

FISHERIES AND AQUATIC SCIENCES PROGRAM UPDATE



Inside this issue:

Greetings and Fisheries and Aquatic Sciences Program Update	1
Yep, Bass Learn to Avoid Lures	2
Tim & Kim: Two Careers and One Family Forever Linked to a Small Lab at the University of Florida	3
Students United in the Research of Fisheries (SURF) Builds Relevance and Connections	4
Vision Award to Florida LAKEWATCH	5
Notes & News	6
Upcoming Events	7
Spring Semester Graduates	7
Recent Publications by Our Faculty	8

Greetings from the Fisheries and Aquatic Sciences Program!

By Mike Allen, PhD, Associate Director, Fisheries and Aquatic Sciences Program, msal@ufl.edu

It's been a busy spring and early summer for the Fisheries and Aquatic Sciences Program (FAS). After extensive national searches, we hired three new faculty members who will join us this summer and fall, all in aquaculture.

Dr. Josh Patterson will be housed at the Florida Aquarium's Center for Conservation in Apollo Beach and work as a faculty member in restoration aquaculture. This partnership between FAS, the Florida Fish and Wildlife Conservation Commission (FWC), and the Florida Aquarium will address challenges in coral and seagrass restoration, and seek other opportunities to improve aquatic habitat.

Dr. Huiping Yang will come aboard this fall and she will address shellfish aquaculture issues statewide. Dr. Yang will be housed at our Gainesville facility and will conduct fieldwork throughout the state including Cedar Key and Charlotte Harbor, in particular.

Dr. Matt DiMaggio, our third new faculty member, will be housed at our Tropical Aquaculture Laboratory in Ruskin. Dr. DiMaggio will evaluate ways to improve culture techniques for freshwater and marine tropical fish.

All three faculty members have research and extension appointments, and they will help county faculty, farmers, and growers throughout the state solve aquaculture problems. The three hires are very exciting for us, and they position our aquaculture program to be among the very best in the nation. Please stop by and welcome them when you are visiting one of our facilities.

Thanks to Nancy Montes, Bob Swett, and Roy Yanong for putting WaterWorks together. This issue of the newsletter was sent to you via our new distribution list built by Mendy Willis, Mark Hoyer, Director of the Florida LAKEWATCH program, and Bob Swett.

If you know others who wish to receive the newsletter, please have them email Mendy at mendywillis@ufl.edu and she will add them to the distribution list. Please help us spread the word about WaterWorks!

This has been a fun year in the FAS program, and we look forward to seeing and interacting with all of you over the summer and fall!

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WaterWorks is a semi-annual publication of the Fisheries and Aquatic Sciences Program (FAS) in the School of Forest Resources and Conservation (SFRC) at the University of Florida/IFAS.

The purpose of the newsletter is to provide information to prospective students, alumni, stakeholders, partners, and colleagues. Past editions can be found at <http://sfr.ufl.edu/fish/about/waterworksnews/>

This issue was designed by Nancy Montes and edited by Bob Swett and Roy Yanong. To contribute an article or information for a future issue, contact Mike Allen (msal@ufl.edu).





YEP, BASS LEARN TO AVOID LURES

By [Nick Cole](#), MS student (Mike Allen, Advisor), [Ed Camp](#), PhD candidate (Kai Lorenzen & Sherry Larkin, Advisors), in the Fisheries and Aquatic Sciences Program, and [Mike Allen](#), PhD, Associate Director, Fisheries and Aquatic Sciences Program

Every once in a while a new lure comes on the market that has a new look, and for a time the lure catches bass like crazy. Remember the Slug-Go? When that soft stickbait first came on the market it was a bass catching magnet, and it became common in just about all angler tackle boxes. More recently, the Alabama rig with multiple baits showed fish a new look, and many fish (including lake record fish) have been caught on this lure around the country. Fishing tackle manufacturers are constantly searching for a new lure type that can catch fish, and anglers are also changing their tactics in order to maintain high catch rates.

