costs are huge- need alternatives that are available and cost effective

Genetic improvement:

- Development of genomic tools for better/faster selective improvement
- Better control of reproduction-triploids are sterile, but don't perform as well
- Net-pen trout in Columbia River: better genetics for big fish (2+kg) in one growth season (April to January)
- Development is needed for broodstocks of fish that:
  - use alternative ingredients
  - use plant oils well
  - tolerate multiple re-use water
  - tolerate warmer water temperature -especially for trout grown for recreational market

Fish health:

- Work on functional immune mechanisms - humoral antibodies
- Work on anti-inflammatory approaches
- Work on Columnaris, which is a big problem in the Columbia River

Water limitations:

- Water re-use issues, i.e., development of methods for reducing effluent (handling effluent restrictions), even zero discharge
- Water availability and water rights – One of the biggest constraints to expanding production in Idaho is water availability and ability to protect water rights. Many small producers simply don't have the economic resources to fight for water rights.
- Development of methods to add value to waste products is needed.
- Obtaining permits also an issue-for netpen trout/steelhead production.

Outreach:

- Better access to publications is needed.
- More fact sheets, newsletters and demonstration trials are important
- Need to show research on a commercial scale and evaluate economics.

Marine species (Pompano, Barramundi, Cobia, Flounder, Redfish) Web-conference
Wednesday 31 July 2013, 3pm to 5pm EDT

There were approximately 38-44 participants in this webinar split between people involved in production and associated industries (feed, health etc.) and scientists (federal, state and private; research and extension).

Unmet Needs:
Fingerling availability:

- A steady supply of fry/fingerlings are needed - 100's of thousands
- Need for an improved broodstock-even just a captive broodstock not yet improved
- Genetics is very important. Breeding programs are needed for domestication and health.
    - In Hawaii selective breeding may not be important but modeling genetic impacts changes in fitness is desirable. Science based risk assessments are needed.
- Egg production and methods of larval culture-fry production are critical needs

Feeds:

- Feeds drive costs
- Less reliance on fish meal and fish oil is needed
- Need more ingredient choice and better ingredients,
- Improved larval nutrition

Fish Health:

- Vaccine development
- Diagnostics
- Identification of disease - Methods are needed to discern which disease is present

Topics Discussed:

- One problem is deciding on what fish/species to work on. Work on every one isn't possible, but do you work on white bass, cobia, flounder, yellow fin tuna, California yellow tail, and corvina? How are the choices made?
- ARS has developed breeding programs for salmon, while catfish followed (didn't precede) industry development.
- Start-up costs are a huge barrier

Some suggestions were made:

- Off-shore aquaculture development
    - need federal help, i.e., a guarantee of eggs for a certain amount of time. Massiveinvestments in resources are needed to establish this industry. Presently, there are many pieces to the puzzle that have been solved, but the pieces are not integrated, thus everyone has a different piece.
- Need public private investments - demonstration trials
- Regulatory issues are huge barrier – there is an absence of enabling regulation.

Outreach:

- Organization of ongoing meetings to disseminate information and better newsletters. "The best information delivery is vendor on farm."

Crawfish Web-conference
Wednesday 25 September - 11:00AM to 1:00PM EDT

There were 7 participants including six from Louisiana; one from North Carolina. One of these participants is a crawfish farmer. The response by industry was poor in view of reaching more than 1,000 people in advance of the webinar. However, the session was informative with agreement on most issues or topic identified as critical to industry growth.

Unmet needs:

