

Buckeye Aquafarming

Ohio State University South Centers

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Upcoming Events

Northeast Aquaculture Conference & Exposition

Omni Providence Hotel
Providence, RI
January 11-13, 2017
northeastaquaculture.org

2017 OAA - ABC Ohio Aquaculture Conference

Quest Conference Center
Columbus, OH
January 27-28, 2017
ohioaquaculture.org/events

Ohio State University Specialty Crops Conference

February 7, 2017
warren.osu.edu

Aquaculture America

Marriott Rivercenter
San Antonio, TX
February 19-22, 2017
was.org/meetings

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ABC students participating in a freshwater prawn harvest.
(Photo by OSU South Centers)

ABC is back for round two

By Dr. Hanping Wang, Senior Scientist and Matthew A. Smith, Extension Aquaculture Specialist

The Ohio Center for Aquaculture Research and Development (OCARD) at the Ohio State University (OSU) South Centers, in partnership with Ohio Aquaculture Association (OAA), University of Wisconsin-Stevens Point (UWSP), and other partners have received an award from the United States Department of Agriculture (USDA) National Institute of Food and Agriculture Beginning Farmer and Rancher Development Program (BFRDP) to develop and operate the 2nd Aquaculture Boot Camp (ABC-2). The USDA Secretary announced our funded project, along with 26 other awards in August. The ABC-2 program uses a “3-I” (Intensive, Intermediate, Introductory) training and multi-faceted approach, including classroom and hands-on training, paired with industry mentoring to enhance the sustainability of new and beginning aquaculture/ aquaponic and next generation farmers in the Midwest. OCARD was the first aquaculture unit to receive this type of project from the USDA. The specific goals of the ABC-2 program will be achieved through collaborations among the aquaculture, horticulture, and business teams at the South Centers, and partnerships with four nongovernmental and community-based organizations, two agricultural colleges, and six aqua-farms. *(continued on page 2)*

ABC is back for round two (continued)

The 3-year ABC-2 project will serve the following target audience in the Ohio and Midwest:

- Beginning and new aquaculture/aquaponic farmers with less than 10 years of farming experience.
- Limited-resource beginning aqua-farmers: most aqua-farmers have low levels of farm sales and low household income, as most of them are new and located in rural areas.
- Next generation farmers: students and those without a family farming history.
- Other new farmers attempting to diversify their existing farming enterprise.

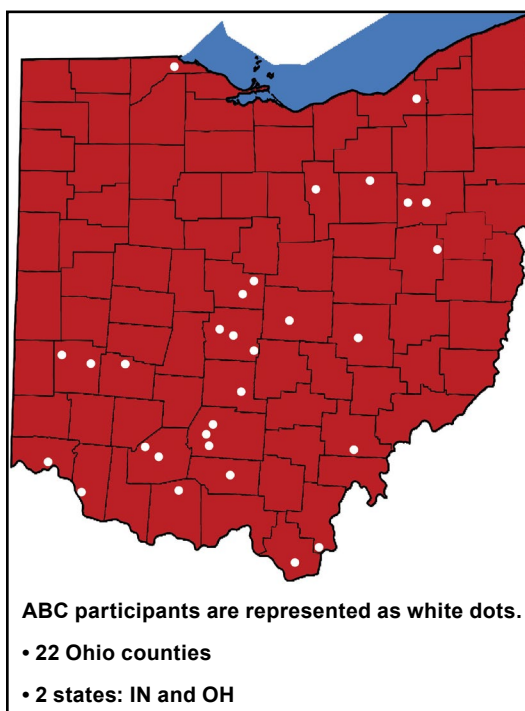
ABC-2 will utilize a modified model of the successful Phase 1 Aquaculture Boot Camp developed and delivered over the past three years by our team. During ABC-2, we will offer new and next generation farmers three levels of involvement, three topic areas and three types of integrated training in aquaculture/aquaponic production and business management strategies. The three levels of participation are: **Intensive**, an in-depth level involving immersion in a year-long hands-on training and classroom/mentoring program; **Intermediate**, a mid-level involving participation in a variety of learning activities and workshops; and **Introductory**, a general or entry level where sharing of information is the goal, and involving participation in the ABC-2 online education and webinars. The three areas which will be covered are general/traditional aquaculture, recirculating aquaculture/aquaponics, and related business and marketing. The three types of instruction are hands-on, classroom/mentoring, and internet/webinar.

