36th Annual Meeting of the

Florida Chapter of the

American Fisheries Society

March 2nd –4th, 2016

FFA Leadership Camp

Haines City, Florida

The Florida Chapter of the American Fisheries Society

Chapter Officers

President: Jennifer Rehage, FIU
President-Elect: Andy Strickland, FWC
Past President: Chris Bradshaw, FWC
Secretary-Treasurer: Kevin Johnson, FWC

Major Contributors for our Annual Meeting

Webmaster: Eric Sawyers, FWC
Newsletter Editor: Chris Wiley, FWC
Raffle Co-Chairs: Alan Collins (retired), NOAA & Andy Strickland, FWC
Student Travel Awards: Chuck Cichra, UF
Roger Rottmann Memorial Scholarships: Chuck Cichra, UF
Rich Cailteux Award: Eric Nagid, FWC
Membership Database Manager: Larry Connor, FWC (retired)

Special thanks to

Symposium participants & all presenters

All moderators & judges

36th Annual Meeting of the Florida Chapter American Fisheries Society
March 2-4, 2016

FFA Leadership Camp, Haines City, Florida

Wednesday, March 2nd

11:00am – 6:00pm	Registration
1:00pm – 1:10pm	Welcome and Announcements
1:10pm – 5:00pm	Contributed Papers
5:00pm – 7:00pm	Poster Setup
6:00pm – 7:00pm	Dinner
7:00pm – 8:00pm	**Formal Poster Session**
	Followed by BONFIRE SOCIAL

Thursday, March 3rd

7:30am – 8:30am	Breakfast
7:30am – 6:00pm	Registration
8:30am – 12:00pm	**Symposium: Improving Florida's Fisheries**
12:00pm – 1:00pm	Lunch
1:00pm – 5:00pm	**Symposium: Improving Florida's Fisheries**
5:00pm – 6:00pm	Student Subunit Meeting
6:00pm – 7:00pm	Dinner
7:00pm – 8:00pm	**Chapter Business Meeting & Award Presentations**
	Student Awards: *Travel and Roger Rottmann Scholarship*
	Professional Awards: *Rich Cailteux Award*
	Followed by the RAFFLE, AUCTION & BONFIRE SOCIAL

Friday, March 4th

7:30am – 8:30am	Breakfast
7:30am – 9:00am	Registration
8:35am – 8:45am	Announcements
8:45am – 11:45am	Contributed Papers
12:00pm – 1:00pm	**Lunch & Awards presentation:**
	Best Papers/Best Posters
	Power Tie
	Lampshade Awards

Day-By-Day Agenda – 36th Annual Meeting, 2016 - Florida Chapter American Fisheries Society

Wednesday, March 2nd

11:00am – 6:00pm **Registration**
1:00pm – 1:10pm **Welcome – Chris Bradshaw, Chapter Past President**

Contributed Papers 1 **Moderator:** Chris Bradshaw, FWC

1:10pm – *Boucek, R, K Adair & J Rehage. Preliminary examination of snook on offshore reefs in the Everglades National Park

1:30pm – *Matthias, B, R Ahrens, M Allen, T Tuten, Z Siders & K Wilson. Decoupling the effects of density and environmental variability on fish growth

1:50pm – Parks, K, M Anderson, W Moore, J Cole, S Gordon, P Mahadevan & J Grim. A metagenomic approach to explore the relationship between the gut microbiome and fish trophic level and habitat

2:10pm – Break

Contributed Papers 2 **Moderator:** Brad Fontaine, FWC

2:25pm – Dutterer, D & B Wattendorf. Predicting trophy bass weight from photographs

2:45pm – Flaherty-Walia K, R Matheson, Jr. & T Switzer. Distribution and abundance of snappers in the northeastern Gulf of Mexico

3:05pm – *Granneman, J, D Jones, S Murawski & E Peebles. Association of Oil-related Trace Metals with Lesioned Fish Collected after the *Deepwater Horizon* Oil Disaster

3:25pm – *Hill, G. Fisheries field work across North America: Application of research methodology to different environments.

3:45pm – Break

Contributed Papers 3 **Moderator:** Katie Woodside, FWC

4:00pm – Harriger, K, A Mattair, M Wegener, J Knight. Identifying Fish Hosts to Benefit the Conservation of Imperiled Freshwater Mussels in Northwest Florida

4:20pm – Wegener, M, J Knight & K Harriger. Alligator Gar Population Estimate in the Escambia River, Florida

4:40pm – Steward, C. Will the bass recovery in Lake Trafford improve the crappie fishery?

6:00pm – 7:00pm **Dinner**
7:00pm – 8:00pm **Formal Poster Session** (Beverages and snacks in the poster area)
Followed by BONFIRE SOCIAL

*Student Presentation, Presenter

Poster Session (7:00pm – 8:00pm)
(In alphabetical order by presenting author)

*Akus, S, G Hill, J Rehage, E Cline & M Cook. Quantifying directional movement of mosquitofish minnows between areas of varying water levels in the Everglades

Alvarez, G, R Gorecki & D Gandy. Habitat preferences and interactions with river discharge on young-of-year Sand Seatrout in Apalachicola Bay, Florida

*Beck, C & J Rehage. Evaluating potential effects of chemical contaminants on the South Florida bonefish population

Bisping, S, T Alfermann & P Strickland. Population Characteristics of Yellow Perch in Dead Lakes, Florida

Hernández, S, R Toscano, N Brennan, K Main, C Martinez-Chávez, C Yanes-Roca & C Martínez-Placios. Compensatory growth of Black Snook juveniles under two different salinities

*Durland Donahou, A, N Funicelli, F Chapman. The Lionfish War: What else can be done? Spawning lionfish in captivity as a knowledge source for management

Eckelbecker, R, E Sawyers, K Johnson, D Kolterman, J Saxton. Integrating Submerged Aquatic Vegetation Mapping into Florida's Freshwater Fisheries Long Term Monitoring Program

Fontaine, B. Improving Habitat and Angling Opportunities in a Newly Flooded Reservoir

*Gipson, E, & R Gorecki. Habitat preference and spatiotemporal trends in abundance of the Dwarf Seahorse

Gorecki, R, T Switzer & D Gandy. Determinants of seagrass habitat complexity on fish assemblage structure in Florida Gulf Coast waters

*Hargrove, J, O Weyl, M Allen & J Austin. Invasion History and Genetic Diversity of an Invasive Fish Predator Abroad

*Heenkenda, E & H Yang. Development of effective method for recognition of *Mercenaria mercenaria*, *Mercenaria campechiensis* and their hybrids for clam breeding and aquaculture

*Hill, G, J Rehage, E Cline, M Cook. Quantifying the movement and habitat use of native sunfishes in response to seasonal hydrological variation in the Everglades

Hyle, R, J Holder, E Lundy & D Gandy. Monitoring and research for recovery of American Shad in Florida's St. Johns River

*Kroloff E, J Rehage, J Heinen, R Santos. Where are all the Bonefish? Integrating Angler Perspectives and Ecological Changes Influencing Bonefish Declines in the Florida Bay

*Mckenzie, R. Body Size, Sex and their Role in the Reproductive Ecology and Conservation of the Gulf Black Sea Bass

*Student Presentation, Presenter

*Nowak, C, D Parkyn & D Murie. Developmental changes in durability and structure of physoclistous swimbladders of four marine fish species from the Gulf of Mexico, and the implications for catch and release mortality.

Olsen, B, & B Simcox. Seasonal Variation of Fish Communities in Four Spring-Fed Coastal Rivers

Pacicco, A & R Allman. Production and Aging of Atlantic Bluefin Tuna using sagittal otoliths

Ressel, K, Q Tuckett, J Ritch & J Hill. The distribution of escaped Green Swordtail and Southern Platyfish varieties in proximity to ornamental aquaculture facilities

*Rosati, D, D Murie & D Parkyn. Diet and Bioenergetics of Spotted Seatrout after a Large Scale Anthropogenic Disturbance, the Deepwater Horizon Oil Spill

*Schuman, C & S Baker. The Secret Lives of Filter Feeders: Estimating Oyster Filtration Rates in the Guana Tolomato Matanzas National Estuarine Research Reserve

*Simon, N & H Yang. Germplasm Cryopreservation Techniques in the Eastern Oyster

Stanton, M, Q Tuckett, K Ressel, J Ritch & J Hill. Pike Killifish prey species preference and gape limitation explains their differential impact on native compared to non-native poeciliids

Trippel, N, & P Shueller. Assessing impacts angling for nesting Florida Bass has on individual nest

*Vecchio, J & E Peebles. Using natural tags to fill gaps in our knowledge of Red Grouper life history

Woodside, K, C Wiley, C Paxton, A Strickland, T Alfermann & S Bisping. Changing largemouth bass regulations from a minimum to a maximum on Lake Jackson, Florida

*Student Presentation, Presenter

Day-By-Day Agenda - 36th Annual Meeting, 2016 - Florida Chapter American Fisheries Society

Thursday, March 3rd

7:30am – 8:30am **Breakfast**
7:30am – 6:00pm **Registration**
8:30am – 8:35am **Welcome – Andy Strickland, Chapter President-Elect, Program Chair**

Symposium: ***Improving Florida's fisheries***

Moderator: Andy Strickland, FWC

8:35am – Wattendorf, B. Does TrophyCatch symbolize 37 years of progress?

8:55am – Furse, B. Aquatic Habitat Restoration and Enhancement in Florida and its role in Fisheries Management

9:15am – Sauls, B, T Cross & A Gray. Meeting the Evolving Data Needs for Assessment and Management of Offshore Recreational Fisheries in Florida

9:35am – Break

Symposium: ***Improving Florida's Fisheries (continued)***

Moderator: Daryl Parkyn, UF

9:50am – Collins, A & R McBride. Here today, Hog tomorrow: An overview of hogfish research and management in Florida

10:10am – Renfro, D. Opening New Opportunities to Improve Florida's Fisheries, Reconnecting Emeralda Marsh Conservation Area 3 to the Harris Chain of Lakes

10:30am – Thompson, B. Fisheries management: throwing the toolbox at Lake Griffin, FL

10:50am – Break

Symposium: ***Improving Florida's Fisheries (continued)***

Moderator: Kerry Flaherty-Walia, FWC

11:00am – Faletti, M. Addressing invasive lionfish in the state of Florida: outreach, control efforts and future directions

11:20am – Alfermann, T, S Bisping & A Strickland. Florida Morones: Creating Fisheries and Diversifying Angling Opportunities for the Public

11:40am – Garnett, M, N Trippel, J Sakmar, R Stout & A Agdeppa. Diverse Roles for Stock Enhancement in Creating Fishing Opportunity

12:00pm – 1:00 Lunch

*Student Presentation, Presenter

Thursday PM

Symposium: ***Improving Florida's Fisheries (continued)***

Moderator: Drew Dutterer, FWC

1:00pm – *Quintana, J. Using Social Science Research Methods in Freshwater Fisheries Management

1:20pm – *Kamaruddin, I, K Lorenzen, T Stein, J Struve, B Lindberg & S Jacobson. Fishing Motivations and Consumptive Orientation of Pier Anglers in Florida

1:40pm – Reed, J. Using Volunteers at Bass Tournaments to Collect Age-and-Growth Data

2:00pm – Break

Symposium: ***Improving Florida's Fisheries (continued)***

Moderator: Cheree Steward, FWC

2:15pm – Gestring, K & M Stanford. Butterfly Peacock in Southeast Florida, a FWC success story

2:35pm – Nagid, E, T Tuten & K Johnson. Effects of reservoir drawdowns and the expansion of hydrilla coverage on year-class strength of Largemouth Bass

2:55pm – *Crandall, C, T Garlock & K Lorenzen. Understanding barotrauma mitigation behavior of fishers and promoting effective practices: A theory of planned behavior approach

3:15pm – Shipley, K & M Recks. Florida's Red Drum: A Management Success Story

3:35pm – Break

Symposium: ***Improving Florida's Fisheries (continued)***

Moderator: Nick Trippel, FWC

3:50pm – Santos, R & J Rehage. Spatiotemporal patterns in the catch rates of two important recreational species in Florida Bay: Bonefish and Atlantic tarpon

4:10pm – *Trujillo, V, J Rehage, J Lee, D Gandy. A non-native cichlid is more suitable than a native centrarchid to persist with current water management in simulated Everglades' solution holes

4:30pm – Brennan, N, C Neidig, P Caldentey, E Marcinkowitz & K Leber. Autonomous *in situ* antenna systems evaluate post-release performance of live feed and structural conditioning release treatments of juvenile common snook in a marine estuary

4:50pm – 5:00pm Symposium Wrap-up/Announcements – Andy Strickland
5:00pm – 6:00pm **Student Subunit Meeting** (all students please attend)
6:00pm – 7:00pm **Dinner**
7:00pm – 8:00pm **Chapter Business Meeting & Awards** – everyone please attend!
Student Awards (*Travel and Roger Rottmann Scholarship*)
Professional Awards (*Rich Cailteux)*
Followed by RAFFLE, AUCTION & bonfire social

*Student Presentation, Presenter

Day-By-Day Agenda – 36th Annual Meeting, 2016 - Florida Chapter American Fisheries Society

Friday, March 4th

7:30am – 8:30am **Breakfast**
7:30am – 9:00am **Registration**
8:35am – 8:45am **Announcements**

Contributed Papers 4 **Moderator:** Jessica Quintana, FWC

8:45am – *Siana, A, J Ault, D Bryan, T Ziegler & E D'Alessandra. Probable biocontrol of the invasive lionfish population as an indicator of marine protected area success

9:05am – *Smith, G, D Murie. Potential Food Resource Competition between Non-native Pike Killifish and Juvenile Common Snook

9:25am – Tuckett, Q & J Hill. The contribution of biotic resistance and feralization to cold tolerance in an introduced tropical fish

9:45am – Anderson, C, T Lange, J Moran, D Richard & G DelPizzo. Assessing the influence of lake trophic state on littoral zone fish communities, dissolved oxygen regimes, and habitat composition

10:05am – Break

Contributed Papers 5 **Moderator:** Eric Nagid, FWC

10:25am – Hill, J, Q Tuckett, S Hardin, L Lawson, Jr., K Lawson, J Ritch & L Partridge. Risk Screen of Important Freshwater Ornamental Fishes for the Conterminous United States

10:45am – *Lawson, K & J Hill. Life history strategies and predicting invasiveness of non-native fishes in Florida

11:05am – *Smith K, S Taylor, W Kelso, J Carlson & D Bethea. Estimating Abundance of Smalltooth Sawfish with Capture-Mark-Recapture Data

11:25am – Wiley, C, D Dutterer, K Woodside, C Paxton. Evaluation of the harvest regulation for Redear Sunfish on Merritt's Mill Pond

12:00pm – 1:00pm **Lunch & Awards Presentation**
Jack Dequine Best Student Paper
Best Professional Oral Presentation
Best Poster Presentation – Student & Professional
Power Tie & Lampshade awards

*Student Presentation, Presenter

Abstracts for the 36th Annual Meeting of the Florida Chapter of the American Fisheries Society

***Akus, S[1], G Hill[2], J Rehage[2], E Cline[3] & M Cook[3]**
Poster presentation
[1]Department of Biology, Florida Southern College, 111 Lake Hollingsworth Drive Lakeland, FL 33801
[2]Department of Environmental Studies, Florida International University, 11200 S.W. 8th Street Miami, FL 33199
[3]South Florida Water Management District, 3301 Gun Club Road West Palm Beach, FL 33406
sakus@mocs.flsouthern.edu

Quantifying directional movement of mosquitofish minnows between areas of varying water levels in the Everglades

An important piece in understanding the functionality of an ecosystem resides in the movement of animals within the habitat. However, the ability to observe and quantify movement, particularly in small species, presents a number of challenges. In this study, we used stationary GoPro video cameras set up between habitats of varying depths to view mosquitofish and other minnow species in the Everglades and study their movements in relation to the water depth. Our study was conducted in an experimental facility in the Loxahatchee National Wildlife Refuge. The GoPro video cameras were mounted to a PVC pole in the substrate so the camera was submerged between areas of varying water depth. The cameras were placed in such a way that the shallower habitat was to the left and deeper habitat was on the right in all videos. In front of the camera about a meter away, another PVC pole was placed with measurements to display the water depth at the time of recording, as well as a 15cm ruler to use as a reference for minnow size. We quantified the movements of minnow species in each video by counting when individuals of species left the view of the camera, either to the left or right. Data collected from this project can serve as an indicator of minnow habitat preference in relation to varying water depths. Quantifying these movements can help us further understand the food web dynamics of the Everglades and assist in the development of sound habitat and water management practices.