Surprisingly, there is little research that has explored the extent to which fish can learn to avoid lures. Previous pond surveys have shown that some bass are caught multiple times and others are never captured, but the degree to which fish can learn to avoid specific lures has not been evaluated. Further, we have no information about how fish may react to regular exposure to different lure types.

We conducted a fishing experiment in the summer of 2012 to evaluate whether bass can learn to avoid lures, and whether the degree of learning was influenced by lure type. We fished Devil's Hole Lake, a private, 27-acre Florida lake that has historically received very little fishing pressure. Prior to angling, we used electrofishing to mark and release adult Florida Bass, and obtained a population estimate of 347 total bass over 10 inches in the lake.

Over a period of four weeks, two anglers fished the lake three days per week. The anglers used two lures: a chrome and black lipless crankbait (Rat-L-Trap© Bill Lewis Lures), and a 4-inch soft stickbait (Senko, Gary Yamamoto Custom Baits© in plum with emerald flake) fished weightless with a 3/0 offset worm hook.

Both lures were fished on 20-lb braided line with a 4-foot, 20-lb fluorocarbon leader. To minimize the effects of angler skill differences on the results, each angler fished each lure for one hour, and then they switched lures for the next hour throughout the day. A fishing day was six total fishing hours (12 total angler hours for both anglers). After capture, the fish were tagged with an individually marked electronic tag and released, which allowed us to know if individual fish were recaptured, as well as identify which lure each fish was caught on previously. Anglers were encouraged to fish in multiple styles and in all areas of the lake in an attempt to maintain high catch rates with each lure over the full length of the study.

Over the course of the four weeks (12 total fishing days), a total of 260 Florida Bass were captured from an estimated population size of 347 adult Florida Bass at Devil's Hole Lake (75% of bass in the lake were caught). Thus, about 25% of the bass were never caught with either lure. The fish ranged in size from 8 to 20 inches, but nearly all the fish in this lake were between 10 and 14 inches.

We found strong evidence that bass learned to avoid capture, particularly for the lipless crankbait. Angler catch rates for the lipless crankbait declined substantially after exposure to angling, falling from 2.5 fish per angler hour to only 0.25 fish per angler hour at the end of the experiment (see Figure 1). After only three days of fishing (25 total fishing hours) the catch rates on the lipless crankbait had fallen from 2.5 fish per hour to 0.5 fish per angler hour. Catch rates also declined for the soft stickbait but to a lesser degree than the lipless crankbait (Figure 1). The catch rates for the soft stickbait dropped from 1.8 fish per angler hour at the start of the experiment to about 1.0 fish per hour at then end of 12 weeks. Thus, we found evidence of fish learning to avoid capture with both lures, but the decline in catch rate was much higher for the loud, lipless crankbait than for the soft stickbait.

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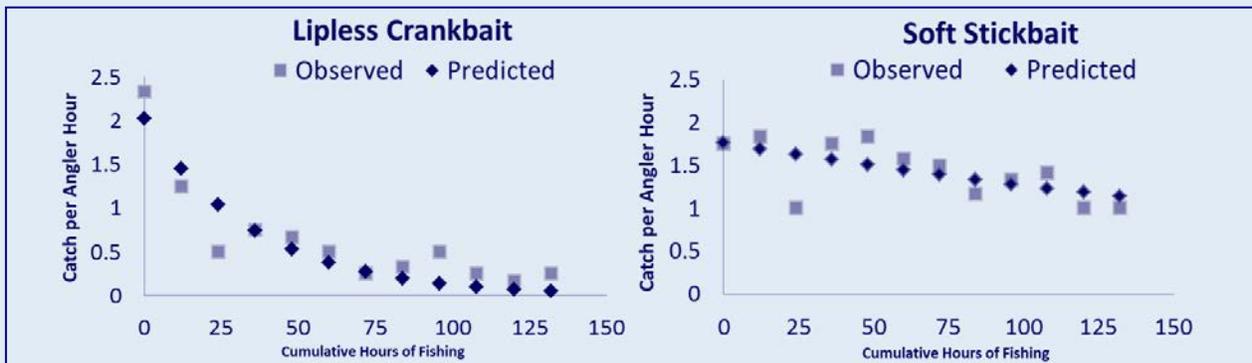


Figure 1. Catch, per angler hour, of Florida Bass with a Rat-L-Trap (on left) and Senko (on right) plotted on the cumulative amount of fishing effort at Devil's Hole Lake. "Observed" indicates data from fishing each day, and the "Predicted" values are from a mathematical model fit to each data set.