Thirty-five highly motivated new (less than 10 years of farming experience) and beginning fish farmers and aquaponic producers from across Ohio and the Midwest have been selected for the Intensive Boot Camp program. These recruits are individuals actively involved in aquaculture/aquaponics or seriously dedicated to developing skills for entry into the industry.

For more information about the ABC-2 program, please contact the ABC-2 Program Coordinator, Jordan Maxwell at 740.289.2071 x124, or email maxwell.411@osu.edu.

2017 Intensive program participants

Anthony Adams Terre Haute, IN*
Ryan Bapst Piketon
Gary Beatty Cincinnati
Jared Black Brookville
Amber Botkin Yellow Springs
John W Busic Hilliard
Paula J Compston Shade
Elias Dunbar Columbus
Paul Dunfee Willow Wood
Tiffany Evans Canton
Angella Friedman Cincinnati
John Fuller South Salem
Richard F Haerer Dayton
Darci Hedges Hillsboro
Ione Kampfer Toledo
Vaughn Kaufmann Frankfort
Michael Leaventon Columbus
Matthew Merritt Lewis Center



Keith L Miller Louisville
James Myers East Liberty
Timothy Myshrral Chagrin Falls
R Bruce Putnam Massillon
Scott Revely Crown City
Stacie D Rhonemus Lynchburg
Tiffany Ricketts Rockford
Jeff Robertson Hilliard
Paul Rybicki Circleville
Joseph Sadowsky C. Winchester
Erika Saunders Granville
Nick Schneider Ashland
Heather Sedlak Creston
Stephen J Sowards Bainbridge
Jessica Stonecypher Zanesville
Richard Tarr Hillsboro
Michael Taylor New Richmond
*Map of Indiana not pictured

Welcome Jordan Maxwell- ABC 2 Program Coordinator

By Dr. Hanping Wang, Senior Scientist

Jordan Maxwell was hired in October 2016 to be the program coordinator for the Aquaculture Boot Camp-2 (ABC-2) program. She assists Dr. Hanping Wang and the ABC-2 team to execute the educational and research activities for the aquaculture programs at OSU South Centers. She will be helping to plan, coordinate, and implement educational activities, including development of training materials, coordination of aquaculture training projects, providing one-on-one support for training and teaching aquaculture production. She will also be collecting data and writing project progress reports, publications, and news articles. ABC-2 is funded through the United States Department of Agriculture National Institute of Food and Agriculture Beginning Farmer and Rancher Development Program.



Ms. Maxwell grew up in Beavercreek Ohio where her family owned a small business. She received an Associate's Degree in Wildlife Resource Management from Hocking College and went on to The University of Rio Grande where she received a B.S. in Wildlife and Fish Conservation Management. She has teaching and coordination experience at Hocking College, and has aquaculture/hatchery experience at the West Virginia Division of Natural Resources Applegrove fish hatchery and the Hocking College fish hatchery. Ms. Maxwell has a passion for aquaculture and is eager to join our team. We believe her prior experience and academic preparation will highlight the ABC-2 Program and its initiatives at The Ohio State University South Centers. If you are one of the 35 lucky farmers selected for ABC-2 in 2017, or are interested in learning about applying for the second round of ABC-2 in 2018, then feel free to contact her with your questions at maxwell.411@osu.edu or 740.289.2071 x124.

HISTORY OF OSU'S ABC PROGRAM

By Jordan Maxwell, ABC Program Coordinator and Dr. Hanping Wang, Senior Scientist

There is a noticeably growing demand for the production of safe, sustainable, and locally produced food in the United States. As a result of this growing interest and demand, Dr. Hanping Wang, together with aquaculture team and business team, at Ohio State University South Centers wrote the first ABC-1 proposal in 2011, but did not get funded that time. In 2012, the proposal was revised and resubmitted, and got funded by USDA National Institute of Food and Agriculture (NIFA) for three years to set up a yearlong aquaculture boot camp (ABC) to help new and beginning fish farmers enhance their knowledge. ABC-1 was designed to train farmers in essential production techniques and business practices in Ohio and adjacent states. This program was the only hands-on training program targeted toward new fish farmers in the United States. Ohio Aquaculture Association (OAA) is a key partner for ABC-1.

There were two one-year programs offered for ABC-1, one in 2013 and one in 2014. The results for ABC-1 were impressive and varied, with many innovative businesses in the works. Nearly half of the graduates are currently putting their knowledge to use in the aquaculture industry. Many students expressed appreciation and stated that the program had increased their knowledge and confidence levels immensely.