- Need effective bait as a replacement for cut fish to attract crawfish to traps with water at cooler temperatures under 20C. Cut fish prices are increasing, with future supply uncertain. Finding such bait replacement would increase the season of supply and reduce harvesting costs.
- More information on factors or processes that cause crawfish to be attracted to bait is needed –
    - Why are they attracted?
    - Basic research questions
- Understanding attractant factors can help formulate improved manufactured feeds.
- Bait improvement can impact the ability to have fewer traps/acre
- Improve labor processes and trap redesign so that crawfish can enter but not escape, improving trapping/harvesting efficiency.
- Increase crawfish demand by extending the market distance (time) by extending shelf-life and improving survival from handling.
- Improve mechanized peeling of tail meat to expand market, develop new value-added products and improve markets for seasonal supply over low to high periods.
- Post-harvest needs include cleaning dirty crawfish prior to processing so they are not rejected, extending shelf-life and survival for live sales, and frozen value-added products.
- Need more economic analysis and information on market trends for in-state and out-of-state markets and product forms.
- There is interest in North Carolina for year-round production, as year-round markets exist, but need methods and economics means to do so. North Carolina crawfish have been sold in farmers markets and the demand for them exceeds supply with steady prices. There are concerns about future shortages of labor, access to water, and effluents.
- Development of indicators or protocol is needed to better assess a pond's production potential prior to the start of a season. This would improve management of inputs based on crawfish productivity assessment. Each pond has different crawfish populations that are unknown, with a wide range of productivity among ponds even though there are equal inputs and traps.
- There is no active crawfish disease or health research program and farmers cannot always assess reasons for pond failures or low productivity. How does white spot virus reach inland crawfish ponds as some test positive and virus can dramatically reduce harvests?
- Methods of managing white river crawfish that can be found in ponds with no market value or acceptance like red swamp crawfish.

In 2012, nearly 1,200 crawfish farmers harvested 90 million pounds of crawfish with a farm-gate value of $150 million on about 180,000 acres.

APPENDIX 1

Catfish Workshop August 7, 2013
Executive Summary

Overview:

USDA invited a team of stakeholders to Stoneville Mississippi to gather feedback and directional guidance. USDA/ARS will use workshop inputs in developing elements of a 5-year research plan. USDA NIFA will use these inputs in program direction (Formula funds, multi-state initiatives) and competitive program planning. Thirty-five farmers, processors and scientists participated in the workshop.

Methodology

The session was professionally facilitated by Group Solutions of Atlanta, GA. An interactive software network enabled all participants to enter comments simultaneously and anonymously. Participants were asked to self-identify as Farmer, Researcher, or Other, to enable grouping of comments and more effective post session analysis. Specific target areas were offered for participants to comment on where more research was needed, where research needs to be continued, and where reduced or different research focus might be appropriate.

While the focus of the session was on USDA research, participants were also invited to comment on additional research that is needed to foster growth and innovation in U.S. farm-raised catfish production, value-chain connection, and market development.

Results

This document contains the input captured in the session grouped by Farmer, Researcher, and Other. Key themes from each area were captured by an on-site edit team as follows:

Research Needs:

- Ways of producing fish efficiently while reducing off-flavor at the same time
- Cheaper way of producing fish, that are of high quality
- Investigate species diversification for production and profitability
- Inventory control methods development
- New product development
- Consumer demand, value-added products
- Improving production efficiency, especially optimizing feed conversion rates
- Improving fillet quality through production methods
- Control of diseases, trematodes that increase mortalities or lower product quality
- More raceway technology development
- Market research
- Study factors affecting on-farm profitability

Continue Research:

- Off-flavor solutions
- Product quality and its measurement
- Nutrition and feed that maximize conversion rates: find out best feed and make it available
- Production systems that reduce mortality, improve inventory control and FCR
- Optimize stocking rates for improved margins on the farm
- Consumer demand
- Markets and marketing strategies
- Consumers' willingness to pay for various quality attributes and relate this back to efficient production and processing BMPs to produce the fish that meet the highest valued attributes
- Emphasize the economic message (return on investment) with all research conducted by ARS

Next Steps

Input from this session will be reviewed by USDA ARS and utilized to develop a draft 5-year research plan that will be shared with the team for additional comment and refinement.

The sponsors would like to express their appreciation to session participants for their sharing their time and perspective to create a better product.

APPENDIX 2

Crawfish comments

Marketing - Research, Extension and Industry Needs

- Input-Output economic studies to determine the economic impact of crawfish aquaculture in Louisiana and the USA – economic value of crawfish aquaculture through all segments of the industry from production, processing, retail, service support industries.
- Studies to quantify out-of-state markets (national and international) for domestic crawfish aquaculture production. For example, of the approximate 100 milllion pounds of the farm-raised crawfish produced in the Louisiana, how much is sold out of state and where? To what demographics? No such studies have been conducted, to my knowledge, since the late 1980's.
- Verification of Crawfish Aquaculture Production Area (Acreage) in Louisiana and other states – using appropriate scientific methodologies such as Geographical Information Systems analysis (GIS), survey's, etc. Important issue for many reasons, including disaster relief following hurricanes and other environmental catastrophes (drought, etc).