TIM & KIM: TWO CAREERS AND ONE FAMILY FOREVER LINKED TO A SMALL FISHERIES LAB AT THE UNIVERSITY OF FLORIDA

By *Tim Bonvechio*, Senior Biologist, Georgia Department of Natural Resources and *Kim Bonvechio*, Florida Fish and Wildlife Conservation Commission

Tim Bonvechio and Kim (Tugend) Bonvechio graduated from the University of Florida's Fisheries and Aquatic Sciences Program in the School of Forest Resources and Conservation. Both studied under Dr. Mike Allen. In 2000, Tim volunteered to help Kim set blocknets on Lake Kissimmee for her thesis. Four years later, almost to the day, they married. Much has happened since, from developing careers to starting a family, but they will never forget their roots and the place where it all began.

In 2001, Kim received her M.S. in Fisheries Ecology with a minor in Geography. Her thesis was titled "Changes in the plant and fish communities in enhanced littoral areas of Lake Kissimmee, Florida, following a major habitat enhancement." After grad school, Kim worked as a fisheries biologist with the Florida Fish and Wildlife Conservation Commission (FWC) in the Kissimmee Fisheries Office and Eustis Fisheries Research Lab. She has spent the majority of her career developing, implementing, and evaluating standardized sampling methods for Florida's freshwater fishes.

In 2006, Kim became pregnant with their first child and, to devote more time to her family, she worked part-time the next six and a half years. With support from her supervisors, in particular Jim Estes, now Deputy Director for FWC's Division of Marine Fisheries Management, she was able to raise two beautiful girls while staying current in her field. Juggling work and family required concessions, but commitment to professional development and dedication to family allowed her to continue as an integral member of the freshwater fisheries research team.

She returned full-time in 2013, ready to tackle challenges that lie ahead. She has participated on professional teams contributing to the development of several websites, data management, statistical, and fisheries management projects. She co-authored 17 peer-reviewed articles, including one book chapter, and continues to participate in American Fisheries Society (AFS) activities.



Kim and Tim will be married ten years this summer and they have two beautiful children, Hannah and Lily.

In 2003, Tim received his M.S. in Fisheries Management. His thesis was titled "Relations between hydrological variables and year-class strength of sport fish in eight Florida waterbodies." Tim's thesis focused on population dynamics and involved measuring 19,301 and aging 6,327 sportfish, including Black Crappie, Bluegill, Largemouth Bass, Suwannee Bass, and Redear Sunfish. The work prepared Tim for his first position after grad school, as a Biological Scientist in FWC's Kissimmee Fisheries Office. He worked on the high profile Kissimmee Chain of Lakes and helped evaluate the sportfish populations.

In 2006, Tim accepted a position as a Fisheries Management/Research Biologist with the Georgia Department of Natural Resources (GADNR). In this position, Tim has worked with several catfish species, including the invasive Flathead Catfish in the Satilla River. Tim has been the Georgia aquatic nuisance species coordinator and lead manager of several trophy bass lakes, including Ocmulgee Public Fishing Area and Lake Lindsay Grace. Tim is now a Senior Biologist and recently became a certified fisheries professional with the AFS. Tim has published 17 professional papers and has been very active within the Society, serving as the Georgia Chapter president and, currently, as chair of the Catfish Committee in the Southern Division of the AFS.



Tim measuring a Flathead Catfish collected from the Satilla River, Georgia.



Kim deploying a lift net to capture juvenile American Eel at Rodman Reservoir, Florida.