Based on ABC-1 students' feedback, aquaculture team, in collaboration with business team and horticulture team, at OSU South Centers, and in partnership with OAA, University of Wisconsin –SP, wrote and submitted a ABC-2 proposal in early 2016 and got funded in August by USDA-NIFA to continue ABC program. ABC-2 is offering new and innovative hands-on teaching techniques and topics that were developed following results and feedback from ABC-1. A key addition to ABC-2 is the inclusion of aquaponics. This expansion is a direct result of strong interest from Ohio and the North Central Region. Upon completion, participants will have the knowledge and hands-on experience to successfully operate a sustainable aquaculture or aquaponics business. OSU looks forward to seeing the expansion of aquaculture and aquaponics as a result of this program.

Striving to improve North Central Region aquaculture businesses through strong state aquaculture associations

By Carole Engle¹, Nick Phelps², Kwamena Quagrainie³, Matthew Smith⁴, Chris Weeks⁵, and Paul Zajicek⁶

¹Engle-Stone Aquatic\$ LLC, ²University of Minnesota, ³Purdue University, ⁴Ohio State University, ⁵Michigan State University, ⁶National Aquaculture Association



(Photo by Matthew A. Smith)

A North Central Regional Aquaculture Center (NCRAC) project is underway to assess how state aquaculture associations in the region

could be improved through leadership training workshops. Aquaculture producers in states with active and engaged associations have benefitted from various services and assistance provided, but not all states in the region have active aquaculture associations. Currently, less than half of the states in the North Central Region have associations with regular meetings and elections. An important first step in strengthening the industry will be to survey aquaculture and aquaponic producers, along with baitfish harvesters, in order to gain an understanding of views and concerns of those in the region regarding aquaculture associations.

A national survey was conducted recently to assess the benefits of industry associations; only 1% of total survey respondents were from the North Central Region. Thus, results from this national survey are not representative of this region. The survey, which will be conducted through the NCRAC project, is focusing only on the North Central Region. We believe information gathered from your responses will directly help to strengthen industry associations.

Aquaculture/aquaponic farmers and baitfish harvesters will be contacted for their input regardless of whether they have ever joined an association or not. The online questionnaire will be sent via e-mail, although alternative methods may be utilized if an Internet-based survey is not possible.

The survey should not take more than 10-15 minutes to complete. Some of the information gathered will include whether you have ever joined an association or not, what services from a state association would be beneficial to your farm, and what barriers or constraints you believe need to be overcome in order to have an effective state aquaculture association.

All responses to these surveys will be kept strictly confidential and developed reports will only include generalized responses. Whether you are currently part of an association or not, we hope you will strongly consider participating to help strengthen

aquaculture as a whole throughout the region. A key element to the success of this project is acquiring input from farmers and bait fishers who are not currently members of any state aquaculture association as well as those who are.

A key element to the success of this project is acquiring input from farmers and bait fishers who are not currently members of any state aquaculture association as well as those who are.

If you are a producer or a baitfish harvester and are not contacted to complete a questionnaire (either by e-mail or phone) by **February 28, 2017** then please contact Dr. Carole Engle at cengle8523@gmail.com, and we will get the survey to you right away. Thank you for your help with this initiative to strengthen aquaculture related businesses in the North Central Region.

Aquaculture and aquaponics: the Lacey Act and injurious species

By Matthew A. Smith, Extension Aquaculture Specialist

Aquaculture, a form of agriculture, is the process of propagating and rearing aquatic species in a controlled environment. Aquaponics utilizes the cultured aquatic species' effluent water as a means of supplying nutrients to hydroponically grown plants. Species throughout the world are raised for food, recreation, biological remediation, and ornamental purposes. Each of these markets can potentially only be reached through interstate transportation.

Often referred to by researchers as a “blanket of regulations,” aquaculture and aquaponics are subject to regulation by numerous state and federal agencies. Aquatic species grown in both aquaculture and aquaponic systems are subject to the same laws in the United States (U.S.). Federal agencies such as the U.S. Fish and Wildlife Service (USFWS), the US Environmental Protection Agency (EPA), the Food and Drug Administration, the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture (USDA), and the U.S. Army Corps of Engineers all regulate the aquaculture industry. State agencies for Ohio include the Ohio EPA and the Ohio Department of Natural Resources Division of Wildlife.

