

DSU Aquaculture: Leading the Wave

Aquaculture Research, Extension and Teaching at Delaware State University
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Summertime Research Focuses on the Freshwater Prawn and Two Baitfishes

This summer the potential production in Delaware of the giant freshwater prawn and two baitfishes will be evaluated. Both prawns and baitfishes offer potentially high valued alternatives to other agricultural crops.



Funding for Aquaculture Research, Teaching and Extension Tops \$1 million

Six different projects provide the necessary support to allow the aquaculture research and extension programs to grow and provide needed information to local farmers. In addition, two of these grants are providing monies to support the undergraduate and graduate natural resources programs, which provide training in natural resources management, including aquaculture.

The foundation for the aquaculture research lies in funding for the three-year (10/00-9/03) project "Coolwater crayfish and baitfish culture" from the U.S. Department of Agriculture (USDA) Evans-Allen program. Additional USDA funding comes from a multi-state, multi-institutional project funded through Kentucky State University (KSU) and the IFAFS (Initiative for Future Agriculture and Food Systems) program. This project is titled "Nutrition, immunity, economics, and field demonstrations of sunshine bass (hybrid striped bass)". DSU will be collaborating with KSU on a two-year pond study starting 2003. Another USDA-funded project is a two-year (2/02-1/04) collaboration with the University

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Send all comments or requests for additional information to:

Newsletter Editor:

Bill Daniels
Department of Agriculture & Natural Resources
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901
(302) 857-6436 (work)
(302) 857-6455 (fax)
Email: wdaniels@dsc.edu

Funding (cont.)

of Maryland-College Park (Dr. Joseph Soares, Jr.) titled "Enhancement of juvenile production of the eastern white river crayfish through determination of protein and energy requirements" and will look at the effects of diet on egg and juvenile production. It is funded through the Northeast Regional Aquaculture Center. Finally, the Natural Resources teaching program received a USDA 1890 Land Grant Institution Capacity Building Grant to develop a centralized laboratory for analysis of aquatic samples collected from the field.

This year DSU was successful in increasing funding from NOAA (National Oceanographic and Atmospheric Administration). Delaware Sea Grant provided a second year of money to support efforts to evaluate pond production of the tropical freshwater prawn. However, the largest single source of funding this year came from a NOAA initiative for building the capacity of Minority Serving Institutions like DSU. This project established the Living Marine Resources Cooperative Science Center, a consortium of six universities lead by the University of Maryland-Eastern Shore. As part of this Center, DSU will establish a marine aquaculture/stock enhancement research facility to complement its existing freshwater ponds and laboratory.

Who Are We?

THE STAFF:

- Bill Daniels (Ph.D.), Research Associate Professor & Extension Specialist for Aquaculture
- Don Wujtewicz (M.S.), Departmental Research Assistant
- Grant Blank (M.S.), Research Technician



The Student Workers:

- Matthew Grabowski, Wildlife Management
- Trevor Knight, Fisheries Management
- Christopher Jackson, Ag Business
- Michael Yost, seasonal worker

Currently Advertised Positions:

- **Fisheries/Water Quality Assistant or Associate Professor (50% teaching, 50% research)**
- **Marine Aquaculture Research Assistant or Associate Professor**

FEATURED STAFF

WILLIAM (BILL) DANIELS RESEARCH ASSOCIATE PROFESSOR/ EXTENSION SPECIALIST, AQUACULTURE

Bill has been working at DSU since 1994 on aquaculture research and extension projects. Before coming to DSU, Bill worked full-time as a research associate for nine years at Mississippi State University and part-time on his PhD. While there he researched the biology and production of the giant freshwater prawn and red swamp crayfish. Previously, he had worked in Texas at Texas Parks and Wildlife and Texas Southmost College. His M.S. degree from Texas A&M University dealt with nutrition of red drum.

While Bill's research and extension duties keep him busy, he is branching out into teaching by assisting in the development of the new masters degree in natural resources and the recent revision of the undergraduate natural resources program. He is busy filling internships and selecting undergraduates for scholarships and stipends through NOAA funding. In addition, he is recruiting four new graduate students.

At home, Bill stays busy with his youngest son Samuel who is active in Special Olympics (track, basketball and soccer) and the Challenger baseball league. He and his wife have three older children, Anthony, Vickie and Jena and two grandchildren, Trey and Ashley.

RESEARCH HIGHLIGHTS

Last year's aquaculture research was divided between two projects.