Alfermann, T, S Bisping & A Strickland
Symposium presentation
Florida Fish and Wildlife Conservation Commission, Joe Budd Field Office, 5300 High Bridge Road, Quincy, FL 32351
ted.alfermann@myfwc.com

Florida Morones: Creating Fisheries and Diversifying Angling Opportunities for the Public

Fisheries managers are limited in the ways they can directly improve fishing in a given waterbody. These methods include fish stocking, habitat enhancement, and setting regulations. Each spring, Florida Fish and Wildlife (FWC) biologists work across division and agency lines to maintain the Morone fisheries (e.g., Striped Bass, White Bass, and Sunshine/Palmetto Bass hybrid fisheries) across the state. Because little or no natural reproduction occurs with Striped Bass and hybrid bass in Florida, these populations and fisheries exist in rivers and lakes throughout the state because of the efforts of FWC and the U.S. Fish and Wildlife Service. These fisheries provide anglers with an exciting species to catch, diversify the number of top trophic level species available to anglers, and are used to recruit new anglers to the sport through the Youth Conservation Centers Network. This collaborative effort begins with researchers collecting Striped Bass brood stock below the Jackson Bluff Dam in the lower Ochlockonee River and the Jim Woodruff Lock and Dam in the Apalachicola River, and White Bass brood stock in the upper Ochlockonee River. Fish are typically collected using boat electrofishing from February through April. Each individual Striped Bass is

checked for egg stage development prior to sending them to the hatchery. At the hatchery, fish are spawned and reared in hatchery ponds to fingerling size (25-50mm TL) for all species, and some hybrids are grown to larger sizes (100-150mm TL) to stock in kids/urban fishing ponds. Since 2010, over 10 million Morones have been stocked in 8 rivers and 29 lakes across the state of Florida, directly improving fishing and fishing opportunities for the public.

Anderson, C[1], T Lange[2], J Moran[2], D Richard[2] & G DelPizzo[2]
Contributed oral presentation
[1] Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Gainesville Fisheries Research Laboratory, 7386 NW 71st Street, Gainesville, Florida 32653
[2] Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Eustis Fisheries Research Laboratory, 601 West Woodward Avenue, Eustis, Florida 32726
christopher.anderson@myfwc.com

Assessing the influence of lake trophic state on littoral zone fish communities, dissolved oxygen regimes, and habitat composition

We deployed mini-fyke nets and dissolved oxygen (DO) sondes in the littoral zones of four Florida lakes to assess the influence of trophic state on fish community composition, habitat composition, and diel dissolved oxygen regimes. Randomly selected sites were sampled in replicate across back-to-back weeks for each lake to assess temporal variability of the fish community and dissolved oxygen data collected at each site. Community composition was similar (Bray-Curtis > 75%) between weeks for all four lakes individually, but differed among lakes. Duration of hypoxia was compared within and among lakes to assess variability in diel dissolved oxygen regimes across a trophic gradient. Within lakes, duration of hypoxia did not differ between weeks, indicating low temporal variability of littoral zone DO within individual lakes. However, duration of hypoxia differed between lakes of lower productivity (i.e., oligotrophic and mesotrophic) and higher productivity (i.e., eutrophic and hypereutrophic), with lakes of higher productivity having significantly longer durations of hypoxia. Differences in habitat variables compared within lakes were not common, but significant differences were detected among lakes for a variety of habitat variables including aquatic macrophyte density and organic sediment thickness. Understanding how trophic state influences the relationships between physical habitat, dissolved oxygen regimes, and fish communities in near shore lake environments is important for effective aquatic resource management and policymaking.

*** Beck, C & J Rehage**
Poster presentation
Department of Earth and Environment, Florida International University
cbeck006@fiu.edu

Evaluating potential effects of chemical contaminants on the South Florida bonefish population

In Biscayne Bay, Florida Bay, and the Florida Keys, the catch numbers of bonefish *Albula vulpes* have declined and the sustainability of this catch-and-release recreational fishery is in question. Although flats fishing in the Florida Keys is economically important to the region and state, the major drivers of bonefish decline have not yet been identified, although potential drivers such changes in prey availability and seagrass cover are under investigation. Chemical pollutants in coastal environments have damaged other fisheries around the world, and some waterways discharging into South Florida's coastlines have high concentrations of organic chemicals and nutrients. Contaminants can have both direct lethal and sublethal effects on fish as well as indirect effects through deleterious changes to ecological conditions. This project asks, what contaminants are of potential concern for *Albula vulpes* in South Florida waters? To answer this, existing data from the literature is being reviewed to determine which

contaminants bonefish are potentially exposed to in the environment, and at what concentrations. I will use GIS and spatial analysis tools to map patterns of key contaminants throughout South Florida. Then a review will be made of these contaminant's potential toxicity and effects on fish, from which a conceptual model of the pathways of bonefish exposure to and potential effects of contaminants will be developed.

Bisping, S, T Alfermann & A Strickland
Poster presentation
Florida Fish and Wildlife Conservation Commission, Eustis Research Lab, Eustis, FL 32726
scott.bisping@myfwc.com

Population Characteristics of Yellow Perch in Dead Lakes, Florida

Yellow Perch are an important recreational and commercial sportfish throughout the United States. In Florida, Yellow Perch exist only in limited populations within the Apalachicola River watershed. We conducted a one-year study to assess the life history and population characteristics of Yellow Perch in the Dead Lakes, Florida. We collected 271 Yellow Perch ranging from 72 to 343 mm TL, via boat electrofishing from West Arm and Stone Mill Creek regions of the Dead Lakes. Yellow Perch ranged from 0–6 years in age; a majority of the catch consisted of Age–0 (48.3%) and Age–2 (32.8%) fish. Length at age data was fitted to a Von Bertalanffy growth curve (L_{inf} = 339.1, K = 0.521, T_O = -0.481). A weighted catch curve was used to estimate total annual mortality (A) at 65%. The overall mean *Wr* was 70 and showed no statistical difference between length groups (ANOVA, *P = 0.49*; Stock–Memorable). The low condition (*Wr*) and high mortality estimates are consistent with other southeast populations. Stomach contents were identified and showed a diet consisting primarily of invertebrates. Our study suggests that Yellow Perch in the Dead Lakes are a fast growing population with limited abundance and a long growing season.

***Boucek, R[1], K Addair[2] & J Rehage[1]**
Contributed oral presentation
[1]Florida International University, Miami, FL, 33199
[2]Charles E. Schmidt College of Science, Florida Atlantic University
Rbouc003@fiu.edu

Preliminary examination of snook on offshore reefs in the Everglades National Park

The extent which, and mechanisms why common snook use non-estuarine habitats has developed into an important area of research. One habitat of interest are nearshore and offshore reefs, where divers and anglers now regularly observe large aggregations of snook. Here we ask 1) are snook found on offshore reefs migrating between reef and coastal habitats, or they are permanent residents to reefs? And 2) if they are migrating between those habitats, what mechanisms might be driving those migrations? We sampled snook in Everglades National Park reefs (10 KM offshore) and nearby coastal locations, monthly from May to October, via hook and line. We measured and sexed all captured snook and took a fin biopsy for stable isotope analysis. To answer our questions, we compared population demographics, catch rates and isotopic signatures between inshore and offshore populations. From angler reports and personal observations, we developed a set of apriori hypotheses, 1) snook found on reefs are migrants from inshore areas, and 2) snook are using reefs as spawning aggregation sites. Our results showed that snook catch rates varied between inshore and offshore habitats, with offshore catch rates being an order of magnitude higher than inshore areas. Offshore snook catch rates also showed a seasonal pattern, with catches peaking during the height of the spawning season (June-July). Second, average body length of reef snook was significantly larger than inshore areas. Sex ratios also varied across habitats. On reefs, in the May-June and the June-July samples, ratios were approximately 50% male and 50% female, and became male dominated at the end of the spawning season. In contrast, all coastal sites except one were male dominated. Results from stable isotope analyses will be presented at the meeting. To conclude, observed

seasonality in catch rates may support our hypotheses that snook are migrating to those reefs from inshore areas, and stable isotope analyses should help support or refute this conclusion. Also, differences in the population demographics between inshore and offshore areas may indicate that these reefs may function as spawning aggregation sites.

Brennan, N[1], C Neidig [1], P Caldentey[1], E Marcinkowitz[2] & K Leber[1]
Symposium presentation
[1] Mote Marine Laboratory 1600 Ken Thompson Parkway, Sarasota, FL 34236.
[2] School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York 11794
nbrennan@mote.org

Autonomous *in situ* antenna systems evaluate post-release performance of live feed and structural conditioning release treatments of juvenile common snook in a marine estuary

Common snook are a good candidate for stock enhancement research as their stocks are subjected to high recreational fishing pressure and habitat loss and require rigorous stock management. Recent progress in snook aquaculture technology includes evaluating the potential for using pre-release conditioning to improve survival of hatchery-reared snook in the wild. In 2014 and 2015, hatchery-reared juvenile snook (120-270 mm TL, mean wet weight 42$\pm$17g[SD]) were individually tagged with half-duplex passive integrated transponder (PIT) tags, then conditioned to alarm cues, live feed and structural habitat prior to release into the wild. Releases occurred in a known snook nursery habitat, North Creek, a tidal creek tributary located in Sarasota County. Replicate treatment releases occurred in August of 2014 (*n*=2100 released) and 2015 (*n*=409 released) at three sub-locations within the tidal creek (upstream, lagoon, and outside of the lagoon nearest the intracoastal waterway). Underwater autonomous PIT tag antennas (Oregon RFID) were installed in proximity to each release site to collect recapture data on the released snook. PIT tag antennas were supplied with 18V DC power supplied through solar panels. Antennas operating at the time of a fish release can provide recapture data to fill critical information gaps in our understanding of post-release fate and survival patterns. Initial data showed that 49% of the released snook were detected by the antennas within 3 weeks post-release. During the Fall, tag detection rates steadily declined, and this corroborates earlier data showing an ontogenetic habitat shift out of the tidal creeks prior to winter. Treatment effects on tag recovery rates will be discussed in the presentation. As snook are known to have high fidelity to their juvenile nursery habitats and concentrate in warmer tidal creek habitats during winter, the antenna systems will continue to provide important recapture data relating to release conditioning treatments, microhabitat use patterns, and seasonal migration patterns.

Hernández, S[1], R Toscano, N Brennan[2], K Main[2], C Martinez-Chávez, C Yanes-Roca[2] & C Martínez-Placios[1]
Poster presentation
[1] Laboratorio de biotecnología acuícola y acuicultura IIAF – UMSNH, Av. San Juanito Itzícuaro s/n. San Juanito Itzícuaro, Morelia, Michoacán, México
[2] Mote Marine Laboratory 1600 Ken Thompson Parkway, Sarasota, FL 34236.
nbrennan@mote.org

Compensatory growth of black snook juveniles under two different salinities

Black snook is one of the least studied species of the Centropomids but has high market prices and demand with good aquaculture potential. Research also indicates that aquaculture production efficiency may benefit from feeding strategies that stimulate compensatory growth which may lead to less feed costs. The objective of this study was to investigate the compensatory growth response of black snook juveniles reared in high (35ppt) and low salinity (1.5ppt), after a nutritional restriction period. Black snook juveniles (68 dph) were size sorted (small 0.45±0.23 g, medium 0.91±0.19 g and large 1.28 ± 0.22 g) and distributed into low (1.5 ppt) and high (35 ppt) salinity systems, with 6-110 L tanks each. Both salinity

treatment received a non-digestible experimental diet (CG) and a commercial diet (Control) (Otohime, Marubeni Nisshin Feed Co.). Fishes were fed 5x daily to apparent satiation. After 2 weeks, the CG organisms were fed with control diet. Feed was weighed to know how much food was consumed after Weight, TL, FL, and ST measurements were taken at the beginning and every two weeks thereafter. After 8 weeks, the data was processed by two-way ANOVA. Comparisons were made between salinities and GC and C treatments, at each two-week period within a minimum significance level of $P<0.05$. At week 2, the GC groups did not experience notable weight gain, and even lost weight in 1.5 ppt (growth depression period). By week 4, after a reestablished diet GC showed significant growth in both salinity treatments, which continued steadily until the end of the exp. Finally, at week 8 all treatments in both salinities attained the same final weight. These results show clear full compensatory growth in black snook at low and high salinities thus increasing our knowledge of their plasticity and the species potential for aquaculture.