"No doubt, we would not be where we are today without the training we received at the University of Florida," said Tim. "It gave us a strong foundation from which to build our successful careers. That foundation gave Kim the knowledge and ability to switch her career focus to biostatistics so she could raise a family and work in a non-traditional, remote office location. That same foundation gave me the confidence and skills I needed to excel in the traditional fisheries biology career tract. Most importantly, it was the people we met along the way who had the most profound impact. We owe so much to Dr. Mike Allen. Even though it's been over ten years since we received our graduate degrees, we still look to him for advice, not just about fish management, but about life itself. He's literally been through it all with us."

SURF Builds Relevance and Connections

By [Savanna Barry](#), PhD candidate (Tom Frazer, Advisor), [Ed Camp](#), PhD candidate (Kai Lorenzen & Sherry Larkin, Advisors), and [Chelsey Crandall](#), PhD student (Kai Lorenzen & Martha Monroe, Advisors), in the Fisheries and Aquatic Sciences Program

Students United in the Research of Fisheries (SURF) introduced several new programs this semester that increase the opportunities for students to unite, and share and build skills. The goals of the new programs are to promote active membership, increase academic relevance, and take advantage of the considerable intellectual capital in our club.

The first program, dubbed 'R Friday,' allows students to share and discuss R code in an informal setting before the weekly FAS seminar. Topics covered to date include plotting, data manipulation, mapping, JAGS interfacing, multivariate ordination, and working with arrays.



Brian Matthias, PhD student (FAS), and students working on multi-dimensional arrays for R software.

A different student leads the discussion each week, facilitating the display of diverse skill sets and perspectives. R Fridays have been well attended and will continue to provide a unique forum in the fall semester for the exchange of skills. R code from past sessions is available for download from the SURF WordPress site at <http://ufsurf.wordpress.com>.

A second SURF-led program is a peer review pool where students can seek feedback on grants, manuscripts, and conference abstracts. The peer review pool offers valuable practice for reviewers as well as cross-disciplinary feedback for authors, representing a dual benefit for our members.

The third program initiated by SURF is a collaboration with the Seahorse Key Marine Lab (SKML) to provide essential outreach experience to our members by orchestrating volunteer experiences with groups of all ages. Several members have taken part in Seahorse Key Open Houses and a number of collaborations between SURF and SKML are planned for the summer term.

SURF also offers members opportunities to participate in unique workshops. The first was led by Dr. Gustav Paulay and focused on proper collection, preservation, and documentation of museum specimens. Many SURF members attended and plan to contribute specimens that will be sequenced and catalogued, eventually building the DNA library necessary for cutting edge DNA bar-coding techniques. In this way, SURF members can add to their legacy by contributing to the permanent collections of the Florida Museum of Natural History (FLMNH).



Dr. Gustav Paulay and SURF members at a workshop on the proper collection, preservation, and documentation of museum specimens.

While SURF is excited about the many new opportunities available to members this year, we want to point out that these are in addition to several other highly successful programs that have been in place for several years. For example, 'Food for Thought,' the monthly pizza social with a faculty member, continues to provide meaningful interaction between faculty and students. In addition, the annual Fish Fry continues to grow and fund the ever popular SURF travel grants, which offer students the resources required to attend state and national meetings.

SURF's aim is to create opportunities that reduce the literal and figurative distance between the diverse group of FAS students, many with offices in different buildings and split between campus and off-campus locales. We believe these programs and future efforts will build student connections as our department grows and adapts to the ever-changing academic landscape.

2014 SURF Leadership

[Ed Camp](#), President

[Savanna Barry](#), Vice President

[Chelsey Crandall](#), Media and Service Coordinator

[Devin Flawd](#), Secretary

Pippa Kohn, Treasurer

Danielle Puls, Social Chair

For more information about SURF,
please visit:

<http://ufsurf.wordpress.com/>



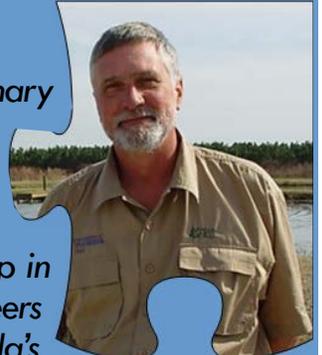


VISION AWARD TO FLORIDA LAKEWATCH

The National Water Quality Monitoring Council's Vision Award

recognizes a monitoring council or a group that has demonstrated extraordinary vision and cooperation in the field of water quality monitoring on a local or regional level to enhance the management and protection of aquatic resources.