EVANS-ALLEN (USDA/CSREES)

"Coolwater Crayfish and Baitfish Culture"



Research projects evaluated the effects of broodstock stocking density on juvenile production, juvenile stocking density on pond production characteristics, and compared growth rates and production of juvenile crayfish between South Carolina (Clemson University) and Delaware. Different management protocols for controlling nuisance aquatic weeds were also tested. These studies demonstrated the feasibility of increasing stocking rates for hatchery production and producing food market size crayfish (25-28 g) in a single growing season of five months. However, the results in South Carolina and Delaware indicate that stocking young hatchlings may not provide good survival and therefore not be economical. Additional research is needed to determine if nursing of hatchlings prior to stocking in ponds may provide increased survival. Also, water quality problems associated with the low hardness and alkalinity (low levels of minerals like calcium and low carbonates) of the water in Delaware and South Carolina may have contributed to poor survival because of associated elevated pH levels. Using triploid grass carp (note: possession of triploid carp requires a permit from DNREC) or herbicides seemed to alleviate some of the aquatic weed problems, it did not solve issues related to high pH.

DELAWARE SEA GRANT (NOAA)

"Evaluation of size grading on freshwater prawn production in Delaware"

This research project was a collaboration with Kentucky State University and evaluated the effect of using size-graded freshwater prawns on production when grown in ponds at 16,000/acre. It demonstrated that prawns could be grown in Delaware. However, prawn growth was slow because of an abnormally cool summer and poor water quality problems, which were associated with high pH. The results indicate that prawn production in Delaware may be risky. This summer's research should determine growth under more seasonal conditions. Additionally, higher stocking densities will be tested. Higher densities may provide economical production even given the slower growth during abnormal seasons. When the prawns derived from the same hatchery were grown in northern Kentucky during the same time period using similar management practices, they gave much better results at higher stocking rates.

VISITING SCIENTIST

Dr. Francesca Gherardi from the University of Florence (Italy) spent January and February 2002 conducting collaborative research at DSU. She provided her own funding to come and conduct behavioral research on crayfish. She utilized the lab at DSU to evaluate the interactions of a local species with two non-native crayfish species. These other crayfish were provided by Clemson University and Louisiana State University. She will be presenting some of her research results this August at the international crayfish meeting in Querétaro, Mexico.



NOAA Living Marine Resources Cooperative Science Center (LMRCSC): Marine Aquaculture/Stock Enhancement

Delaware State University (DSU) is a partner in the NOAA Living Marine Resources Cooperative Science Center (Center), which is housed at the University of Maryland Eastern Shore. Other members of the Center include Savannah State University, Hampton University, the University of Maryland Center for Marine Biotechnology (COMB) and the University of Miami (UM). The goal of the Center is *“To promote and improve opportunities for equal educational, research and advancement opportunities for faculty and under-represented students who aspire to pursue careers in the marine sciences”*. The Center is working closely with NOAA to meet these goals.



As part of the Center, DSU is assisting in the development of a “virtual campus” for sharing classes among institutions by distance learning, enhancing the recruitment of students from under-represented groups for both undergraduate and graduate studies and internships, and developing its research capacity in marine aquaculture and stock enhancement. DSU is also the lead for the aquaculture component of the Center.

To accomplish these objectives, DSU received \$358,200 for year one to set up a marine laboratory for both research and teaching, to establish a “virtual campus” and to provide undergraduate and graduate funding in the form of scholarships, stipends, internships and assistantships. Over the next three years, DSU will receive a total of \$970,710. DSU has been granted two graduate assistantships (\$36,000 total) and \$55,000 for undergraduate student support for each year. In addition, a marine aquaculture specialist will be hired to assist in both the teaching and research programs. This comes at a critical time when DSU is establishing a new Master’s degree in Natural Resources and revising the undergraduate curriculum.

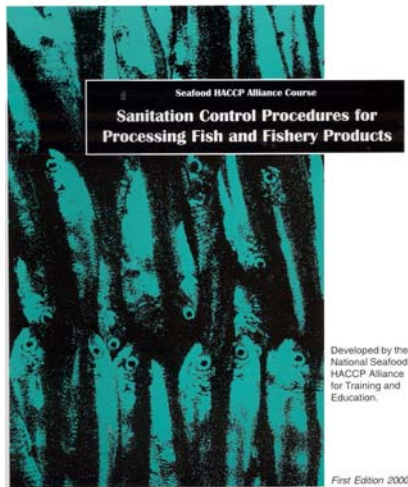


This summer three undergraduate students were granted stipends and three others will conduct internships with NOAA in Miami, Florida. The interns will be working with National Marine Fisheries Service collecting fisheries data or working in the information technology section. The students on stipends will assist in aquaculture research at DSU. Interns are Rodney Hazelton, Patrick Gilles, and Nanga’ah Ndumu. Stipends were given to Trevor Knight, Matthew Grabowski, and Christopher Jackson. This fall several undergraduate scholarships will be granted and two new graduate students will join the program.