Collins, A[1] & R McBride[2]
Symposium presentation
[1]University of Florida/IFAS Extension, Florida Sea Grant, 1303 17th Street West, Palmetto, FL 34221
[2] Northeast Fisheries Science Center, National Marine Fisheries Service ,166 Water Street, Woods Hole, MA 02543
abcollins@ufl.edu

Here today, Hog tomorrow: An overview of hogfish research and management in Florida

Hogfish stock assessments have been confounded in the past due to a lack of information regarding overall demographics and stock structure. Data regarding the fishery are often limited and regionally dependent; however, spatially explicit applied research can inform management efforts. This research was initiated over a decade ago to address the data-poor nature of hogfish, and through time, has provided a large suite of information. Using cooperative research and intensive field sampling, we were able to describe geographic differences in size, timing of sex change and total egg production, as well as provide information on the genetic structure of hogfish in the southeastern United States. Hogfish are protogynous, relatively long-lived harem-forming fish that spawn daily for months. Size, age and timing of sex change were found to vary on a spatial scale. Offshore females were larger, spawned longer and reached almost twice the size before sexual transition than females nearshore. Spatial variations in size coincide with ontogeny because hogfish move offshore with growth; however, even after accounting for fish size, offshore females spawned more. These nearshore and offshore spawning components represent two contingent spawning strategies that likely enhance total population stability and resilience of this stock in the eastern Gulf of Mexico. The genetic structure of hogfish within the southeastern U.S. was also examined and genomic proportions of hogfish were partitioned into 3 distinct genetic clusters, geographically delineated as 1) the eastern Gulf of Mexico, 2) the Florida Keys and the southeast coast of Florida, and 3) the Carolinas. The geographically limited reproductive exchange in this species, as well as the spatial variability in demographics, indicates that future stock assessments should incorporate regionally partitioned analyses of life history and fishery data.

***Crandall, C, T Garlock & K Lorenzen**
Symposium presentation
University of Florida, Gainesville, FL 32653
kicksea@ufl.edu

Understanding barotrauma mitigation behavior of fishers and promoting effective practices: A Theory of Planned Behavior approach

Reducing barotrauma-related discard mortality of reef fish is an important stock conservation priority. Fish venting and use of descending gear are equally effective measures to reduce barotrauma-related mortality, but fishers are not currently required to possess or use venting or descending gear (a venting tool requirement in the Gulf of Mexico was revoked in 2013). An online survey was conducted to better understand current barotrauma mitigation behavior by fishers and attitudes towards related regulations. The survey targeted recreational reef anglers, charter captains, and commercial fishers and used the Theory of Planned Behavior to predict and explain fishers' intentions to use venting tools and/or fish descenders based on three variables: attitude towards the behavior, social norms and perceived control. Overall, results show a general preference for venting tools over fish descenders. Fishers felt confident in their ability to use the method(s) they are familiar with (possibly over-confident given that in other surveys, many fishers had difficulties describing correct use of venting tools). Perceived social norms had the biggest influence on intention to use either method. Social norms for the use of mitigation measures can be reinforced for example through messages from respected opinion leaders and through regulations. The results also show fishers were generally not opposed to the (re-)introduction of regulatory policies on barotrauma mitigation.

***Durland Donahou, A[1], N Funicelli[1,2] & F Chapman[1]**

Poster Presentation

[1]University of Florida, Fisheries and Aquatic Sciences, 7922 NW 71st St, Gainesville, FL 32653

[2]Nova Southeastern University, 8000 N Ocean Dr, Dania Beach, FL 33004

adurland@ufl.edu

The Lionfish War: What else can be done? Spawning lionfish in captivity as a knowledge source for management

Lionfish, *Pterois* spp., management techniques are limited to the removal of lionfish through recreational fishing and derbies. While these efforts have the ability to reduce local populations, the effects have not been clearly demonstrated. The fished areas are potentially repopulated with recruitment from areas where there is no fishing, as well as with lionfish found at depths that exceed diving limits. A novel management practice is essential for ecosystem-wide reduction of lionfish populations. Additional information about the life history of lionfish is needed to effectively manage this species. Current knowledge of lionfish spawning is limited and more quantitative studies of lionfish reproductive behaviors are needed. In order to improve management, a greater understanding of lionfish reproduction and new techniques for controlling reproduction are essential. Achieving lionfish spawning in captivity could provide knowledge about why lionfish populations spread so rapidly and potentially lead to an additional control method. The goal is to provide management with potential techniques for improved control efforts, such as sterilization, Trojan males, and triploid individuals, among others. Additionally, understanding lionfish spawning behavior in captivity may provide an unknown outlet for control efforts. In order to make any significant reduction in lionfish populations, management efforts need to include a variety of techniques.

Dutterer, A[1] & B Wattendorf[2]

Contributed oral presentation

[1]Florida Fish and Wildlife Conservation Commission - Fish and Wildlife Research Institute, Gainesville Fisheries Field Office, 7386 NW 71st St., Gainesville, FL 32653

[2]Florida Fish and Wildlife Conservation Commission – Division of Freshwater Fisheries Management, Bryant Building—FWC Headquarters, 620 S Meridian St., Tallahassee, FL 32399

Andrew.dutterer@myfwc.com

*Student Presentation, Presenter

Predicting trophy bass weight from photographs

TrophyCatch is a relatively new citizen-science and conservation program for trophy bass (≥8 lbs) in Florida. It documents catches of trophy-size bass, building a dataset of where and when these fish were caught, and promotes the catch-and-release angling ethic for these rare and valuable fish. Program qualification is weight-based and relies on anglers to photo document their catches with live fish on weighing scales. Since its start in 2012, the program has experienced tremendous growth, and anglers have documented over 3,000 trophy bass. Despite its success, two points of criticism are occasionally voiced by stakeholders—the process of photo documenting bass provides opportunity for cheating and requires handling of rare fish that may be excessive, causing harm to the fish. In response, we investigated methods to predict bass length and weight from photographs. This tool would give *TrophyCatch* the ability to double-check entries suspected of fraud and possibly eliminate the need to use weighing scales in the documentation process, which would reduce handling of bass prior to release. During routine, prescribed boat electrofishing samples in spring 2014 and 2105, we collected photographs of 184 bass, most of which were ≥8 lbs. We evaluated two holding positions of fish (one-hand vertical vs. two-hand horizontal) and used multiple measures of length and body depth collected from photographs as predictor variables for empirical measures of length and weight. The average performance of using photo-derived measures to estimate empirical length was good. With linear models, we were able to estimate TL to within ±30 mm (±1.2 inches) for 93% and 85% of observations for horizontally and vertically oriented bass, respectively. Similarly, (but with a polynomic model that incorporated a volume function) we could estimate a bass's weight to within ±500 g (1.1 lbs) of empirical weight for 79% and 84% of observations for the horizontal and vertical linear models, respectively. The downside of these methods is that some errors in measurement (i.e., difference between predicted and observed) were rather large. Maximum error in predicting TL was 89 mm (3.5 in), and maximum error in predicting weight was 1,934 g (4.3 lbs). Any future use of these methods should take into consideration that average performance is accurate, but the uncertainty associated with any given estimate will be large relative to true values.

Eckelbecker, R, E Sawyers, K Johnson, D Kolterman & J Saxton

Poster Presentation

Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Eustis Fisheries Field Lab, FL

Robert.Eckelbecker@myfwc.com

Integrating Submerged Aquatic Vegetation Mapping into Florida's Freshwater Fisheries Long Term Monitoring Program

The Florida Fish and Wildlife Conservation Commission (FWC) recently added submersed aquatic vegetation (SAV) sampling to its Freshwater Fisheries Long Term Monitoring (LTM) program. This sampling will occur annually during summer months. We use hydro-acoustic sensing paired with BioBase, a cloud based software service that automates processing of depth finder sonar log files, to produce SAV and bathymetric maps for core LTM lakes. Biobase also provides quick estimate of percent area covered (PAC) and percent volume infested (PVI) estimates of vegetation for each lake. In addition, point-intercept sampling is conducted to determine species richness, frequency of occurrence, and density. This valuable baseline dataset of vegetation parameters will contribute to research and management decisions within FWC.

Faletti, M
Symposium presentation
Florida Fish and Wildlife Conservation Commission, Division of Marine Fisheries Management, 2590 Executive Center Circle East, Tallahassee, FL 32301
Meaghan.faletti@myfwc.com

Addressing invasive lionfish in the state of Florida: outreach, control efforts and future directions
The first reported sighting of invasive lionfish occurred in 1985 off Dania Beach, Florida. The Florida Fish and Wildlife Conservation Commission (FWC) is taking actions to combat this invasion and prevent further damage to native marine ecosystems. In recent years, FWC has implemented rule changes to allow uninhibited harvest of lionfish, hosted summits to collect stakeholder feedback on state involvement in lionfish control, created a Lionfish Outreach Program to encourage further participation in lionfish removals throughout the state, and initiated a draft Lionfish Control Plan specific to the state of Florida. Here, we address the specific rule changes that have been approved to assist stakeholders in removal of invasive lionfish and gauge their effectiveness based on public surveys. We review goals and lessons learned from the stakeholder meetings and summits FWC has held and how this has led to the draft of a state Lionfish Control Plan. We also review the accomplishments of the Lionfish Outreach Program and its future directions. This includes the expansion of the Reef Rangers Lionfish Control Program, in which divers pledge to clean lionfish off their local reefs and engage with other dive groups in their community. The FWC highly encourages removals of lionfish from Florida waters, and continually seeks out new ways in which to control this invasive species.

Flaherty-Walia, K, R Matheson, Jr. & T Switzer
Contributed Oral presentation
Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, 100 8th Avenue SE, St. Petersburg, FL 33701
kerry.flaherty-walia@myfwc.com

Distribution and abundance of snappers in the northeastern Gulf of Mexico
Reef fishes, such as those in the snapper family, support important recreational and commercial fisheries in the Gulf of Mexico. Many species of snapper are susceptible to overfishing due to depth and habitat preferences, age at maturity, and a high probability of discard mortality for undersized and out-of-season fish. Fisheries-independent trawling data (2010-2014) collected during SEAMAP on the continental shelf from Texas to the Florida Keys were used to document and analyze distribution and abundance patterns of several snapper species including Gray Snapper, Lane Snapper, Red Snapper, Vermilion Snapper, Wenchman, and Yellowtail Snapper. Spatial patterns for each species are described by region and depth, with comments about sizes collected, annual abundance, and known life history characteristics. The comprehensive description provided by this study will provide valuable information for future discussions regarding fisheries management for this economically important family in the Gulf of Mexico.

Fontaine, B
Poster presentation
Florida Fish and Wildlife Conservation Commission, 2595 McGraw Ave, Melbourne, FL 32934
Bradley.fontaine@myfwc.com

Improving Habitat and Angling Opportunities in a Newly Flooded Reservoir
Increasing human populations in Florida are expected to have effects on freshwater resources. The need for flood control and nutrient filtering impoundments will likely increase in the future. One of these impoundments, Fellsmere Water Management Area (FWMA) is scheduled for flooding in 2016. The

property purchased by the St. Johns Water Management District (SJWMD) was relatively flat and monotypic agricultural land, not ideal for fish and wildlife habitat. The Division of Freshwater Fisheries Management (DFFM) has been working closely with SJWMD in making habitat improvements in selected areas of the reservoir. Included in the habitat improvements, are roughly 1,800 acres of flat land, that has been modified to create divots, ditches, humps, shelves and other land configurations that are expected to hold fish and wildlife and enhance the sport fishery. This project cost in excess of One Million dollars at completion. Therefore, research is needed to determine the impact that the new habitat will have on the fish and wildlife communities, along with the fishery. Research will focus on how the newly created habitats influence and impact fish communities and fishing. These habitat enhancements are expected to influence fish communities through creation of structured habitat, development of emergent and submersed vegetation, and impacts to water quality. FWMA represents a unique opportunity to study biological, chemical, and physical responses to flooding. By taking a holistic approach, and measuring the biological, chemical, and physical responses, as well as an economic measure in the creel, this project will help guide managers in future water retention reservoir design and construction.

Furse, B
Symposium presentation
Florida Fish and Wildlife Conservation Commission, 3991 SE 27th Court, Okeechobee, FL 34974
Beacham.furse@myfwc.com

Aquatic Habitat Restoration and Enhancement in Florida and its role in Fisheries Management

On the first day of "Fisheries Management" class, we are taught fisheries management is a three-legged stool: fish, habitat, and people. We learn that all aspects of aquatic habitat are important when it comes to fisheries management (first lesson: you need water for fish). Unfortunately, many fisheries managers don't fully understand the "people" part until they have been to their first public meeting or done their first creel survey: we manage people (and their wants and desires) often more than the fish we spend so much time studying. In Florida, lakes, rivers, wetlands, and other water-bodies have experienced habitat changes resulting from anthropogenic influences, which impact fish populations and the ways we manage those populations and the people who use them. The Florida Fish and Wildlife Conservation Commission, in cooperation with stakeholders, non-governmental entities, and other state, federal, and local natural resources agencies, uses various aquatic and wetland restoration and management techniques to improve freshwater aquatic habitat on public resources. Current techniques include, but are not limited to, installation, modification, or removal of water control structures and conveyances for hydrologic restoration, excavation and removal of nuisance aquatic plants and organic sediments within limnetic and littoral habitats, control of exotic, noxious, and invasive aquatic and wetland plants through mechanical treatment and herbicide application, and re-establishment of native aquatic and wetland plants through transplanting. This multi-disciplinary, team-oriented approach to aquatic habitat management provides the agencies and stakeholders with a broader, more holistic approach toward enhancing degraded aquatic fish and wildlife habitat. This presentation will (1) discuss the threats facing water-bodies and wetlands in Florida; (2) provide a summary of habitat restoration and enhancement techniques and expected benefits; (3) discuss challenges faced in aquatic and wetland restoration and enhancement for fisheries benefits; and (4) discuss the importance of developing partnerships to complete restoration and enhancement projects.