Recently, there has been even more discussion regarding the Lacey Act and injurious species. The Lacey Act was the first federal law passed to protect wildlife by prohibiting the interstate transportation and trade of unlawfully harvested game and plants. The Act has been amended a number of times over the years and directly affects aquaculture producers that desire to transport across the border. This statute applies to all “wild” animals, which includes fish that have been on the farm for their entire life. Injurious means to have a harmful or detrimental effect. As applied to aquaculture, the USFWS can list a species that they have determined as having a detrimental effect on wild fish populations as injurious and therefore cannot be legally reared, cultured, or sold.

For more on information on the Lacey Act and how it affects the aquaculture industry, please see Southern Regional Aquaculture Center's Publication #5005, entitled *Aquaculture and the Lacey Act*. This free publication also offers some good examples as to what actions cause a farmer to fall under the Lacey Act.

Effective October 31, 2016, an additional 11 freshwater aquatic species were added to USFWS injurious species list. Prior to the end of October, 135 species were listed as injurious in the fish,



(Photo by Matthew A. Smith)

mollusks, and crustaceans category. Also, an interim ruling regarding the addition of over 200 salamander species to the injurious species list passed in January 2016. Currently, there are close to 350 aquatic species listed as injurious by the USFWS, and very few of those species were ever cultured in the U.S.

The 11 species recently added include Crucian Carp (*Carassius carassius*), Prussian carp (*Carassius gibelio*), Wels Catfish (*Silurus glanis*), Eurasian Minnow (*Phoxinus phoxinus*), Stone Moroko (*Pseudorasbora parva*), European Perch (*Perca fluviatilis*), Nile Perch (*Lates niloticus*), Roach (*Rutilus rutilus*), Amur Sleeper (*Perccottus glenii*), Zander (*Sander lucioperca*), and Yabby (*Cherax destructor*). A quick Internet search will reveal that Prussian Carp and Crucian Carp are very similar in appearance to Goldfish. They have both been subject to taxonomy confusion and the Prussian carp has been noted as a Goldfish subspecies.

The USFWS was also petitioned to add another 43 species to the injurious species list by the Center for Invasive Species Prevention (CISP) on September 23, 2016, some of which are native to the U.S. The list, too long to reference here, includes some popular cultured animals such as several species of Tilapia, Grass Carp, Common Carp (Koi), Crawfish, and Blue and Flathead Catfish. (continued on page 6)

Lacey Act and injurious species (continued)

While the USFWS is not under a specific timeframe and may find that the petition does not have a basis for further action, it is necessary to understand potential problems. Knowledge about the Lacey Act and injurious species are especially necessary as the media, state aquaculture associations, and individual farmers have made reference to CISP's petition in recent months. We all know how important Triploid Grass Carp and Tilapia are to Ohio aquaculture and aquaponic farmers.

Even though Ohio almost exclusively imports aquatic species as opposed to exporting, it is important to partner with reputable suppliers that are adhering to all regulatory agencies. This helps limit your liability in case someone isn't following the laws and also improves the health of aquatic animals you receive, which can ultimately improve survival and profits.

The basics of biofloc aquaculture systems

**By Dr. Andrew J. Ray, Assistant Professor of Aquaculture Production,
Aquaculture Division, Kentucky State University Land Grant Program**



LAND GRANT PROGRAM

The biofloc approach can be defined as a semi-intensive to super-intensive recirculating aquaculture practice in which a dense microbial community contained in the water column serves as the primary mechanism for the biofiltration of nitrogen compounds (ammonia, nitrite, and nitrate). In these systems a high animal stocking density is used and very little (less than 1% per day) water is exchanged. High feeding rates lead to high nutrient concentrations, and as a result a microbial community develops in the water. This community includes bacteria, fungi, zooplankton, and if there is light available, algae. The microbes primarily live on small particles in the water called biofloc particles. Research suggests that animals like shrimp and tilapia can eat these particles, thereby recycling nutrients and reducing feed costs. Typically the only filtration in biofloc systems are particulate filters to control the concentration of biofloc which makes filtration less extensive than other recirculating aquaculture systems (RAS).