While DSU has a strong aquaculture research and extension program supported by numerous grants, the focus has been on inland, freshwater production. Funding from the Center will allow DSU to collaborate with well-established marine aquaculture facilities, such as COMB and UM, and with NOAA to provide much needed research on marine species important to Delaware, the Mid-Atlantic region and NOAA. The establishment of this facility will allow for the leveraging of additional funds from other funding agencies. Already, opportunities are available for DSU students to travel to these institutions to conduct research and internships.

SEAFOOD SAFETY & QUALITY

New Video for Seafood Processors



The safety of the U.S. food supply has been listed as a major concern by the government and public. According to the National Fisheries Institute, American consumers spend almost \$50 billion each year on fish and shellfish products. American companies process most of the seafood including imports prior to its distribution to consumers. One of the major deficiencies in HACCP (Hazardous Analysis and Critical Control Points) training has been the lack of extensive training in sanitation control procedures. HACCP is a written plan that helps the seafood industry monitor and document food safety.

DSU, in cooperation with the University of Delaware, and assisted by personnel from the University of Georgia, University of Maryland, University of Rhode Island, Cornell University, Sea Watch International, Inc. (Milford, DE) and the National Fisheries Institute, developed a video and cd set on the development and implementation of sanitation control procedures modeled after the one-day training course and manual "Sanitation Control Procedures for Processing Fish and Fishery Products" developed by the National Seafood HACCP Alliance. The video is free to seafood processors and extension agents and specialists.

For further information or to order the video, you can contact Dr. Bill Daniels by calling (302) 857-6436 or email him at wdaniels@dsc.edu.

USDA/ARS FOOD SAFETY SYMPOSIUM HELD AT DSU

On May 2-3, 2002, the USDA/ARS Seafood Safety Laboratory, housed in the College of Agriculture and Related Sciences and directed by Dr. Gary Richards, hosted the first USDA/ARS (Agricultural Research Service) Microbial Food Safety Symposium in the U.S. Washington Cooperative Extension Center on the campus of DSU. Dr. David Kingsley assisted in organizing the symposium and making local arrangements for the visitors. The symposium brought together scientists and staff from the USDA/ARS Eastern Regional Research Center of the North Atlantic Area Microbial Food Safety Unit.

Opening remarks were given by Mr. Lou Gallegos, USDA Assistant Secretary from Administration; Dr. William B. DeLauder, DSU President; Dr. Kenneth W. Bell, Dean of the College of Agriculture and Related Sciences; Dr. John Cherry, Eastern Regional Research Center Director; and Dr. John Luchansky, Microbial Food Safety Unit Director.

The symposium gave researchers from the College of Agriculture and Related Sciences an opportunity to share their research with those of the Microbial Food Safety Unit. Drs. Bill Daniels, Michael Reiter and Arthur Tucker presented their aquaculture, natural resources, and herb research projects, respectively. Mr. Dean Purnell gave an overview of the small farmer technical assistance and outreach program.

Researchers from the Microbial Food Safety Unit gave presentations on bacterial stress adaptation, microbial genomics, predictive microbiology and process risk models, and intervention and HACCP. Researchers from the Seafood Safety Lab discussed their research on seafood safety issues, including uptake of *Vibrio vulnificus* in oysters, development of viral extraction techniques for shellfish, identification of enteric viruses, and persistence of Hepatitis viruses in shellfish. All of these efforts will help insure the safety of U.S. food supplies, including seafood and aquaculture products.

Dr. Kingsley's phone number is (302) 857-6406 and his email is dkingsle@dsc.edu.

Spotlight on Research

Overview of Crayfish Research



Issue (Who cares and why?)

Farmers, especially those with limited resources, are increasingly challenged in sustaining the economic viability of the family farm. Farmers in Delaware are looking for alternative crops to either replace or supplement existing ones. Aquaculture is one of the fastest growing segments of agriculture in the U.S. Delaware has a relatively short growing season and limited water and land available for large-scale aquaculture. Farmers have few options since most aquaculture research and development in the United States has concentrated on coldwater or

warmwater species, which do not fit into coolwater production schemes of the Mid-Atlantic region.