Garnett, M[1], N Trippel[2], J Sakmar[1], R Stout[1] & A Agdeppa[1]
Symposium presentation
[1] Florida Bass Conservation Center. 3583 CR 788, Webster, FL 33597
[2] FWRI Eustis. 601 West Woodard Avenue, Eustis, FL 32726
melissa.garnett@MyFWC.com, nick.trippel@myfwc.com

*Student Presentation, Presenter

Diverse Roles for Stock Enhancement in Creating Fishing Opportunity

The Florida Fish and Wildlife Conservation Commission's (FWC) Division of Freshwater Fisheries Management (DFFM) and Fish and Wildlife Research Institute (FWRI) are dedicated to the research, management and conservation of Florida's freshwater aquatic life for public benefit. The Florida Bass Conservation Center (FBCC) and the Blackwater Research and Development Center (BRDC) support this mission through stock enhancement designed to improve Florida's fishing and fishing opportunities. As Florida's population grows, it becomes increasingly important for fisheries managers to consider the diversity of stakeholder fishing methods when developing a management program. Specifically, fish stocked for youth fish camps, local derbies, family fishing events and urban pond projects promote recreational fishing for Florida families and the general angler. Stock enhancement has long been considered a valuable tool for fisheries managers in a traditional sense of increasing depressed fish populations by introducing more individuals on a large scale. Stocking can also be used to create small scale ephemeral fisheries, or put-and-take. Ongoing stocking efforts have included the following species: Florida bass (*Micropterus floridanus*), channel catfish (*Ictalurus punctatus*), bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), sunshine bass (*Morone chrysops x M. saxatilis*), palmetto bass (*M. saxatilis x M. chrysops*). In fiscal year 2015-2016, the FBCC received a total of 147 requests for stocking, and of those only thirteen are for large systems. The remaining 134 requests are for fish in smaller put-and-take style fisheries. Culture facilities such as the FBCC and BRDC ameliorate the needs of these programs by culturing desirable fish species targeted for angling habits of specific stakeholder groups. Therefore; the usefulness of stock enhancement as a managing tool should expand and continue to include catering to these put-and-take style fisheries, since the end goal of management is to improve fishing and fishing opportunity for Florida, as Florida transforms into an increasingly urban state.

Gestring, K & M Stanford

Symposium presentation

Florida Fish and Wildlife Conservation Commission, Nonnative Fish and Wildlife Program, 10216 Lee Road, Boynton Beach, FL 33473

kelly.gestring@myfwc.com

Butterfly Peacock in Southeast Florida, a FWC success story

Butterfly peacock were introduced into southeast Florida freshwater canals 1984 as a biological control to increase predator pressure on abundant exotic forage fishes and to provide additional sportfishing opportunities. Pre-introduction field and laboratory studies indicated that butterfly peacock will be geographically restricted to these man-made, highly disturbed canal systems since they cannot tolerate saltwater or winter temperatures in the shallower fresh waters of south Florida's natural systems. Extensive assessments of southeast Florida canal fish communities yielded prey biomass estimates >10 times that of predators with spotted tilapia as a dominant prey species. Post-introduction findings show that butterfly peacock have overwintered and reproduced every year since 1984 and as predicted, have permanent populations in Miami-Dade and south Broward counties and expand their range into southern Palm Beach County and into adjacent water conservation areas during mild winters. Butterfly peacock have contributed to observed declines in spotted tilapia biomass (83%) and numbers (92%) and have had little or no adverse impact on canal fish communities. Butterfly peacock are south Florida's most popular freshwater sportfish with an economic worth of more than $12 million dollars a year. Mercury testing indicate butterfly peacock are safe to eat but a very strong Catch and Release ethic amongst anglers helps keep this fishery viable.

Alvarez, G, R Gorecki & D Gandy
Poster presentation
Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 350 Carrol St., Eastpoint, FL 32328
gina.alvarez@myfwc.com

Habitat preferences and interactions with river discharge on young-of-year Sand Seatrout in Apalachicola Bay, Florida

Apalachicola Bay is a productive estuary whose vitality is largely dependent on the influx of freshwater from the Apalachicola River. Together, the bay and river provide key habitat essential for growth and survival of a wide array of estuarine-dependent fishes. The Sand Seatrout, *Cynoscion arenarius,* is one of many estuarine-dependent fishes of commercial and recreational importance found within the estuary. Previous work has been completed on Sand Seatrout and their habitat preferences in Gulf of Mexico waters, including Apalachicola Bay. However, interactions between river discharge, salinity and habitat preferences in relation to abundance of young-of-year (YOY) recruits in Apalachicola Bay have not been previously studied. To better understand the influence of river discharge on YOY Sand Seatrout abundance, we analyzed fifteen years (2000-2014) of trawl and small mesh seine data collected by the Florida Fish and Wildlife Research Institute, Fisheries-Independent Monitoring Program. We examined monthly length frequencies to determine timing of peak YOY recruitment (May-Sept). Habitat preferences for temperature, salinity, bottom type, depth, distance from river mouth, and the interaction with river discharge) were analyzed using a habitat suitability approach and generalized linear modeling (GLM). Young-of-year Sand Seatrout preferred unvegetated muddy areas in river and bay habitats, particularly in warmer temperatures (29.1-31°C). We observed a significant relationship between the interactions of river discharge with salinity or distance from river mouth and the abundance of Sand Seatrout for all gears. Future work will primarily focus on the role of river discharge in conjunction with other habitat parameters to describe essential habitat.

***Gipson, E & R Gorecki**
Poster presentation
Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 350 Carrol St., Eastpoint, FL 32328
Emily.gipson@knights.ucf.edu

Habitat preference and spatiotemporal trends in abundance of the Dwarf Seahorse, *Hippocampus zosterae*.

Populations of *Hippocampus zosterae* have been steadily declining from historic levels due to habitat loss and overfishing from the aquarium trade. The Florida Fish and Wildlife Conservation Commission, The Nature Conservancy, and the American Fisheries Society list the conservation status of *H. zosterae* as threatened, while IUCN Red List of Threatened Species lists them as data deficient due to an absence of data concerning population trends, extent of occurrence and habitat use. We analyzed otter trawl and small mesh seine data collected by the Florida Fish and Wildlife Research Institute, Fisheries-Independent Monitoring Program from 2000-2014 in Florida estuaries to: 1) examine spatiotemporal trends in *H. zosterae* abundance, and 2) identify key habitat preferences that may be used to improve future conservation efforts. We found *H. zosterae* were most abundant in the Indian River Lagoon (IRL), Charlotte Harbor, Tampa Bay, and Florida Bay. Habitat suitability and generalized linear modeling (GLM) were used to examine habitat preferences for temperature, salinity, bottom type, depth, percent cover of submerged aquatic vegetation (SAV), and SAV species composition within each of the aforementioned bays where *H. zosterae* were most abundant. Results indicated a strong habitat preference towards *Thalassia* spp. dominated seagrass beds ($P = < 0.05$), and sand or mud/sand substrate for all four bays. We

also found *H. zosterae* showed a strong preference for salinities higher than 10 ppt in all bays (*P*=<0.01) except for IRL where salinities largely remained above 10 ppt over the study period.

Gorecki, R[1], T Switzer[2] & D Gandy[1]
Poster presentation
[1]Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 350 Carrol St., Eastpoint, FL 32328
[2] Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 100 8th Avenue SE, St. Petersburg, FL 33701
Bob.Gorecki@myFWC.com

Determinants of seagrass habitat complexity on fish assemblage structure in Florida Gulf Coast waters
Seagrass beds provide important feeding and nursery habitat for a diverse array of species including many of recreational, ecological, and commercial importance. Seagrass habitats vary in size, composition, and patchiness throughout Florida's Gulf Coast and may influence community structure. Six years (2009-2014) of trawl and haul seine data over seagrass beds for seven Gulf Coast regions collected by the Florida Fish and Wildlife Research Institute, Fisheries-Independent Monitoring Program were examined to understand spatiotemporal trends in seagrass habitats and relationships between seagrass bed patchiness and fish assemblage structure. Seagrass habitat descriptors (SHD) were classified into five different categories of patchiness at the time of sampling. Species contributing to observed differences in seagrass habitat complexity and regions were determined using SIMPER analyses. Differences in fish assemblages between years (trawl *P* =0.001; haul seine: *P*=0.001), estuaries (trawl: *P* =0.001; haul seine: *P*=0.001), and levels of seagrass patchiness (trawl: *P* =0.001; haul seine: *P*=0.001) were evident in PermANOVA analyses for both trawl and haul seine data. Pairwise comparisons showed no significant difference between unbroken seagrass meadows and those with small (<10m²) un-vegetated patches, while comparisons between areas with small un-vegetated patches were marginally different (trawl: *P*=0.061, seine: *P*=0.055) from areas with large (>10m²) un-vegetated patches. The remaining levels of seagrass patchiness investigated showed significant pair-wise differences (*P*<0.01) between groups for both gear types. Fish community structure varied inter-annually, by geographic location, and levels of seagrass patchiness.

***Granneman, J, D Jones, S Murawski & E Peebles**
Contributed oral presentation
College of Marine Science, University of South Florida, St. Petersburg, FL USA
jgranneman@mail.usf.edu

Association of Oil-related Trace Metals with Lesioned Fish Collected after the *Deepwater Horizon* Oil Disaster
The incidence of external lesions on Gulf of Mexico (GoM) fishes is suspected of increasing after the Deepwater Horizon (DWH) oil disaster, yet a lack of baseline data makes it difficult to definitively link cause and effect. The objectives of the present study were to: (1) determine if fish were exposed to metals associated with the DWH oil as a result of the oil spill, and (2) examine patterns of oil-associated metal exposure, particularly among lesioned and non-lesioned fish. The function of otoliths as recorders of both fish age and microchemistry enables us to describe the lifetime chemical histories of fish. Therefore, we analyzed otoliths from the following species collected from 2011 to 2013 in the GoM: Red Snapper, Red Grouper, Yellowedge Grouper, Southern Hake, Red Porgy, and Tilefish. Otoliths were analyzed for a suite of 9 trace metals that are known to be associated with DWH crude oil: ^{24}Mg, ^{51}V, ^{53}Cr, ^{57}Fe, ^{59}Co, ^{60}Ni, ^{63}Cu, ^{64}Zn, and ^{208}Pb. We found that the concentrations of oil-associated metals did not significantly change before, during, or after the DWH oil spill. However, we found that the extent of exposure to oil-associated metals appeared to vary according to species-specific life history patterns. Additionally, lesioned fish had

distinctive trace metal compositions in their otoliths, with ^{60}Ni and ^{64}Zn being the primary elements responsible for distinguishing lesioned from non-lesioned fish groups. Lesioned fish often had elevated otolith ^{60}Ni and ^{64}Zn before and after the DWH oil disaster. These findings suggest that lesioned individuals were exposed to a persistent source of metals in the GoM prior to the oil spill; this may have made them vulnerable to the DWH oil spill and resulted in lesion formation in response to DWH oil exposure.

Parks, K[1], M Anderson[1], W Moore[1], J Cole[1], S Gordon[1], P Mahadevan[2] & J Grim[2]
Contributed oral presentation
[1] Presbyterian College, Department of Biology, 503 S. Broad St. Clinton, SC 29325
[2] The University of Tampa, Department of Biology, 401 W. Kennedy Blvd, Tampa, FL 33606
jgrim@ut.edu

A metagenomic approach to explore the relationship between the gut microbiome and fish trophic level and habitat

The microbial ecosystem associated with the gut in fishes is complex and dynamic, and the characteristics of this community are likely varied to support the occupation of a range of ecological niches by the host. To further test the hypothesis that associated microbes may be species-specific, we examined the intestinal microbiota from two pairs of species - one from near-shore, temperate, marine habitats and a second from near-shore, polar, marine habitats. Spotted sea trout (*Cynoscion nebulosus*) and flathead mullet (*Mugil cephalus*), two species which utilize different trophic niches (carnivore and herbivore, respectively), were sampled from Charleston Harbor, Charleston, SC. Additionally, two Antarctic notothenioid fishes (blackfin icefish – *Chaenocephalus aceratus* and black rockcod – *Notothenia coriiceps*) were sampled to represent unique trophic levels in near-shore habitats of the thermally stable Southern Ocean. A metagenomics approach was used to evaluate the gut microbial communities from different regions and preparations of the host gut by sequencing 16s rDNA. The resulting sequences were compared within and among species. The study revealed differences in composition of microbial communities based on host habitat (temperate versus polar marine habitats) and diet (carnivore, omnivore, and herbivore), and we propose specific bacterial phyla that support these differences. Additionally our analyses reveals a 'core gut microbiota' common to these fishes regardless of differences in ecological niche, location of origin, or phylogeny. Future work will be required to relate differences in bacterial community composition to potential variation in community function in order to determine how (or if) these different bacterial communities support host function. Work supported by NSF Office of Polar Programs (ANT-1019305), Presbyterian College Faculty Development Committee, and PGRP NSF 11-500, and The University of Tampa College of Health and Natural Sciences and Department of Biology.

***Hargrove, J[1], O Weyl[2,3], M Allen[4] & J Austin[1, 4]**
Poster Presentation
[1]Department of Wildlife Ecology and Conservation, University of Florida, P.O. Box 110430, Gainesville, Florida 32611, USA
[2]South African Institute for Aquatic Biodiversity (SAIAB), Private Bag 1015, Grahamstown, 6140 South Africa
[3]Centre for Invasion Biology, SAIAB, Private Bag 1015, Grahamstown, 6140 South Africa
[4]Fisheries and Aquatic Sciences Program, University of Florida, 7922 Northwest 71st Street, Gainesville, Florida 32653, USA
tractor@ufl.edu

Invasion History and Genetic Diversity of an Invasive Fish Predator Abroad

Largemouth Bass was brought to South Africa at the beginning of the 20th century to create novel angling opportunities and since that time has been transferred extensively throughout the country. Largemouth

Bass are of concern to conservation managers as populations can become invasive and exert negative impacts on native animal communities. Historical records indicate the large number of modern bass populations in South Africa are the descendants of <50 fish imported from the United States. The focus of the present study was to quantify levels of genetic diversity in invasive bass populations and utilize a suite of microsatellite markers and mitochondrial DNA sequence data to reconstruct the invasion history of select populations. Average values of allelic richness (1.90) and expected heterozygosity (0.19) were low across all microsatellite loci, and a high mean F_{ST} value (0.10) provides evidence suggestive of a historical population bottleneck. Approximate Bayesian Computing techniques were utilized to evaluate a series of potential models to explain the pathways followed by Largemouth Bass following their initial introduction and results from these analyses will be presented.

Harriger, K, A Mattair, M Wegener & J Knight
Contributed oral presentation
Florida Fish and Wildlife Conservation Commission, Holt, FL
kate.harriger@myfwc.com

Identifying Fish Hosts to Benefit the Conservation of Imperiled Freshwater Mussels in Northwest Florida
Freshwater mussels (Unionidae) have a unique life cycle that requires fish hosts. Larval mussels (glochidia) must attach to the gills or fins of an appropriate fish host to transform into juvenile mussels. Therefore, knowledge of a mussel's host requirements is critical to its conservation. Host requirements are unknown for many imperiled freshwater mussels in northwest Florida. We designed a facility for conducting mussel-fish host research at the Florida Fish and Wildlife Conservation Commission Blackwater Research and Development Center in Holt, Florida. Trials to identify fish hosts were conducted by introducing glochidia to fishes and determining which fish species produced juvenile mussels. Since 2012, fish hosts have been identified for a common mussel species, the southern fatmucket (*Lampsilis straminea*); a species of special concern, the purple pigtoe (*Quadrula succissa*); and a threatened species, the narrow pigtoe (*Fusconaia escambia*). Findings from this research will be valuable for future propagation that may be needed for these mussel species. Our research will also allow biologists to understand whether reproduction and dispersal for these mussel species is threatened by declining host populations.