Food Science

- Investigate technologies for extending the shelf life (storage time) for live crawfish to increase/advance marketing opportunities for live crawfish. Average shelf life for live crawfish is 2 to 4 days; industry has stated extending average shelf life to 7 to 14 days could significantly expand out-of-state marketing opportunities for live crawfish. (**short term and long term need)**
- Research on external cleaning of the carapace of the live crawfish, harvested late in the season, increase marketability of live crawfish. (problem: late in season when crawfish mature/stop growing, excessive epiphytic growth on the carapace dramatically reduce the marketability of live crawfish for many producers). **(short-term need)**
- Research on developing value-added products from crawfish and crawfish waste **(long-term need).**
- Recommend that the USDA-ARS Southern Regional Research Center in New Orleans establish a research program on post-harvesting aspects of crawfish. New product development of from meats, waste products, etc. It was stated during the webinar that USDA-ARS has no research program in crawfish aquaculture. The crawfish aquaculture industry is sufficiently large in terms of acreage, producers, economic impact to warrant some research effort, in some capacity, by USDA-ARS **(long-term need).**

Diseases and Predators

- Investigation into potential disease-related problems and causes of early crawfish mortality in crawfish aquaculture, to include but not be limited to White Spot Syndrome Virus (WSSV) and other potential viral, bacterial, and parasitic organisms. To my knowledge, no current active research program on crawfish diseases in aquaculture is being conducted in the USA. **(long-term need)**

- Investigations on the biological and economic impacts of avian predators, and potential disease-related issues associated with avian species, on farmed-raised crawfish production. **(long-term need)**

Production Systems

- Investigate the biological and economic feasibility of off-season or year-around crawfish production. Limited research in the late 1980s demonstrated the biological potential to produce crawfish during months when live crawfish are unavailable. Year-round availability crawfish, with a combination of traditional (in-season production) and non-traditional (out-of-season) production strategies, could reduce seasonal gluts in supply, expand markets, increase product availability, and provide for a more stable infrastructure in rural communities. **(long-term need)**

- Develop practical protocols for assessing harvest potential in crawfish production systems. Numerous crawfish farmers have production failures and usually cannot identify where in the production cycle reproductive failure or post reproduction mortality of juveniles occurred. Population assessment tools and protocols applied at various stages ("waypoints") in the production cycle has potential to provide producers a means to assess harvest potential in individual ponds. **(short-term to long-term need)**

- Improve and develop alternative crawfish harvesting technologies. Harvesting constitutes the largest single operating expense in crawfish aquaculture. Baited wire-mesh traps are inefficient at removing crawfish from the harvestable population. Commercial pelleted baits are superior to other baits in warm water, but they are less effective than fresh, cut fish in cool water. To date, research has not identified suitable alternative baits for cool-water trapping. Warm-water pelleted bait might be more effectively utilized in cool-water by altering harvesting strategies. Opportunities to improve harvesting by can be potentially achieved through better trap designs, better baits, implementation of cost-effective baiting/harvesting strategies, or increasing the water stability of pelleted baits. **(short-term and long-term need)**

- Research on stress physiology of procambarid crawfishes in pond production systems and it potential on impacting crawfish aquaculture production and shelf life. **(long-term need)**

Extension/Outreach

- Investigation into to better means of communicating information to the commercial crawfish aquaculture producers and affiliated industries via newsletters, webinars, use of social media (e.g., twitter). The old paradigm of producer meetings does not seem to be very effective any more. Producers do not turn out in numbers for regional producer meetings. Probably because technological advances in crawfish aquaculture have been slow, and experienced crawfish farmers perceive they are not getting "new" information to assist them. **(short-term and long-term need)**
- Improving crawfish farmers' and crawfish industry leaders' participation in federal, state and regional community programs. **(short-term and long-term need)**

APPENDIX 3

Polling results from the Stakeholder Web-conferences

Walleye and Perch poll questions and answers from webinar held July 17, 2013

Did the group identify the most critical problems?

Yes	43%	(12/28)
No	18%	(05/28)
No response	39%	(11/28)

Is research-extension collaboration becoming stronger and more effective?

Yes	32%	(09/28)
No	32%	(09/28)
No response	36%	(10/28)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

No Data

Are farmers willing to help document on-farm impacts from research?