What has been done?

Delaware State University has been developing projects to evaluate several potential aquaculture species, including the native eastern white river crayfish, *Procambarus acutus acutus*; the giant freshwater prawn, *Macrobrachium rosenbergii*; yellow perch, *Perca flavens*; and two minnow species (golden shiners and mummichogs). To date, the focal species has been the freshwater crayfish, which is adapted to the local environment but normally takes one and a half year to reach food market size. Multi-tiered studies have been conducted to develop protocols to manage its entire life cycle.

Impact

Currently, the timing of egg laying in this crayfish can now be controlled, allowing the farmer to schedule production to meet market demand. Winter hatchery production shows the most promise as crayfish can be stocked in April or May when water temperatures are good for growth. Preliminary results indicate that the crayfish stocked in April or May are able to reach food market size (about 1 ounce) by late September. Bait market-size crayfish (2-3 inches) can be reached by mid-June and appear acceptable as a bait by saltwater anglers. These results provide farmers with the option of producing multiple crops of bait-size crayfish or a single crop of food-size crayfish during a single growing season (April-September). Additional pond research is still required to maximize production and survival to insure profitability. One farmer in New York, using hatchery-reared crayfish stocked into his ponds, produced over 20,000 bait-size crayfish in August when he normally has no crayfish available for market. At an average market price of \$0.22/crayfish (soft-shell), he was able to gain an additional \$4400 in revenue. Given the current market prices of \$0.05-0.07/bait-size crayfish for the freshwater angling market and \$2.00-2.50/lb of food-size crayfish, a farmer stocking 16,000 juvenile crayfish/acre with 50% survival could potentially gross \$400-560/acre every 1-1.5 months for bait production or \$884-1240/acre in 5 months for food-market production.

Extension Highlights

Bill Daniels leads the aquaculture program of DSU Delaware Cooperative Extension.

Delaware Aquaculture:

Bill has been working closely with Mr. John Ewart (Aquaculture Specialist, Delaware Marine Advisory Service, MAS), the Delaware Department of Agriculture, and local aquaculture farmers in the development of aquaculture regulations for Delaware. These regulations will facilitate the safe and sustainable development of aquaculture in Delaware.

Public Education:

Last October at Coast Day, Mrs. Doris Hicks (Seafood Specialist, MAS) highlighted the freshwater prawn research as part of a very tasteful cooking demonstration.

U.S. Aquaculture Society

In late January, Bill Daniels took over the reins as President of the U.S. Aquaculture Society (USAS), a chapter of the World Aquaculture Society (www.was.org). He represented the USAS in Beijing, China at the World Aquaculture meeting and will serve until next February. On June 13th, Bill will represent the USAS on an aquaculture panel at the Northeast Regional meeting of the U.S. Commission on Ocean Policy, Seattle, Washington. This commission reports directly to the President.



U.S. Assistant Secretary of Agriculture Visits DSU



On May 2nd, the College of Agriculture and Related Sciences had a chance to showcase its research facilities, including the herbarium, USDA/ARS seafood safety lab, and aquaculture facilities, to Mr. Lou Gallegos, Assistant Secretary for Administration for the United States Department of Agriculture. Dr. DeLauder, President, Dr. Bell, Dean, and other university officials accompanied him. Dr. Daniels explained the different research initiatives at DSU, including the ones funded by USDA. He also discussed the current internships available at DSU and how these matched well with the natural resources internships that USDA hopes to have in place in the near future.

This is the fourth issue of ***DSU Aquaculture: Leading the Wave***. ***DSU Aquaculture*** is a semi-annual publication highlighting the aquaculture research, extension and teaching efforts being conducted by Delaware State University. It provides highlights as well as feature articles on activities and the personnel who support the programs.

This newsletter is part of our commitment and service to the Delaware community. As such, we welcome your comments and feedback. If you would like to provide input into this newsletter or would like to have further information about articles in this newsletter, please contact the newsletter editor whose contact information is listed on the front page.

Delaware State University Aquaculture Information Request Form

To provide comments, get more information or be placed on the newsletter mailing list, please fill out this form and mail it to:

Bill Daniels
Department of Agriculture & Natural Resources
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901-2277

Name _____ Information Requested _____
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Suggestions: _____

Thank you for your inquiry.

Bill Daniels
Department of Agriculture & Natural Resources
Delaware State University
1200 N. Dupont Hwy.
Dover, DE 19901-2277

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