***Heenkenda, E & H Yang**
Poster presentation
Fisheries and Aquatic Sciences Program, School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32653
eheenkenda@ufl.edu

Development of Effective Method for Recognition of *Mercenaria mercenaria*, *Mercenaria campechiensis* and Their Hybrids for Clam Breeding and Aquaculture
Hard clam, *Mercenaria mercenaria,* is one of Florida's preferred aquaculture species. Meanwhile, another southern hard clam species, *Mercenaria campechiensis,* is naturally distributed along the Florida coast. These two hard clam species are not reproductively isolated in the areas where they are co-distributed and hybrids have been readily found. Accurate identification of the two species through phenotypic observation can be difficult due to siltation, and could be problematic for clam breeding programs. The goal of the proposed project is to develop an effective method based on multiple PCR sequencing to identify the two hard clam species and their hybrids for clam breeding and aquaculture purposes. Samples will be collected from different geographic locations in Florida, the states along the Gulf of Mexico, and the US east coast. In order to distinguish the two hard clam species and their hybrids, three barcoding genes will be screened: mitochondrial cytochrome oxidase I (COI) gene, nucleus 18s rRNA gene, and the ITS regions between the rRNA genes. DNA extraction and analysis will follow the protocols provided by

the standard kits. Designing and identification of primers will be based on the barcoding sequence data, and multiplex PCR will be performed and screened. Methods of multiplex PCR and morphological analysis will be compared to establish the best way of discriminating the two hard clam species and their hybrids. Genetically improved brood stock can play an important role in commercial clam culture. In breeding programs, it is very important to recognize working species which in turn important in keeping stable, known families or lines.

***Hill, G**

Contributed oral presentation

Department of Environmental Studies, Florida International University, 11200 S.W. 8th Street Miami, FL 33199

ghill007@fiu.edu

Fisheries field work across North America: Application of research methodology to different environments

Methodology and technology used in fisheries research has grown rapidly over the last few decades. However, understanding how to best apply certain techniques and technology to a given environment is crucial to achieving the best results for project goals and purposes. In this presentation I discuss the various ways which researchers have applied commonly used field techniques and equipment to the diversity of aquatic ecosystems and climates in North America. Tagging techniques involving floy tags, passive integrated transponders, radio telemetry tags and their associated detection systems have been employed by agencies and universities to measure response variables for a variety of species in a many different habitats. I will elaborate the application of these techniques to freshwater systems of the Florida everglades, desert southwest, Great Lakes, Rocky Mountains, Pacific Northwest, and arctic tundra regions of North America. The ingenuity displayed by scientists in each of these regions provide workable examples for future research to build off of and help troubleshoot logistical problems presented by each environment.

***Hill, G[1], J Rehage[1], E Cline[2] & M Cook[2]**

Poster presentation

[1]Department of Environmental Studies, Florida International University, 11200 S.W. 8th Street Miami, FL 33199

[2]South Florida Water Management District, 3301 Gun Club Road West Palm Beach, FL 33406

ghill007@fiu.edu

Quantifying the movement and habitat use of native sunfishes in response to seasonal hydrological variation in the Everglades

Understanding animal habitat selection and inter-habitat movements plays an important role in population and community ecology. Yet, obtaining a sufficiently high spatiotemporal resolution of the movement paths of organisms remains a major challenge in movement ecology. In this study, we use a combination of tagging and enclosure techniques to gain this high spatiotemporal resolution and examined the movement and habitat use of native centrarchid fishes (warmouth & spotted sunfish), in relation to seasonal variation in hydrologic conditions. We conducted our study in an experimental wetland facility at Loxahatchee National Wildlife Refuge. Low frequency Radio Frequency Identification (RFID) technology was used to track the movement and habitat use of fishes individually tagged with 21 mm Passive Integrated Transponder (PIT) tags. To overcome the sparse recapture rate inherent in tagging studies, we use six replicate 12m by 4 m field in situ enclosures, equipped with an antenna array. Each enclosure spans three key Everglades habitat types: ridge, slough and alligator holes, along an increasing water depth gradient. Data collected from 2013-2015 shows variation in the use of the three habitats by

centrarchids across time and hydrological conditions. Overall, habitat partitioning by warmouth and spotted sunfish at decreasing and low water condition was alligator hole dominant with minor slough usage and minimal to no ridge use. This changed abruptly in response to an induced reversal and upon the start of the rainy season. As water levels began to increase, habitat usage shifted with a significant increase in ridge use and decrease in alligator hole use observed. Later when water levels stabilized, ridge use decreased slightly and partitioning between the alligator hole and slough was similarly equal. These data suggest a degree of temporal partitioning in habitat usage that may relate to foraging and may differentially influence the susceptibility of sunfishes to avian predation.

Hill, J[1], Q Tuckett[1], S Hardin[2], L Lawson Jr.[1], K Lawson[1], J Ritch[1,3] & L Partridge[1,3]
Contributed oral presentation
[1]University of Florida/IFAS, School of Forest Resources and Conservation, Program in Fisheries and Aquatic Sciences, Tropical Aquaculture Laboratory, 1408 24th Street SE, Ruskin, FL 33570
[2]8602 Cabin Hill Road, Tallahassee, FL 32311
[3]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, 100 8th Avenue Southeast, St. Petersburg, FL 33701
jeffhill@ufl.edu

Risk Screen of Important Freshwater Ornamental Fishes for the Conterminous United States

The trade in ornamental fish is increasingly viewed as a major pathway for the introduction of invasives into the environment. Concerns are centered on the high diversity of species and large volume of individuals in the trade, the large numbers of fish reportedly released annually into the environment, and the presence of known international invasives in the pathway. Nevertheless, invasiveness risk is a function of the probability that a non-native species will establish and the likelihood of impacts following establishment; however, few ornamental fishes are established and widespread in the United States. To better evaluate the risk of this pathway we assessed 34 important ornamental fish species using the Fish Invasiveness Screening Kit (FISK) v2 for the conterminous United States. Screens from the 3 to 5 independent assessors resulted in categorization of 13 species as low risk, 20 species as medium risk, and 1 species as high risk (Vermiculated Sailfin Catfish *Pterygoplichthys disjunctivus*). The mean FISK score of 10 species with established or locally established populations was higher than the remaining species (mean ± SE = 8.5 ± 1.9 vs 0.9 ± 0.7). Established populations were largely confined to peninsular Florida and locally established populations occurred there and in springs of the western regions of the USA. Impacts of these species are few and largely anecdotal with the exception of the Vermiculated Sailfin Catfish. Despite the medium and high risk categorization of some species, almost all ornamentals are tropical and risk is largely confined to warm portions of the conterminous United States, primarily peninsular Florida, and to isolated thermal refuges such as geothermal springs. Our results suggest that the freshwater ornamental fish trade is less risky than concluded in most previous studies, though some species may be of heightened management concern on a regional or local scale.

Hyle, R[1], J Holder[2], E Lundy[2] & D Gandy[3]
Poster presentation
[1] FWRI, Melbourne Freshwater Fisheries Field Lab, Melbourne, FL.
[2] FWRI, Deleon Springs Freshwater Fisheries Field Lab, Deleon Springs, FL
[3] FWRI, Apalachicola Field Lab, East Point, FL
reid.hyle@MyFWC.com

Monitoring and research for recovery of American Shad in Florida's St. Johns River

American Shad is a coastal migratory species that is managed under a federal fishery management plan (FMP) administered by the Atlantic States Marine Fisheries Commission. Populations throughout the

species' range are low and in need of recovery. Spawning occurs in freshwater and American Shad have high fidelity to natal rivers so that each river has a unique spawning stock. ASMFC member states are directed by the federal FMP to have their own approved state management plan. Florida's plan specifies that the spawning stock abundance and juvenile production will be monitored from year to year to determine if recovery is occurring or if further management action is needed. The FWRI Freshwater Fisheries Research section uses rate-based indices to monitor the spawning stock abundance and juvenile production of American Shad in the St. Johns River. Spawning stock abundance is tracked by a standardized electrofishing survey on the spawning grounds and juvenile abundance is assessed by a standardized trawl survey in the nursery zone. Both indices yield a geometric mean catch per standard sample (CPUE). The age composition of the adult population was determined from whole otoliths taken from a subsample of the adult catch in each year beginning in 2011. These indices were tested for trends over time and compared to one another as a means of validating whether or not the indices reflect actual abundance. The CPUE of the adult spawning stock has increased over time. The CPUE of juvenile American Shad has been highly variable but has also generally increased over time. Preliminary analysis of CPUE at age indicates that juvenile CPUE predicts future adult year class strength. Additionally, river discharge during the spawning season is positively correlated with juvenile abundance during the ensuing summer which may indicate the importance of water management for further recovery of the population.

***Kamaruddin, I[1,3], K Lorenzen[1], T Stein[1], J Struve[1], B Lindberg[1] & S Jacobson[2]**
Symposium presentation
[1]School of Forest Resource and Conservation, University of Florida, Gainesville, FL 32653
[2]Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL 32611
[3]Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia, 43400 Selangor, Malaysia.
ikamaruddin@ufl.edu

Fishing Motivations and Consumptive Orientation of Pier Anglers in Florida

Florida is known as the (recreational) fishing capital of the world. Florida offers many opportunities for fishing especially for saltwater anglers. Fishing piers provide access to saltwater fishing opportunities for anglers who do not own or have access to a boat. The purpose of this study was to investigate fishing motivations and fish consumptive orientations of pier anglers. The research designed as a cross-sectional study using a face-to-face on site survey. The sampling design was based on a multistage cluster sampling. Four counties in Florida were selected; Bay County (northwest), Sarasota County (southwest), Miami-Dade County (southeast) and Flagler County (northeast). Within each county, four fishing piers were randomly selected as study areas. A total of 277 respondents completed the survey. Anglers where predominantly white (56.6%), followed by Hispanic (23.6%), African American (5.6%), Asian (5.2%), and others (9.0%). The mean age was 44.5±15.6 years. Pier anglers mostly fished from shore including ; fishing piers (91.7%), beaches (49.5%) and bridges (46.6%), while less fished from boats [someone else's boat (28.5%), own boat (20.9%) and charter vessel (17.7%)]. Fishing motivations revealed a high importance of 'relaxation' and 'being outdoors', and a low importance of items such as 'selling fish' and 'trade or swap fish'. Only a minority of pier anglers placed high importance on keeping their catch. Fishing motivations and consumptive orientation varied geographically and by socio-demographic background.

***Kroloff, E, J Rehage, J Heinen & R Santos**
Poster Presentation
Florida International University, Miami, FL
ekrol001@fiu.edu

Where are all the Bonefish? Integrating Angler Perspectives and Ecological Changes Influencing Bonefish Declines in the Florida Bay

In south Florida and throughout the west-central Atlantic Basin, bonefish *Albula vulpes* are the backbone of recreational fisheries and are favored by anglers because of their challenging capture. Bonefish fisheries in Florida contribute almost $1.5 billion yearly to the economy (Vasquez-Yeomans et.al. 2009), supporting livelihoods for professional fishing guides year-around. Recreational fishing and evidence of bonefish decline have both increased with human population growth (Cooke and Phillip, 2004). In the last century, Florida bay has changed from a natural to a highly managed system due to the construction of large networks of canals that have diverted freshwater away from the Bay, as well as other notable changes (Stabenau and Kotun, 2012). This project aims to account for the change in distribution and abundance of bonefish throughout Florida bay. We ask what has caused bonefish decline, how has bonefish decline changed over space and time, and how has the decline in bonefish changed overall angler perceptions and behaviors? We aim to answer these questions by analyzing trends in previously and on-going collected data on prey abundance, sea-grass distribution, and hydrological changes in Florida bay. A mix of semi-structured surveys and key informant interviews were conducted to complement and strengthen the patterns and changes we find in the biological data sets. By establishing data through these methods we should be able to derive a baseline not currently known due to a lack of data on bonefish catches. The importance of understanding bonefish dynamics and why they have experienced declines benefits both the conservation and maintenance of the species, and the maintenance of livelihoods that recreational bonefish fisheries provide. By involving anglers and guides in the main data collection process we can increase both outreach and education on the importance of sustainable fishing practices and increase overall support for conservation.

***Lawson, K & J Hill**

Contributed oral presentation

University of Florida/IFAS, SFRC Program in Fisheries and Aquatic Sciences, Tropical Aquaculture Laboratory, 1408 24th Street SE, Ruskin, FL 33570

dowlika@ufl.edu

Life history strategies and predicting invasiveness of non-native fishes in Florida

Non-native fishes threaten native biodiversity in many regions. While non-native fishes are common throughout the U.S., Florida, in particular, has a large number of established non-native fishes compared to most other regions due to its favorable subtropical climate. Life history traits have been used to predict the risk of establishment for non-native fish with varying levels of success. These profiling studies have been conducted for non-native fish in California and the Great Lakes, but not yet for Florida, despite the elevated risk of establishment and potential for impacts to native biota. We used the triangular life history model proposed by Winemiller and Rose to visualize the overall life history strategies for three different groups: native fishes, fish species that are currently established in Florida, and fishes that have been introduced but failed to establish in Florida. Fish were plotted according to their fecundity, investment per progeny, and size at maturity. Overall life history strategies (opportunistic, periodic, equilibrium) were then identified. The resulting 3-dimensional graph revealed that many successfully established species such as those in the family Cichlidae, are equilibrium strategists. Fishes in this category tend to have a high degree of parental care, low to intermediate fecundity, and a larger maturation size. Understanding the life history strategies and traits that aid in the prediction of non-native fish invasiveness is key for effective risk assessment and management.