The Council awarded its **2014 Vision Award to Florida LAKEWATCH** for leadership in water quality monitoring and environmental protection. LAKEWATCH volunteers also received the **2014 Distinguished Service Award** from the University of Florida's School of Forest Resources and Conservation.



Mark Hoyer, Director
University of Florida

Florida LAKEWATCH was begun in 1986 by the University of Florida with the goal of collecting credible data on Florida's aquatic systems. Officially established by the state legislature in 1991, LAKEWATCH exemplifies the University of Florida's land-grant ethic of teaching, research, and outreach/extension.

including development of numeric nutrient criteria, assessment of impaired waters, development of Total Maximum Daily Loads, and development of Basin Management Action Plans.



Lake County volunteers with both awards

Since the program's inception, thousands of LAKEWATCH volunteers have collected water quality data on more than 1,100 lakes, 175 coastal sites, 120 rivers, and 5 springs in 57 Florida counties.

Over the last 25 years, LAKEWATCH data have been used in over 40 peer reviewed scientific publications and three books. Florida LAKEWATCH has also cooperated with scientists from around the globe by sharing data for comparative ecological studies. Over 35 graduate students, all of whom received degrees in the lake management field, were mentored through the program. Undergraduate students are also mentored and supported in hands-on lake research and management activities.



Webmaster and Research Scientist:
Marilyn & Roger Bachmann

For long-term trend analyses, LAKEWATCH provides at least 20 years of monthly data on 27 lakes and 15 years of monthly data on 195 lakes. All data collected (currently about 45,000 samples per year) are publicly available in EPA's STORET as well as on the Florida LAKEWATCH website (<http://lakewatch.ifas.ufl.edu/LWCIRC.HTML>), along with publications and other information generated by the program to promote science-based management of Florida's aquatic resources.

The success of LAKEWATCH could not happen without contributions from many scientists, staff, and volunteers. However, it takes leadership to bring together such a diverse group, to grow a program and keep it vibrant and pertinent, and to maintain sources of funding. The leadership provided by Mark Hoyer, Director of LAKEWATCH, enables this important and valuable program to thrive.



Lab Folks (left to right): Tad deGroat, Ivelisse Ruiz, Claude Brown, Steve Banes, Fred Reeves

Data collected by LAKEWATCH volunteers have been shown to be comparable to data collected and processed by Florida Department of Environmental Protection (FDEP) professionals. These comparison studies allow FDEP to use LAKEWATCH data for regulatory decisions



Field and Administrative Folks (left to right): Jason Bennett, Christy Horsburgh, Mary Lettelier, Dan Willis, David Watson

Congratulations to the director, staff, and volunteers of Florida LAKEWATCH!!

NOTES & NEWS

18th Annual UF Fisheries/FWC Tournament at Cedar Key

By *Mike Allen, PhD, Associate Director, Fisheries and Aquatic Sciences Program, msal@ufl.edu.*

Our 18th Annual UF Fisheries and Aquatic Sciences Program/Fish and Wildlife Conservation Commission (FWC) tournament at Cedar Key was held on Saturday May 17, 2014. A total of 35 anglers and 15 boats participated this year.

Anglers were greeted Saturday morning with a stiff east wind that was forecast for 10-15 mph, but was easily 20-25 mph at take off. The water color was stained in some areas and downright dirty in others. Overall, fishing was much slower this year than normal, with only 23 Spotted Seatrout, 1 Spanish Mackerel and 1 Red Drum caught in total (all boats combined). Our lowest fish count ever!