Yes	25%	(07/28)
No	14%	(04/28)
No response	61%	(17/28)

Is there adequate research capacity to solve critical problems?

Yes	21%	(06/28)
No	39%	(11/28)
No response	39%	(11/28)

Is there adequate extension capacity to assist the industry?

Yes	18%	(05/28)
No	39%	(11/28)
No response	43%	(12/28)

Can regulatory barriers realistically be overcome in 5 years?

Yes	11%	(03/28)
No	61%	(17/28)
No response	29%	(08/28)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	82%	(23/28)
No	4%	(01/28)
No response	14%	(04/28)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	54%	(15/28)
No	18%	(05/28)
No response	29%	(08/28)

Will you provide further written input?

Yes	36%	(10/28)
No	25%	(07/28)
No response	39%	(11/28)

Shellfish poll questions and answers from webinar held July 17, 2013

Did the group identify the most critical problems?

No Data

Is research-extension collaboration becoming stronger and more effective?

Yes	30%	(09/30)
No	40%	(12/30)
No response	30%	(09/30)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	17%	(05/30)
No	53%	(16/30)
No response	30%	(09/30)

Are farmers willing to help document on-farm impacts from research?

Yes	57%	(17/30)
No	7%	(02/30)
No response	37%	(11/30)

Is there adequate research capacity to solve critical problems?

Yes	13%	(04/30)
No	33%	(10/30)
No response	53%	(16/30)

Is there adequate extension capacity to assist the industry?

Yes	31%	(09/29)
No	38%	(11/29)
No response	31%	(09/29)

Can regulatory barriers realistically be overcome in 5 years?

Yes	69%	(20/29)
No	10%	(03/29)
No response	21%	(06/29)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	72%	(21/29)
No	3%	(01/29)
No response	24%	(07/29)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	50%	(15/30)
No	17%	(05/30)
No response	33%	(10/30)

Will you provide further written input?

No Data

Atlantic Salmon poll questions and answers from webinar held July 30, 2013

Did the group identify the most critical problems?

Yes	60%	(18/30)
No	13%	(04/30)
No response	27%	(08/30)

Is research-extension collaboration becoming stronger and more effective?

Yes	47%	(14/30)
No	20%	(06/30)
No response	33%	(10/30)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	31%	(09/29)
No	38%	(11/29)
No response	31%	(09/29)

Are farmers willing to help document on-farm impacts from research?

Yes	32%	(09/28)
No	7%	(02/28)
No response	61%	(17/28)

Is there adequate research capacity to solve critical problems?

Yes	21%	(06/28)
No	14%	(04/28)
No response	64%	(18/28)

Is there adequate extension capacity to assist the industry?

Yes	24%	(07/29)
No	28%	(08/29)
No response	48%	(14/29)

Can regulatory barriers realistically be overcome in 5 years?

Yes	21%	(06/29)
No	41%	(12/29)
No response	38%	(11/29)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	62%	(18/29)
No	0%	(00/29)
No response	38%	(11/29)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	38%	(11/29)
No	14%	(04/29)
No response	48%	(14/29)

Will you provide further written input?

Yes	38%	(11/29)
No	14%	(04/29)
No response	48%	(14/29)

Bass, Sunfish & Tilapia poll questions and answers from webinar held July 30, 2013

Did the group identify the most critical problems?

Yes	38%	(13/34)
No	26%	(09/34)
No response	35%	(12/34)

Is research-extension collaboration becoming stronger and more effective?

Yes	14%	(05/35)
No	43%	(15/35)
No response	43%	(15/35)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	29%	(10/34)
No	38%	(13/34)
No response	32%	(11/34)

Are farmers willing to help document on-farm impacts from research?

Yes	41%	(14/34)
No	6%	(02/34)
No response	53%	(18/34)

Is there adequate research capacity to solve critical problems?

Yes	21%	(07/34)
No	47%	(16/34)
No response	32%	(11/34)

Is there adequate extension capacity to assist the industry?

Yes	21%	(07/34)
No	53%	(18/34)
No response	26%	(09/34)

Can regulatory barriers realistically be overcome in 5 years?

Yes	76%	(26/34)
No	0%	(00/34)
No response	24%	(08/34)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	76%	(26/34)
No	0%	(00/34)
No response	24%	(08/34)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	62%	(21/34)
No	15%	(05/34)
No response	24%	(08/34)

Will you provide further written input?