***Matthias, B[1], R Ahrens[1], M Allen[1], T Tuten[2], Z Siders[1] & K Wilson[3]**

Contributed oral presentation

[1]University of Florida, 7922 NW 71st St., Gainesville, FL 32653, United States

[2]Florida Fish and Wildlife Conservation Commission, 7922 NW 71st ST, Gainesville, FL 32653
[3]University of Calgary, Calgary, Alberta T2N 1N4 Canada
bmatthias@ufl.edu

Decoupling the effects of density and environmental variability on fish growth

Management of exploited fish populations often relies on understanding individual growth patterns to develop harvest regulations, and it is common to assume that these growth patterns remain constant through time. However, changes in growth arise from many factors including density dependence and environmental variation. Our objective was to determine the impacts of density and environmental variation on lifetime growth patterns of Black Crappie *Pomoxis nigromaculatus* via assessing changes in both growth in length and weight using a set of non-linear hierarchical Bayesian models. Black Crappie population densities changed drastically from 1998 to 2013, driving large changes in estimated growth trajectories for both length and weight that were negatively influenced by year-specific density. Growth in length was negatively influenced by temperature, which was the greatest environmental effect on growth; however chlorophyll A concentrations and water level also influenced Black Crappie growth. With the prospects of changing environments caused by climate and ecosystem changes, ignoring the effects of both density dependence and environmental variation on fish growth rates when developing fishery regulations could render length limits ineffective and cause overexploitation of fish populations.

***Mckenzie, R**

Poster presentation

Florida State University Coastal and Marine Laboratory, 3618 Coastal US Highway 98, St. Teresa, FL 32358
rmckenzie@bio.fsu.edu

Body Size, Sex and their Role in the Reproductive Ecology and Conservation of the Gulf Black Sea Bass

Our knowledge of the reproductive behavioral ecology of many economically important marine fish species in Florida is remarkably poor. This limits our ability to understand their susceptibility to exploitation and design effective management policies. My study aims to describe the behavioral dynamics involved in the reproduction and exploitation of the Gulf Black Sea Bass (*Centropristis striata melana*), an economically important fish species in the Northeastern Gulf of Mexico for which there are few data of any kind. The main objectives of my study are to understand the effects of sex and relative body size on the social behavior and fishing susceptibility of individuals during the spawning season. I will use a combination of field and captive behavioral observations to quantify the effects of relative body size and sex on social dominance and swimming/exploring activity level during the spawning season. I will also conduct hook and line surveys during the spawning season to determine the effects of relative body size and sex on susceptibility of individuals to angling. By providing information on the role that sex and body size play in the social behavior and fishing susceptibility during the spawning season, my study will provide insights into the role that management regulations, such as harvest length limits and seasonal closures, could play in this species management and conservation.

Nagid, E[1], T Tuten[1] & K Johnson[2]

Symposium presentation

[1]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Gainesville Fisheries Research Laboratory, 7386 NW 71st Street, Gainesville, Florida 32653
[2]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Eustis Fisheries Research Laboratory, 601 West Woodward Avenue, Eustis, Florida 32726
eric.nagid@myfwc.com

Effects of reservoir drawdowns and the expansion of hydrilla coverage on year-class strength of Largemouth Bass

We examined the effects of reservoir drawdowns and hydrilla coverage on largemouth bass year class strength at Rodman Reservoir, Florida. Average catch curve residuals that were obtained from multiple age samples illustrated that four of the seven cohorts produced during drawdown water levels were strong year classes, whereas the majority of cohorts produced during normal pool levels were generally average to weak year classes. Linear regression of average catch curve residuals and the net change in percent area covered (PAC) of hydrilla were positively related (R^2 = 0.60) in cohorts produced during drawdown water levels, whereas no relationship was found between cohorts produced during normal water levels and hydrilla PAC. The Largemouth Bass fishery at Rodman Reservoir could be managed for strong year classes in predictive intervals (3-4 years) by the current drawdown magnitude, timing, and duration if hydrilla PAC is managed accordingly. The response of abundant year classes in the population presumably leads to increased angler effort, higher angler catch rates, and abundance of trophy-sized fish.

***Nowak, C, D Parkyn & D Murie**

Poster presentation

University of Florida, Fisheries and Aquatic Sciences, 7922 NW 71st Street, Gainesville, FL 32653

c.nowak@ufl.edu

Developmental changes in durability and structure of physoclistous swimbladders of four marine fish species from the Gulf of Mexico, and the implications for catch and release mortality

Catch-and-release fishing, although done with the intent to increase survival rates, oftentimes results in mortality of the bycatch or undersized fishes and contributes to fishery exploitation. In some sectors of both commercial and recreational fisheries management, voluntary release is required by anglers to comply with sustainable exploitation regulations such as length or bag limits. Physoclistous species (fishes lacking a *ductus pneumaticus* connecting the swimbladder (SB) with the gut tract) rely on active secretion and resorption of oxygen to regulate buoyancy, and when caught in depths >20 m, oftentimes experience acute effects of barotrauma within the SB and other structures. During normal changes in depth, oxygen is secreted against the blood O_2 pressure gradient via the gas gland and associated *rete mirable*, and removed via the *ovale* resorption chamber and associated capillary beds. Forced ascent to the surface occurs at rates that exceed the ability of the *ovale* capillaries to uptake SB O_2. Rapid ascent leads to rapid expansion of gas trapped within the SB, resulting in organ displacement, delamination of the SB, or complete rupture of the SB wall. The aim of this study is to compare the developmental histology of the SB of four marine reef-dwelling fish species from the Gulf of Mexico: Red Grouper *Epinephelus morio*, Gag Grouper *Mycteroperca microlepis*, Black Sea Bass *Centropristis striata*, and White Grunt *Haemulon plumieri*. SB gross anatomy, microanatomy, and durability will be examined and compared amongst the species with respect to age and size. Age and size-specific models of durability will be developed to provide predictive capacity of SB rupture at depth. SB durability will be tested using a pneumatic tensometer, and SB samples will be processed for histology. Understanding the microanatomy of physoclistous SBs will provide predictive capacity to assess how SB trauma influences release mortality of species at different depths.

Olsen, B, & B Simcox

Poster presentation

Florida Fish and Wildlife Conservation Commission, Lakeland Florida

brie.olsen@myfwc.com, Brandon.simcox@myfwc.com

Seasonal Variation of Fish Communities in Four Spring-Fed Coastal Rivers

Florida is home to the highest concentration of springs in the world with over 1,000 documented in the state. As Florida's population grows, discharge levels and water quality in these springs has declined, resulting in increased nutrients, loss of habitat due to aquatic invasive algae, and reduced flows. In 2013, the Southwest Water Management district allotted funds to the Fish and Wildlife Conservation Commission to obtain information on the fishery resource of four first-magnitude springs (i.e., Chassahowitzka, Homossassa, Weeki Wachee rivers, and King's Bay). Sampling has been conducted twice per year (winter and summer) and is expected to continue through June 2017. To date, we have sampled 488 transects throughout the 4 spring-fed rivers collecting 54 different species. Seasonal patterns in fish assemblage structure were analyzed using multivariate techniques (i.e., non-metric multi-dimensional scaling, analysis of similarity, and similarity percentage analysis). Each spring was stratified into zones based on water quality conditions (salinity values). Using multi-dimensional scaling within zones, differences in the fish community structure were found in each of the coastal springs. Winter samples were dominated by saltwater species in Chassahowitzka, Homosassa, and Weeki Wachee. Freshwater fish species were most abundant during summer sampling. Seasonal variation was strongest in each of the rivers near the spring-head. Kings Bay showed a lack of seasonal differences in 2 of the 3 zones. These data are important for understanding how euryhaline and stenohaline fishes interact in these transitional systems throughout the year.

Pacicco, A[1] & R Allman[2]

Poster presentation

[1]NOAA Fisheries Contractor, Riverside Technology, Inc., 2950 East Harmony Rd., Ste 390 Fort Collins, CO 80528

[2]NOAA Fisheries Science Center, 3500 Delwood Beach Rd., Panama City, Florida 32408

Ashley.pacicco@noaa.gov

Production and Aging of Atlantic Bluefin Tuna using sagittal otoliths

Atlantic bluefin tuna are highly prized species, primarily due to the high demand for sushi. The most recent stock assessment conducted by the International Commission for the Conservation of Atlantic Tunas (ICCAT) in 2014 concluded that the western Atlantic bluefin tuna stock is overfished. In addition, uncertainty in population status exists due to mixing between the eastern and western stocks. In 2009, the National Marine Fisheries Service in Panama City (NMFS), Florida began a bluefin tuna production aging program using sagittal otoliths collected from the U.S. Atlantic and the Gulf of Mexico. Otoliths are collected from a variety of sampling programs including Quantech Inc., the NMFS Pelagic Observer Program, the NOAA Northeast Regional office, and the North Carolina Division of Marine Fisheries. Prior to age determination, the core is removed using a micro-mill for stable isotope analysis to determine natal origin. Sections are then sanded down to an optimal thickness of 0.5 millimeters and viewed under transmitted light for age determination. In order to standardize otolith processing and aging, a reference set of 200 sectioned otoliths is circulated to all laboratories ageing Atlantic bluefin tuna. From 2009 to 2014, the NMFS laboratory has aged 1034 bluefin otoliths which ranged from 2 to 33 years and with standard fork lengths from 618 to 2870 millimeters.

***Quintana, J**

Symposium presentation

Fish and Wildlife Research Institute, FL Fish and Wildlife Conservation Commission

jessica.quintana@myfwc.com

Using Social Science Research Methods in Freshwater Fisheries Management

Due to recent declines in the number of licensed freshwater anglers, there is an increasing demand to understand angler preferences and how that impacts participation. Incorporating social science research methods into traditional fisheries has been recognized as a key element to effective management of fisheries resources. Gathering information on anglers such as motivations, preferences, and satisfactions can relay valuable information to mangers about the changes, needs, and expectations of fisheries stakeholders. As demographics change, the need to understand anglers within Florida is growing. To effectively do this, using a research example from Alabama, social science methods can demonstrate how to gather, understand, and utilize that information, and how that can inform fisheries managers on best management decisions.

Reed, J

Symposium presentation

Florida Fish and Wildlife Conservation Commission, Southwest Regional Office, 3900 Drane Field Road, Lakeland, FL 33811

james.reed@myfwc.com

Using Volunteers at Bass Tournaments to Collect Age-and-Growth Data

Bass tournament information is a useful supplement to species data collected by other means. Available is length data on all fish brought to the weigh-in, and weight information on the largest fish or those that are dead at weigh-in. The primary concern while obtaining data is to not interrupt the tournament's activities. On Lake Istokpoga a team of volunteers has developed their own equipment and procedures. After each angler weighs in, volunteers move the tournament fish into an aerated bin. Quickly, but with care, the length of each fish is measured and the fish returned to the angler's carry bag. Tournament dead fish are retained by FWC for age and growth data, including otolith removal. The FWC team leader organizes the activities, maintains the equipment and coordinates directly with the tournament director. One volunteer takes the angler's fish bag from the weigh-in to the holding bin, a second volunteer hands each fish to the measurer who calls out the length to the recorder, then returns the fish to the angler's carry bag. The FWC biologist monitors the overall activity and keeps things going smoothly. In addition, bass weighing more than 8 lbs are eligible for Trophy Catch program awards. One of the team members photographs each of these fish and collects the angler's e-mail address. The photos are forwarded to the angler and to Trophy Catch for the awards. By cooperating with and assisting the tournament director the FWC tournament teams have made a positive contribution to the tournament and to the amount of data which is available. Since this program started 3 years ago the volunteers have collected data on over 4000 tournament fish, without involving extra FWC staff.

Renfro, D

Symposium presentation

Florida Fish and Wildlife Conservation Commission, Eustis Fisheries Research Laboratory, 601 West Woodward Avenue, Eustis, Florida 32726

Dennis.renfro@myfwc.com

Opening New Opportunities to Improve Florida's Fisheries, Reconnecting Emeralda Marsh Conservation Area 3 to the Harris Chain of Lakes

In the 1950's a levee system was constructed that resulted in isolating 10,000 acres of marsh from Lake Griffin. The marsh was drained and transformed into productive farmland to support the increased need for agriculture. In the 1991 the state of Florida purchased the S. N. Knight Farm for 5.8 million dollars. S.

N. Knight Farm is now referred to as Emeralda Marsh Conservation Area 3 (EMCA 3). In 2005 the state began a restoration and reconnection project on a parcel known as, Area 2 (north of Area 3) to reconnect the drained wetland to the Yale Griffin canal, followed by the reconnection of Area 4 (due south of Area 3) to Lake Griffin in 2007. The restoration allowed for a highly productive bass fishery to develop in both areas. In addition, an aggressive plant management plan has created a popular duck hunting location in Central Florida. The benefits that were realized in the reconnection of Area 2 and 4 are hoping to be expanded upon in the planned reconnection of the Emeralda Marsh Conservation Area 3. The project is estimated to cost $850,000 and is funded by FWC's Aquatic Habitat Restoration and Enhancement Section (AHRES) and partnership with the St. Johns River Water Management District (SJRWMD). The project consists of two phases, Phase I encompasses breaching the internal levees at six locations, removing the surface of the interior levees and creating four 30 x 15 feet habitat islands. Each island will have approximately fifteen trees (cypress, maple, pot ash) and emerged vegetation (bulrush, pickerel weed, and arrowhead). In Phase II the external levees will be breached in four locations, one 600 feet breach and three 200 feet long breaches. The exterior breaches will allow boat access from both Lake Griffin and the Yale Griffin Canal. The reconnection of 1,000 acres of wetlands will create new fishing opportunities, improve access to Lake Griffin, manage wetlands/aquatic vegetation for duck hunters and provide wildlife viewing opportunities through habitat management. This project helps to meet the goals of FWC's strategic plan in providing residents and visitors with quality fishing, hunting, boating and wildlife viewing opportunities while also providing for the sustainability of natural resources.

Ressel, K[1], Q Tuckett[1], J Ritch[1,2] & J Hill[1]
Poster presentation
[1]University of Florida/IFAS, SFRC Program in Fisheries and Aquatic Sciences, Tropical Aquaculture Laboratory, 1408 24th Street SE, Ruskin, FL 33570
[2]Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 100 8Th Ave. SE, St Petersburg, FL 33701
kressel@ufl.edu

The distribution of escaped Green Swordtail and Southern Platyfish varieties in proximity to ornamental aquaculture facilities

Aquarium release and escape from aquaculture facilities are two dominant vectors for the introduction of non-native ornamental fish. The Green Swordtail, *Xiphophorus hellerii*, and Southern Platyfish, *X. maculatus*, are among the most common livebearing ornamental fish produced in Florida and are also known to escape from aquaculture facilities. Many different varieties are reared in addition to the less colorful wild types. We hypothesize that the effects of predators or other environmental resistance may be greater for more brightly colored varieties. Initial observations suggest that varieties with distinctive coloration are found immediately downstream of fish farm effluent; however it is unclear if they are also prevalent further downstream. The purpose of this study was to: 1) examine the distribution of Green Swordtails and Southern Platyfish in proximity to ornamental aquaculture facilities and 2) compare the Green Swordtail and Southern Platyfish varieties found in the wild to the varieties produced through aquaculture. It was expected that the number of Green Swordtail and Southern Platyfish would be inversely related to the distance from the effluent and only less-colorful varieties would persist further downstream. Fish were collected via minnow traps, dip nets, and backpack electrofishing downstream of ornamental aquaculture facilities in the Tampa Bay area of west-central Florida. Most non-natives were found close to the effluent suggesting that although ornamental fish do escape, they are often found immediately adjacent to aquaculture facilities. Additionally, the wild type Green Swordtail and Southern Platyfish were the most common varieties found as the distance from the effluent increased, suggesting that the vivid fish preferred by ornamental fish farms are less likely to survive and establish successful reproducing populations.