AND THE WINNERS WERE:

Largest Red Drum – **Jordan Holcomb** of the FWC at 24.9 inches. Jordan was fishing in his first year at our tournament and out of a kayak. *Great job!*

Largest Spotted Seatrout – **Mendy Willis** at 20 inches. Mendy was fishing on my boat in her first event, along with Greg Sass of Wisconsin DNR and Tom Hrabik of University of Minnesota at Duluth. *Congrats Mendy!*

Largest Spanish Mackerel – also **Mendy Willis** of UF, at 14.6 inches. This was not a big mackerel but the only one brought in this year. Windy conditions and dirty water at Seahorse Reef made this species particularly hard to find this year.

Congratulations to the FAS 2013-14 Award Winners

Graduate Students of the Year

MS Degree: **Nick Cole**, nominated by Mike Allen
PhD Degree: **Ed Camp**, nominated by Kai Lorenzen

Outstanding MS Thesis

Kyle Wilson, chaired by Mike Allen and Michael Netherland

Outstanding Doctoral Dissertation

Dr. **Andrew Barbour**, chaired by Don Behringer and Kai Lorenzen

FAS Outstanding Faculty

Dr. **Shirley Baker**, nominated by the Students United in the Research of Fisheries (SURF)

Faculty Updates

Several investigators at UF are collaborating on a two year, \$1.86 million grant from the U.S. Bureau of Ocean Energy Management on the **Ecological Function and Recovery of Biological Communities within Dredged Ridge-Swale Habitats in the South Atlantic Bight**, including **Debra Murie, Daryl Parkyn, Ed Philips, Patrick Baker, Don Behringer** and **Rob Ahrens** from the UF Fisheries and Aquatic Sciences Program, Arnoldo Valle-Levinson from UF Civil and Coastal Engineering, and Peter Adams from UF Geological Sciences.

Dr. Shirley Baker was inducted into the first cohort of the **University of Florida Entrepreneurship Faculty Fellows**. As part of the program, Dr. Baker will be developing a new undergraduate course centered on innovation and entrepreneurship in the marine and coastal sciences. *Guest speakers and ideas for case studies are welcome!*

Students' Spotlight



Michael Dickson holding a Peppermint Shrimp.

Michael and the Peppermints is an award-winning documentary (≈8 minutes) about UF graduate student Michael Dickson (Don Behringer, Advisor). The documentary looks at his work, both in the field and in the lab, as he conducts scientific research into the ecology and population structure of peppermint shrimp in the Gulf of Mexico.

The documentary was produced and edited by Michael Crandall and Chelsey Crandall (also a FAS student) under Ocypode Productions. **Michael and the Peppermints** was presented at the Beneath the Waves Film Festival, a part of the Benthic Ecology Meeting this past March 20th, and it won the **People's Choice Award!** The documentary can be found at: <http://vimeo.com/85529079>.



Geoff Smith

PhD Candidates **Geoff Smith**, (Debra Murie, Advisor) and **Ed Camp**, (Kai Lorenzen & Sherry Larkin, Advisors) each received a **2014 Guy Harvey Scholarship (\$5,000)**



Ed Camp

SNRE PhD student **Carrie Schuman**, (Shirley Baker, Advisor) received a scholarship from the **International Women's Fishing Association**.

Alumni Update

Jason Childress was recently promoted (September 2013) to Environmental Programs Manager at the Oklahoma Water Resources Board, where he manages and coordinates the state of Oklahoma's Water Quality Standards program.

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Upcoming Events



Sixth International Symposium on GIS/Spatial Analyses in Fishery and Aquatic Sciences

August 25-29, 2014, Tampa, FL

Co-sponsored by the Fisheries and Aquatic Sciences Program

Registration/Abstract deadline June 30. For more info go to:

http://www.esl.co.jp/Sympo/6th/final_announcement.pdf



Spring Semester Graduates

The UF School of Forest Resources and Conservation is pleased to acknowledge our May 2014 graduates with majors in Fisheries and Aquatic Sciences:

Doctor of Philosophy



Felipe Correia Carvalho, Changes in target species and spatial population structure in stock assessment models for highly migratory pelagic fish stocks as exemplified by the south Atlantic Blue Shark. Chair: Debra Murie; Co-Chair: Robert Ahrens.