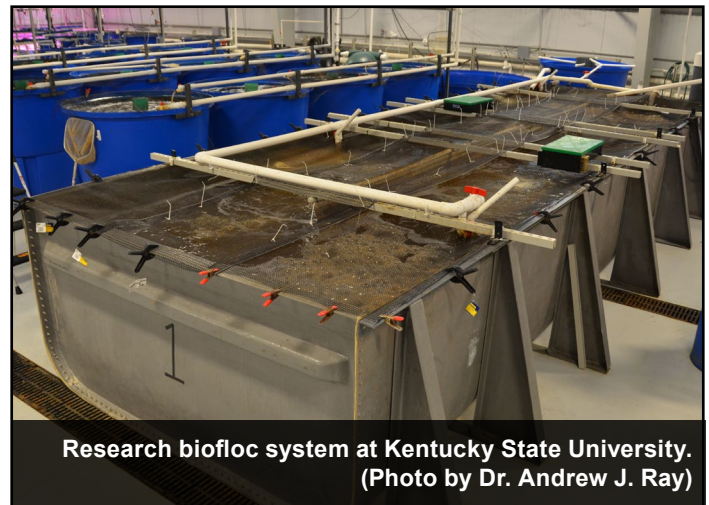
Paying close attention to water quality is especially important in biofloc systems because animals are stocked at high density and some parameters can change rather quickly. Dissolved oxygen (DO) is most critical as the microbes use oxygen in addition

Additionally, instead of importing species in the first place, it would improve our industry by culturing our own species (although probably only certain sizes) instead of relying on other states.

The National Aquaculture Association (NAA) has a call for action letter and can be found by contacting Executive Director Paul Zajicek at naa@thenaa.net. For more information on the 11 aquatic species please visit <https://www.fws.gov/injuriouswildlife/11-freshwater-species.html> and for the full list of the 43 species petitioned by CISP, visit <http://www.cisp.us/>. In the effort to have full disclosure, I am on the NAA's Aquatic Nuisance Species Committee.

Suggested Reading:

SRAC Publication #5005, *Aquaculture and the Lacey Act*



Research biofloc system at Kentucky State University.
(Photo by Dr. Andrew J. Ray)

to cultured animals; therefore, robust aeration is required. pH tends to decline in biofloc systems, so buffers such as sodium bicarbonate are required. Care must be taken when establishing biofloc systems because many of the bacteria responsible for maintaining water quality are slow to reproduce. Artificial biomedica such as small plastic bioballs or biowheels can be "seeded" beforehand either by using them in other aquaculture systems or submerging them in water and adding ammonium chloride. (continued on page 7)



Shrimp from a biofloc system.
(Photo by Dr. Andrew J. Ray)

Biofloc aquaculture systems (continued)

If ammonia or nitrite concentrations become elevated, sugar can be added. This stimulates the function of heterotrophic

bacteria which in turn take up ammonia and prevent the formation of nitrite. This process is effective, but generates more solids (biofloc particles) and reduces DO.

Although biofloc particles offer distinct benefits, their concentration must be controlled. A simple way of measuring particulate concentration is to place 1 L of water in an Imhoff cone and allow it to settle for one hour. Readings should be kept between about 5 and 20 ml/L. Settling chambers can be made from almost any small tank, although cone bottom tanks work best. Water should be pumped to the settling chamber where it slowly flows through, allowing solids to settle on the bottom which can be drained later.

Biofloc systems offer the ability to grow animals, including marine animals, indoors year-round. Feed conversion rates are likely lower than other RAS, and biosecurity is enhanced over outdoor ponds. Close attention should be paid to water quality and some understanding of the way the microbial community functions should be developed to increase the odds of success.

Biofloc aquaculture research at Kentucky State University is supported in part by the USDA, National Institute of Food and Agriculture.

Suggested Readings:

Hargreaves, J.A., 2013. *Biofloc production systems for aquaculture*. Southern Regional Aquaculture Center Publication 4503, Stoneville, MS, USA. 11 pp.

Ray, A.J., Shuler, A.J., Leffler, J.W., Browdy C.L., 2009. *Microbial ecology and management of biofloc systems*. In: Browdy, C.L., Jory, D.E. (Eds.), *The Rising Tide, Proceedings of the Special Session on Sustainable Shrimp Farming*. World Aquaculture Society, Baton Rouge, LA, USA. pp. 231-242.

Ray, A.J., 2015. *Indoor-raised shrimp find potential market in Kentucky State University test*. *The Global Aquaculture Advocate* 18(6), 76-77. *The Global Aquaculture Advocate* 18(6), pp. 76-77.

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