*Student Presentation, Presenter

Rosati, D, D Murie & D Parkyn
Poster presentation
University of Florida, Fisheries and Aquatic Sciences, 7922 NW 71st St, Gainesville FL, 32653
jrosati88@ufl.edu

Diet and Bioenergetics of Spotted Seatrout *Cynoscion nebulosus* after a Large Scale Anthropogenic Disturbance, the Deepwater Horizon Oil Spill

Estuaries in the Gulf of Mexico provide habitat for many fishes supporting recreational fisheries that provide over 100,000 jobs. The Spotted Seatrout *Cynoscion nebulosus* is one of the most sought after and commonly captured estuarine-dependent recreational fish species. Spotted Seatrout typically spend their entire life within the same estuary and bay system in which they are spawned and this makes them particularly susceptible to perturbations within their home estuaries. In 2010, the Deepwater Horizon oil spill released an estimated 4.9 million barrels of crude oil into the Gulf of Mexico, affecting over 1,700 km of coastal shoreline from Louisiana to northwest Florida. Oil spills can be detrimental to almost any habitat and oil that lingers within habitats can continue to cause issues years after its introduction. Chronic exposure to oil has been linked to population collapses and disruptions within trophic dynamics, particularly predator-prey interactions. Historically, the Spotted Seatrout has relied primarily on a diet of fish and shrimp, with differences in the relative proportions potentially influencing their growth. This study aims to investigate the post-spill diet of Spotted Seatrout off Louisiana (impacted area) relative to its diet off the west coast of Florida (non-impacted area) and compare it to published pre-spill studies to determine if significant changes in their diet have occurred. This will also serve as baseline dietary information, which is currently lacking, in the event of another large scale disturbance. Additionally, a bioenergetics model will be used to simulate the differences in growth potential based on dietary shifts of fish versus shrimp varying from 0 to 100% in the diet of Spotted Seatrout.

Santos, R[1,2] & J Rehage[1,2]
Symposium presentation
[1] Earth and Environment, Florida International University
[2] Southeast Environmental Research Center, Florida International University
rsantosc@fiu.edu

Spatiotemporal patterns in the catch rates of two important recreational species in Florida Bay: Bonefish (*Albula vulpes*) and Atlantic tarpon (*Meglops atlanticus*)

Florida Bay coastal habitats sustain an economically-valuable recreational fishery that generates $1.2 billion in economic activity. However, increasing regional demand on fishery resources and ecosystem level shifts caused by historical and present modifications of freshwater inflows may have compromised the stability of recreational fisheries. To determine the current state of recreational fisheries in Florida bay, catch records from guide reports submitted to Everglades National Park were used to assess spatiotemporal patterns of bonefish and tarpon (i.e., the top two species that constitute guide catches) and identify common trends that distinguish localized vs regional effects. Thus, we looked for evidence of one common underlying trend verses varying trends between the catches of these species, as well as, over time across study regions. For both species a relative index of abundance was estimated for three subregions (e.g., Inner Florida Bay, Outer Florida Bay, and Cape Sable) using a two-stage modeling approach that combines generalized linear models of the proportion of positive trips and positive catch rates. Next, a dynamic factor analysis (DFA) was used to detect underlying trends across the time series of the estimated index of abundance for both species and the three subregions. The benefit of reducing data with DFA is that a large dataset can be reduced into a smaller set of underlying trends, and factor analysis may then identify whether multiple time series fall into clusters represented by similar (e.g.,

regional effects) or various (e.g., localized effects) trend weightings. Both bonefish and tarpon index of abundance time series were best explained by a single underlying trend. In addition, underlying trends were also characterized by a steady decrease between 1988 and 2004, and a subsequent period characterized by an increase in relative abundance. However, current bonefish relative abundance still remains lower than estimates from the 1980's. This difference in recovery may indicate dissimilarities in populations and/or fishing dynamics. The presence of a single underlying trend and consistent positive canonical correlation across the time series may also suggest a regional temporal pattern in catch rate which may be driven by large scale or widely-distributed stressors. These results are a preliminary step to determining the mechanisms driving the condition and sustainability of recreational fisheries in Florida Bay.

Sauls, B, T Cross & A Gray
Symposium presentation
Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Fishery Dependent Monitoring Program, 100 8th Avenue SE, Saint Petersburg, FL 33701
Beverly.Sauls@MyFWC.com

Meeting the Evolving Data Needs for Assessment and Management of Offshore Recreational Fisheries in Florida

Fisheries management in the U.S. has experienced a fundamental shift towards strict annual catch limits (ACLs) following implementation of the reauthorized Magnuson-Stevens Fishery Conservation Act. The Southeastern U.S. supports the highest concentration of recreational fishing effort in the country, with the majority originating from the state of Florida. Historically, the Marine Recreational Information Program (MRIP, formerly the Marine Recreational Fisheries Statistics Survey) has been the primary source of vital statistics for marine recreational fisheries in Florida. The MRIP is a general survey of recreational fishing for all saltwater finfish species over large spatial and temporal scales. However, to effectively manage recreational fisheries with ACLs also requires more specialized approaches to supplement the MRIP survey. This talk will highlight efforts in the state to address evolving data needs for managing offshore recreational fisheries. We will introduce two specialized surveys designed to improve spatial and temporal resolution of estimates of recreational fishing effort and catch. The first is a study that was designed to monitor small ACLs for the South Atlantic red snapper stock over very short recreational harvest seasons (3 to 8 days). The second is a new collaborative effort with National Marine Fisheries Service to improve estimates of recreational catch and effort for a suite of reef fish species in the Gulf of Mexico. We will compare and contrast these two distinct recreational fisheries on the Atlantic and Gulf coasts of the state, discuss the unique survey design challenges, and highlight successes and future challenges for meeting current data needs.

***Schuman, C[1,2] & S Baker[1]**
Poster presentation
[1]University of Florida, Fisheries and Aquatic Sciences, 7922 NW 71st Street, PO Box 110600, Gainesville, FL 32653
[2]School of Natural Resources and Environment, University of Florida, 103 Black Hall, PO Box 116455, Gainesville, FL 32611
carrie.schuman@ufl.edu

The Secret Lives of Filter Feeders: Estimating Oyster Filtration Rates in the Guana Tolomato Matanzas National Estuarine Research Reserve

Oysters have been lauded for being "ecosystem engineers" and providing a variety of ecosystem services. Some of these services, like improved water quality and control of harmful algal blooms, are closely linked

to oyster filtration. Frequently, filtration rates attributed to oysters have been the result of laboratory studies. These observations may be incorporated into models meant to simulate the system-wide level impact of oyster reefs. There is controversy as to how well lab data can be applied to systems of interest, and the studies that have extended this exploration to field-based measurements are limited. This part of my dissertation work was focused on characterizing in-field oyster filtration rates in the Guana Tolomato Matanzas National Estuarine Research Reserve (GTM NERR) in the St. Augustine region of Florida. Along with this objective, I explored two sub-questions to support better filtration estimates: 1) How do filtration rates differ on higher and lower points on reefs? Prior studies suggest reef elevation may affect certain characteristics of oyster success such as growth and mortality, so filtration rates may show similar patterns. 2) How do filtration rates attenuate as oysters are aggregated? As oysters become clustered on reefs, re-filtration occurs and should be taken into account when upscaling study results to reef-scale estimates. Biodeposition methods employing sediment traps were based on and adapted from those in Yu and Culver (1999) and Sroczyńska et al (2012). Paired control and experimental traps were placed on high and low points on 9 reefs within the reserve for a two week period. Control traps collected background sediments, while experimental traps additonally collected biodeposits from 10 live filtering oysters. Deposits were ashed to determine inorganic content, and then paired with data on inorganic matter in the water column, number of oysters in each experimental trap and total hours of trap deployment to generate an integrated effective clearance rate (Yu and Culver 1999) which was then standardized to gram dry weight. Preliminary data and conclusions from these experiments are presented.

Shipley, K & M Recks
Symposium presentation
Division of Marine Fisheries Management, Florida Fish and Wildlife Conservation Commission, 2590 Executive Center Circle East, Tallahassee, Florida 32301
Krista.Shipley@MyFWC.com

Florida's Red Drum: A Management Success Story

Red drum is among Florida's most popular recreational fisheries and overfishing led to severe population depletion and three emergency closures in Florida's state waters during the 1980s. The emergency closures prompted the Marine Fisheries Commission, the predecessor to the Florida Fish and Wildlife Conservation Commission ("Commission"), to prohibit the sale of native red drum and to strengthen the protections for the species in 1989. Although red drum escapement had been consistently exceeding the 30% management goal in all regions of the state since the late-1980s, in 2007 the Commission proactively increased the escapement goal to 40% in response to stakeholder concerns regarding increased fishing pressure. Under the current management approach, all regions of the state are regularly exceeding the Commission's 40% management goal. This fishery was able to recover from a complete collapse in the 1970s and 1980s to a robust population that is managed for abundance, not mere sustainability. Because of the successful management of this important recreational Florida fishery, fisheries managers now have the flexibility to manage the fishery for the public's desired fishing experience in addition to sustainability. At the February 2016 Commission meeting, results of "The 2015 stock assessment of Red Drum, *Sciaenops ocellatus*, in Florida," completed by the Fish and Wildlife Research Institute, were presented. While the results of the 2015 stock assessment are positive, the Commission has recently heard concerns from stakeholders in various areas of the state about the status of red drum and an increase in fishing pressure, suggesting that adjustments to the current regulations may be desirable in order to maintain a high level of angler satisfaction.

***Siana, A, J Ault, D Bryan, T Ziegler & E D'Alessandra**
Contributed oral presentation
University of Miami's Rosenstiel School of Marine and Atmospheric Science
4600 Rickenbacker Causeway, Miami, FL 33149
Axs762@miami.edu

Probable biocontrol of the invasive lionfish population as an indicator of marine protected area success

Marine Protected Areas (MPAs) are an important conservation tools for sustaining marine resources through a range of potential ecological benefits. MPAs may also have unforeseen benefits, such as controlling invasive species. The Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) are a successful invasive species that have spread throughout the western Atlantic causing great concern. The south Florida Reef Visual Census (RVC) data from 2010-2015 and National Park Service lionfish removal data from 2011-2015 were used to spatially analyze temporal changes in lionfish distributions between MPAs and unprotected areas. The RVC data was also used to analyze the distribution of potential lionfish predators such as snappers and groupers throughout the south Florida reef tract. MPAs should increase the density and occurrence of these potential lionfish predators, resulting in a decrease of the invasive lionfish population. Lionfish density and occurrence trends were higher in unprotected areas than in protected areas. The catch per unit effort (CPUE) of lionfish in the protected Dry Tortugas National Park has decreased each year since lionfish data collection commenced in 2011 and is lower than the CPUE in Biscayne National Park, which is unprotected. The occurrence and density of potential lionfish predators were significantly greater in MPAs in comparison to unprotected areas. Lionfish declines in the Dry Tortugas, lionfish population trends in the Dry Tortugas, the Florida Keys, and Biscayne National Park, and the statistically higher density and occurrence of potential lionfish predators in protected areas, may reflect an additional benefit of MPAs.

***Simon, N & H Yang**
Poster presentation
Fisheries and Aquatic Sciences Program, School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32653
nsimon921@ufl.edu

Germplasm Cryopreservation Techniques in the Eastern Oyster

Germplasm preservation is an advantageous technology that would benefit the oyster industry through the preservation of hereditary tissue for genetic improvement and breeding programs. The goal of this study will be to develop effective protocols for germplasm cryopreservation for the Eastern Oyster. Based on the existing protocols, the objectives will be to evaluate the effects of cold shock, cryoprotectants, cooling profile, sugar additions, and thawing rates on sperm viability. Sperm samples will be collected from natural spawn and dissection methods. Sperm quality will be estimated by using flow cytometry and microscopy to determine the plasma membrane integrity and sperm motility. Potential applications of cryopreservation techniques on oysters include preservation of natural populations, specific lines or traits, self-fertilized inbred lines, tetraploid oysters, and mutant breeding programs, and development of stock resources for future seed productions.

***Smith, G & D Murie**
Contributed oral presentation
Fisheries and Aquatic Sciences, University of Florida, 7922 NW 71st St., Gainesville, FL 32653
geoffreyhsmith@ufl.edu

Potential Food Resource Competition between Non-native Pike Killifish and Juvenile Common Snook

Pike Killifish is an established non-native fish species in Florida that was first documented in south Florida in 1957 and secondarily in Tampa Bay tributaries in 1994. Decreases in small-bodied fish abundances have been linked to the introduction of Pike Killifish in both of these regions. Increases in the range and abundance of Pike Killifish in the Tampa Bay area and overlap in habitat usage has led to concerns about potential competition with, and predation on, early-juvenile Common Snook (≤100 mm SL). Stomach contents of Pike Killifish and early-juvenile snook were collected to examine the dietary overlap of these two species and potential differences in the diet of early-juvenile snook from locations with and without Pike Killifish co-occurring. Prey resources were also collected at the time of fish sampling from locations with and without Pike Killifish co-occurring to assess prey resource limitation and prey selectivity. Stomach content analysis indicates that there is some overlap in the diets of Pike Killifish and early-juvenile snook. However, early-juvenile snook have a wider diet breadth, consuming a number of organisms that are not consumed by Pike Killifish and make up a large portion of the early-juvenile snook diet. Preliminary analysis of prey resources appears to indicate that cyprinodontiform fishes, a shared prey resource, have lower abundances in locations where Pike Killifish are present. This is reflected in the diet of early-juvenile snook, with snook from locations with Pike Killifish co-occurring rarely consuming cyprinodontiforms while those from locations without Pike Killifish co-occurring regularly consume cyprinodontiforms. Despite this, there doesn't appear to be a substantial difference in the diet overlap of early-juvenile snook from locations with and without Pike Killifish co-occurring. Future analysis of early-juvenile snook daily growth will be used to assess if the reduction in this prey group appears to impact early-juvenile snook growth.