Paula A. Viveros Bedoya, Phytoplankton biomass and composition in Apalachicola Bay, a subtropical river dominated estuary in Florida. Chair: Edward Philips.

Master of Science



Larry L. Lawson, Jr., Evaluation of the fish invasiveness screening kit (FISK v2) for identifying the invasiveness risk of non-native freshwater fishes in peninsular Florida. Chair: Jeffrey E. Hill.



Zachary J. Slagle, Factors affecting nesting success in Florida Bass *Micropterus floridanus*. Chair: Mike Allen.

School of Natural Resources and the Environment (SNRE), Interdisciplinary Ecology major with a concentration in Fisheries and Aquatic Sciences Master of Science



John Elliott Hart, Interspecific competition as a driver of juvenile Spiny Lobster abundance and distribution. Chair: Don Behringer.

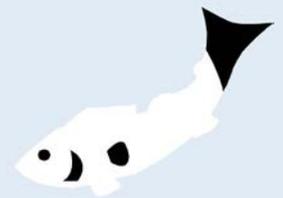
Marine Sciences Interdisciplinary Studies Major

Paige Carper

Annabeth Peterson

Sean Deeb

Brittany Troast



Recent Publications By Our Faculty

- Baeza, J.A., M.D. Dickson, R. Squibb, J.R. Anderson, and **D.C. Behringer**. 2014. Aspects of the Reproductive Biology of a Heavily Traded Ornamental Shrimp, *Lysmata boggessi* (Crustacea, Decapoda, Caridea), in the Southeastern Gulf of Mexico. *Journal of the Marine Biological Association of the United Kingdom* 94: 141-149.
- Bourtis, C.M., **R. Francis-Floyd**, E.A. Reyier, **R.P. Yanong** and L.J. Guillette Jr. (2014). Development of a Nonlethal Health Assessment for Wild Red Drum Using a Health Index, *Journal of Aquatic Animal Health* 26(2): 91-95.
- Brown, A.L., J. Zill, **T.K. Frazer**, C.W. Osenberg. 2014. Death and Life: Muricid Snails Consume the Vermetid Gastropod, *Dendropoma maximum*, and Use Empty Shells for Reproduction. *Coral Reefs* 33:497.
- Camp, E.V., C.L. Staudhammer, W.E. Pine III, J.C. Tetzlaff and **T.K. Frazer**. 2014. Replacement of Rooted Macrophytes by Filamentous Macroalgae: Effects on Small Fishes and Macroinvertebrates. *Hydrobiologia* 722:159-170.
- Carvalho, F., **R. Ahrens**, **D. Murie**, J.M. Ponciano, A. Aires-da-Silva, M.N. Maunder, and F. Hazin. 2014. Incorporating Specific Change Points in Catchability in Fisheries Stock Assessment Models: An Alternative Approach Applied to the Blue Shark (*Prionace glauca*) Stock in the South Atlantic Ocean. *Fisheries Research* 154: 135-146.
- Choice, Z.D., **T.K. Frazer** and C.A. Jacoby. 2014. Light Requirements of Seagrasses Determined from Historical Records of Light Attenuation Along the Gulf Coast of Peninsular Florida. *Marine Pollution Bulletin* 84:91-102.
- Cichra, C.E.**, S. Holland, J. Stephens, and A. Croteau. 2013. Recreational impacts on the Rainbow River. *Aquatics*, 35(3): 9-14.
- Diller, J.L., **T.K. Frazer** and C.A. Jacoby. 2014. Coping with the Lionfish Invasion: Evidence that Naïve, Native Predators Can Learn to Help. *Journal of Experimental Marine Biology and Ecology* 455:45-49.
- Havens, K.E.** 2014. Lake Eutrophication and Plankton Food Webs. In: Ansari, A.A. and Gil, S.S. (eds). *Eutrophication: Causes, Consequences and Control*. Springer, NY. 598 pp.
- Hill, J.E.**, L.L. Lawson, Jr., and S. Hardin. 2014. Assessment of the Risks of Transgenic Fluorescent Ornamental Fishes to the United States Using the Fish Invasiveness Screening Kit (FISK). *Transactions of the American Fisheries Society* 143:817-829.
- Huge, D.H., P.J. Schofield, C.A. Jacoby and **T.K. Frazer**. 2014. Total Mercury Concentrations in Lionfish (*Pterois volitans/miles*) from the Florida Keys National Marine Sanctuary, USA. *Marine Pollution Bulletin* 78:51-55.
- Krediet, C.J., J.L. Meyer, N. Gimbrone, **R.P. Yanong**, I. Berzins, A. Alagely, H. Castro, K.B. Ritchie, V.J. Paul and M. Teplitski. 2014. Interactions Between the Tropical Sea Anemone *Aiptasia pallida* and *Serratia marcescens*, an Opportunistic Pathogen of Corals. *Environmental Microbiology Reports* 6 (3): 287-292.
- Lopeztegui-Castillo, A., **S.M. Baker**, Y. Garcés-Rodríguez, R. Castelo-Báez, N. Castro-Graña, and A. Artilles-Valor. 2014. Spatial and Temporal Patterns of the Nonnative Green Mussel *Perna viridis* in Cienfuegos Bay, Cuba. *Journal of Shellfish Research* 33 (1): 273-278.
- Sass, G., and **M.S. Allen**. 2014. *Foundations of Fisheries science*. American Fisheries Society, Bethesda, Maryland.
- Shaw, S.L., and **M.S. Allen**. 2014. Localized Spatial and Temporal Variation in Reproductive Effort for Florida Bass. *Transactions of the American Fisheries Society* 143:85-96.
- Thompson, B.C., and **M.S. Allen**. 2014. Effects of Surgically Implanting Radio Transmitters in Juvenile Largemouth Bass. *Transactions of the American Fisheries Society* 143:346-352.