Yes	36%	(12/33)
No	27%	(09/33)
No response	36%	(12/33)

Trout & Charr poll questions and answers from Webinar held July 31, 2013

Did the group identify the most critical problems?

Yes	34%	(12/35)
No	6%	(02/35)
No response	60%	(21/35)

Is research-extension collaboration becoming stronger and more effective?

Yes	34%	(12/35)
No	17%	(06/35)
No response	49%	(17/35)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	34%	(12/35)
No	14%	(05/35)
No response	52%	(18/35)

Are farmers willing to help document on-farm impacts from research?

Yes	40%	(14/35)
No	3%	(01/35)
No response	57%	(20/35)

Is there adequate research capacity to solve critical problems?

Yes	29%	(10/35)
No	26%	(09/35)
No response	46%	(16/35)

Is there adequate extension capacity to assist the industry?

Yes	9%	(03/35)
No	31%	(11/35)
No response	60%	(21/35)

Can regulatory barriers realistically be overcome in 5 years?

Yes	11%	(04/35)
No	46%	(16/35)
No response	43%	(15/35)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	68%	(23/34)
No	3%	(01/34)
No response	29%	(10/34)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	50%	(17/34)
No	9%	(03/34)
No response	41%	(14/34)

Will you provide further written input?

Yes	21%	(07/34)
No	24%	(08/34)
No response	56%	(19/34)

Crawfish poll questions and answers Webinar held September 25, 2013

Did the group identify the most critical problems?

Yes	67%	(6/9)
No	0%	(0/9)
No response	33%	(3/9)

Is research-extension collaboration becoming stronger and more effective?

Yes	56%	(5/9)
No	11%	(1/9)
No response	33%	(3/9)

Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	12%	(1/9)
No	44%	(4/9)
No response	44%	(4/9)

Are farmers willing to help document on-farm impacts from research?

Yes	22%	(2/9)
No	44%	(4/9)
No response	33%	(3/9)

Is there adequate research capacity to solve critical problems?

Yes	22%	(2/9)
No	44%	(4/9)
No response	33%	(3/9)

Is there adequate extension capacity to assist the industry?

Yes	44%	(4/9)
No	22%	(2/9)
No response	33%	(3/9)

Can regulatory barriers realistically be overcome in 5 years?

Yes	33%	(3/9)
No	11%	(1/9)
No response	56%	(5/9)

Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	67%	(6/9)
No	0%	(0/9)
No response	33%	(3/9)

Did you feel this format allowed you to get your thoughts and concerns across?

Yes	67%	(6/9)
No	0%	(0/9)
No response	33%	(3/9)

Will you provide further written input?

Yes	33%	(3/9)
No	33%	(3/9)
No response	33%	(3/9)

APPENDIX 4

Grand Total from all polls taken during Stakeholder Webinars held July 17, - September 25, 2013

1) Did the group identify the most critical problems?

Yes	61/136	45%
No	20/136	15%
No response	55/136	40%

2) Is research-extension collaboration becoming stronger and more effective?

Yes	54/167	33%
No	49/167	29%
No response	64/167	38%

3) Did the group identify the best ways to reach farmers directly with new information in a timely manner?

Yes	37/137	27%
No	49/137	36%
No response	51/137	37%

4) Are farmers willing to help document on-farm impacts from research?

Yes	63/164	39%
No	15/164	9%
No response	86/164	52%

5) Is there adequate research capacity to solve critical problems?

Yes	35/164	21%
No	54/164	33%
No response	75/164	46%

6) Is there adequate extension capacity to assist the industry?

Yes	35/164	21%
No	61/164	37%
No response	68/164	42%

7) Can regulatory barriers realistically be overcome in 5 years?

Yes	62/164	38%
No	49/164	30%
No response	53/164	32%

8) Did the web-conference enable you to participate more easily in the stakeholder meeting (reduced travel obligations, costs etc.?)

Yes	117/163	72%
No	3/163	2%
No response	43/163	26%

9) Did you feel this format allowed you to get your thoughts and concerns across?

Yes	85/164	52%
No	22/164	13%
No response	57/164	35%

10) Will you provide further written input?

Yes	43/133	33%
No	31/133	23%
No response	59/133	44%