YEP, BASS LEARN TO AVOID LURES



Fish caught using a Rattletrap bait.

Recaptured fish data also supported evidence for bass learning. The lipless crankbait had the lowest incidence of recaptures, with only two bass caught twice with this lure. The soft stickbait had 25 recaptures with the majority of those (n=20) being caught twice. These significant differences in recaptures suggest that Florida Bass were much less likely to be caught again on a lipless crankbait than the soft stickbait, suggesting that after capture Florida Bass were able to learn avoidance for the lipless crankbait to a larger degree than with the soft stickbait.

Our experiment showed strong evidence that bass can learn to avoid lures after exposure to fishing, but our design didn't consider all variables that interact in real fisheries. We restricted the anglers to using two lures, and thus, we do not know whether angler catch rates would decline as substantially if anglers could have chosen a wider range of lures.

The reduction in angler catch rates we observed after initiating fishing

CONTINUED FROM PAGE 2

could have resulted from fish moving to areas where they were not exposed to angling. However, Devil's Hole Lake is clear, relatively shallow (maximum depth: 15 feet), and the anglers fished both onshore and offshore areas of this small lake. We think the most likely reason that angler catch rates declined was because fish learned to avoid capture after exposure to angling. An interesting question that our study didn't address is why the apparent learning was so different between lure types. Perhaps the most reasonable explanation lies in the lures themselves. The flashy, loud, vibrating lipless crankbait put out much more sensory cues than the soft stickbait, and resulted in higher catch rates at first. While these cues might have attracted Florida Bass initially, the same cues might have made the crankbait much easier to recognize and avoid over time. Such an explanation would seem to support the finesse patterns that many anglers employ in highly-pressured lakes and rivers.

This study provided evidence that changing tactics and using different lure types can influence your catch rates, and anglers should consider that fish are able to learn at least some degree of avoidance from repeated use of the same lure type.

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