***Smith, K[1], S Taylor, W Kelso[1], J Carlson[2] & D Bethea[2]**

Contributed oral presentation

[1]Louisiana State University, School of Renewable and Natural Resources, Rm 227 South Tower at Highland Rd., Baton Rouge, LA 70803

[2]NOAA Fisheries Service-Southeast Fisheries Science Center, 3500 Delwood Beach Rd., Panama City, FL 32408

Ksmi295@lsu.edu

Estimating Abundance of Smalltooth Sawfish (*Pristis pectinata*) with Capture-Mark-Recapture Data

The Smalltooth Sawfish (*Pristis pectinata*) is an endangered elasmobranch currently comprising a single population that is restricted to southwestern Florida in the United States. The population has been drastically reduced and fragmented during the 20th century due to overfishing and habitat loss (Simpfendorfer 2000). Federally listed as endangered in 2003, subsequent research has focused largely on habitat use and migration (Carlson et al. 2014), age and growth (Scharer et al. 2012), and other life history characteristics (Fields et al. 2015). However, current abundance remains unknown. Capture-mark-recapture data collected in Everglades National Park and Ten Thousand Islands National Wildlife Refuge in southwestern Florida, U.S. from 2000-2015 was used to determine a contemporary census size of *P. pectinata*. Program MARK (White and Burnham 1999) was used to estimate recapture probabilities and apparent survival from individual capture histories, assuming an open, randomly mixed population (White and Burnham 1999; Luikart et al. 2010). Because previous population viability analysis conducted for *P. pectinata* determined that the risk of potential extinction is most dependent on the initial estimates of population size (Carlson and Simpfendorfer 2014), historic population estimates will be compared to contemporary estimates of abundance. This makes population decline quantifiable, allowing for more direct and effective management, conservation, and recovery efforts for the species.

Stanton, M[1], Q Tuckett[1], K Ressel[1], J Ritch[2] & J Hill[1]
Poster Presentation
[1]University of Florida/IFAS, SFRC Program in Fisheries and Aquatic Sciences, Tropical Aquaculture Laboratory, 1408 24th Street SE, Ruskin, FL 33570
[2]Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. 100 8Th Ave. SE, St Petersburg, FL 33701.
Mrstanton93@ufl.edu

Pike Killifish (*Belonesox belizanus*) prey species preference and gape limitation explains their differential impact on native compared to non-native poeciliids.

Biotic resistance of Florida habitats have hindered numerous small-bodied ornamental fish species from successfully establishing in Florida. In particular, Eastern Mosquitofish (*Gambusia holbrooki*) has been shown to resist establishment of non-native ornamental fish through agonistic interactions. However, some Green Swordtail (*Xiphophorus hellerii*) populations persist and initial observations suggest Eastern Mosquitofish, but not Green Swordtails, are almost completely absent in the presence of non-native Pike Killifish (*Belonesox belizanus*), a novel poeciliid piscivore. Ultimately, the ongoing invasion of Pike Killifish may facilitate the establishment of Green Swordtails by reducing biotic resistance. The goal of this research was to examine the causes of the differential impact by examining Pike Killifish 1) prey species preference, 2) size preference, and 3) gape limitation. We conducted these three experiments on both Eastern Mosquitofish and Green Swordtails in 10-gallon flow-through aquaria. Our results indicate that Pike Killifish selected Eastern Mosquitofish over Green Swordtails of the same size and selected all sizes of Eastern Mosquitofish, but not all sizes of Green Swordtails. Average-sized Pike Killifish could consume the largest Eastern Mosquitofish, but not the largest Green Swordtail. Because Green Swordtails reach a larger maximum body size compared to Eastern Mosquitofish and also exhibit greater body depth, they are able to escape predation by Pike Killifish. Green Swordtails may thus benefit from the removal of Eastern Mosquitofish through greater juvenile survival and reduced fin nipping. These results suggest predator-prey studies are useful in predicting and understating the impact of non-native species.

Steward, C
Contributed oral presentation
Florida Fish and Wildlife Conservation Commission, 601 W. Woodward Ave., Eustis, FL 32726
Cheree.steward@myfwc.com

Will the bass recovery in Lake Trafford improve the crappie fishery?

Lake Trafford, is a small (600 ha) hypereutrophic lake in southwest Florida with the southernmost black crappie fishery in the United States. It also once supported a popular largemouth bass fishery. Fish kills in the late 1990's culminated with a large kill event in April 2004. Following the fish kill, spring electrofishing collected zero bass and no crappie were collected in fall bottom trawls. Since 2005 crappie catch rates have recovered with a high of 113 fish/min in 2010. However, size-at-age has decreased, with the average size of harvested age-2, -3, and -4 fish hovering around 240mm. Phase I and II fingerling bass were stocked in 2010 and 2011 and spring bass sampling resumed in 2011. Managers then wanted to know if the return of the bass population, and their predation on crappie, might increase crappie growth rates. To estimate the quantity of crappie consumed by bass we used electrofishing to collect bass throughout the year and gastric lavage to collect stomach contents. We identified fish prey to family and genus where possible. Between September 2014 and September 2015 we collected 436 bass. Preliminary results indicate that 32% of the stomachs were empty and dominant prey items varied thru the year and included grass shrimp, crayfish, insects, frogs and fish. The number of exotic cichlids was similar to that of centrarchids and each accounted for less than 5% of identifiable prey items. No crappie were identified as prey. We conclude that crappie growth rates in Lake Trafford

are more likely to be affected by the eventual attrition of the 2010 year class than by the recovery of the bass population.

Thompson, B
Symposium presentation
Florida Fish and Wildlife Conservation Commission, 601 West Woodward Ave, Eustis, FL 32726
Brandon.thompson@myfwc.com

Fisheries management: throwing the toolbox at Lake Griffin, FL

Prior to the 1970s, Lake Griffin was regarded as a primary destination for Largemouth bass and Black Crappie. Accelerated eutrophication has resulted in continuous algal blooms, increased flocculent organic sediments, and drastic declines in native rooted aquatic vegetation. By the early 1980s, little aquatic vegetation remained and angler effort and catch of sport fish was reduced to a fraction of historical levels. Fisheries managers have utilized most major fisheries management tools in attempts to improve and restore the sport fishery at Lake Griffin. Several management actions such as stocking Largemouth Bass, Black Crappie size regulation, installation of fish attractors, and full lake drawdown were evaluated to determine the impact on fish populations and/or the anglers. The effect to the fishery has varied from short-term improvements to significant long term solutions. Although total angler effort remains below historical levels; fish populations, habitat, and angler catch rates for most sport fish species has improved over the past 10 years at Lake Griffin.

Trippel, N[1] & P Shueller[2]
Poster presentation
[1]Florida Fish and Wildlife Conservation Commission, 601 W. Woodward Ave., Eustis, FL 32726
[2]Florida Fish and Wildlife Conservation Commission, 7922 NW 71st St., Gainesville, FL 32653
Nick.trippel@myfwc.com

Assessing impacts angling for nesting Florida Bass has on individual nest success

Three lakes were snorkeled during the spring of 2012 and 2015 in the Ocala National Forest in central Florida to survey Florida Bass nests. When active nests (nests having eggs or non swim-up fry present) were located, we recorded the estimated length of the guardian male, brood stage and size, and the number or egg predators (e.g., Bluegills and shiners) observed in the vicinity of the nest for two minutes. Nests were then placed randomly into three test groups: controls (never angled), catch–and-immediate-release, or catch-and-hold-for-one-hour and released 100 m down the shoreline. After the initial treatment nests were re-surveyed again 24 to 120 hours later in order to assign a fate of either successful or failed to each nest. A successful nest was defined as a nest on which swim-up fry were documented. There were no statistical differences in nest success rates between the three treatment groups: 32% for controls, 27% for catch and release, and 27% for catch and hold. Lake, male size, and brood stage were better predictors for nest success rates than angling treatments were. Nest success was higher for smaller males than larger males.

***Trujillo, V, J Rehage, J Lee & D Gandy**
Symposium presentation
Department of Biological Sciences, Florida International University, 11200 S.W. 8th Street Miami, FL 33199
Nessa.trujillo@gmail.com

A non-native cichlid is more suitable than a native centrarchid to persist with current water management in simulated Everglades' solution holes

Vertebrate populations are regularly being subjected to novel anthropogenic stressors that are only thought to multiply exponentially in the future. Introductions of non-native species are one of many

potential drivers of change to native communities with many interaction outcomes remaining inadequately measured. The Rocky Glades, located in Everglades National Park, may serve as a sink instead of a source for natives who typically do not survive the dry season; and a source of non-natives that may be better adapted for chronically stressful conditions. In the seasonally-flooded Everglades, the non-native African jewelfish invaded in 2000 and since then has shown rapid expansion. African jewelfish are aggressive and territorial, thus they are predicted to be more successful in acquiring space and resources, displacing native sunfish. To date, relatively few studies have recognized any direct ecological effects from fish introductions in Everglades National Park, which has led to conflicting perspectives on the overall influence of non-native aquatic taxa in the ecosystem. In manipulated mesocosms, we monitored solution hole communities across the dry season and quantified survivorship and condition of native dollar sunfish and non-native African jewelfish. Overall, natives did poorly across all trials, even in all native treatments, while non-natives had higher survivorship and were in better condition. Determining the types of effects non-natives play in an ecosystem, whether indirect (e.g. behavior) or direct (e.g. survivorship) can provide evidence for non-native effects and better targets for non-native species management.

Tuckett, Q & J Hill
Contributed oral symposium
University of Florida Tropical Aquaculture Laboratory, 1408 24th Street SE, Ruskin, FL 33570
qtuckett@ufl.edu

The contribution of biotic resistance and feralization to cold tolerance in an introduced tropical fish

Temperature is a central environmental variable affecting species distributions. Because of the importance of temperature, organismal thermal tolerance can be used to identify the risk of establishment for non-native species. Cold tolerance, in particular, is a dominant factor affecting the risk of tropical fish establishment in sub-tropical Florida. However, common methods used to assess cold tolerance in potential invasive species can sometimes lack ecological relevance because they do not include environmental variation nor do they account for feralization leading to thermal adaptation. For example, Eastern Mosquitofish (*Gambusia holbrooki*) is ubiquitous in Florida and enhances biotic resistance to tropical fish invasion through agonistic interactions. Further, recent evidence suggests cold tolerance can evolve on contemporary time scales, perhaps influenced by feralization. Using a common garden approach and chronic lethal methodology we investigated the contribution of biotic resistance and feralization to cold tolerance in the Green Swordtail (*Xiphophorus hellerii*), a common ornamental fish with commercial production and locally persistent populations in Florida. Our findings indicate that feral populations of Green Swordtail have greater cold tolerance than farmed populations, but this enhanced cold tolerance is offset by the presence of Eastern Mosquitofish. These results suggest feralization can lead to thermal adaptation which could be an important pathway promoting persistence of tropical non-natives introduced at the periphery of their thermal niche. However, our results also suggest the inclusion of more ecologically-relevant study designs (e.g., competitors or predators) might eliminate any evolutionary gains to thermal tolerance.

***Vecchio, J & E Peebles**
Poster presentation
jvecchio@mail.usf.edu

Using natural tags to fill gaps in our knowledge of Red Grouper (*Epinephelus morio*) life history

Red Grouper (*Epinephelus morio*) is one of the most heavily targeted species on the West Florida Shelf (WFS) by both recreational and commercial fishers. The species exhibits size stratification across the WFS and tends to maintain shallow depressions in soft sediment; however, seasonal to annual movement patterns and contributions of specific spawning areas to the population are unknown. This project aims

to address gaps in our knowledge of Red Grouper movement using a combination of stable isotope analysis of eye lenses and microchemistry of otoliths. Fish eye lenses are made primarily from a protein called *crystallin* and grow in concentric layers as the individual ages. Eye lens layers, representing approximately three to four months of life, will be analyzed for $\delta^{13}C$ and $\delta^{15}N$ and compared to isoscapes that have already been generated for these two isotopes. Using this new technique, we will be able to re-create Red Grouper movement patterns across both depth and latitude along the WFS. Fish otoliths record both fish age and microchemistry, enabling us to describe lifetime chemical histories of fish. Otolith trace element chemistry may be used to indicate location where an individual was spawned along with other salinity life-history events, allowing us to estimate contributions to the population from specific spawning areas. The increased understanding of Red Grouper movements and life history afforded by these analyses can lead to better management of the species by targeting specific areas for conservation or exploitation.

Wattendorf, B
Symposium presentation
Florida Fish and Wildlife Conservation Commission, 620 South Meridian St., Tallahassee, FL 32399
Bob.Wattendorf@MyFWC.com

Does TrophyCatch Symbolize 37 years of progress?

After attaining a Masters in Fisheries Science with a minor in statistics from NCSU in 1979, I moved to Florida to begin work as a fisheries biologist with the Game and Fresh Water Fish Commission. After a stint on the Non-Native Fish Research Project, I became our first so-called Fisheries Geneticist and then transferred to Eustis to work at Richloam Hatchery in an effort to make Triploid Grass Carp an efficient plant management tool. From there, I went to Tallahassee as Assistant Director of Fisheries and Sport Fish Restoration Coordinator. While there, I earned a second Masters in Executive Management with an emphasis in Marketing, and eventually became the Marketing and Special Projects Coordinator for the Division of Freshwater Fisheries Management after the merger created FWRI. This presentation explores the changes in fisheries that have occurred during that time period culminating with recent developments in the TrophyCatch program, how that encapsulates those changes and what it portends for the future of fisheries management in Florida.

Wegener, M, J Knight & K Harriger
Contributed oral presentation
Florida Fish and Wildlife Conservation Commission, Holt, FL
matt.wegener@myfwc.com

Alligator Gar Population Estimate in the Escambia River, Florida

The population status of Alligator Gar *Atractosteus spatula* in Florida is currently unknown, but is thought to be declining throughout its historical range. Harvest of this species in Florida was prohibited in 2006; however abundance estimates are needed to assess this suspected decline in population size. Therefore, mark-recapture techniques were used to estimate population size in the Escambia River in 2014 and 2015. A total of 104 Alligator Gar were captured during the 2 year study, ranging in size from 93 to 206 cm TL. In 2014, 33 fish were caught and of those 3 were recaptured. In 2015, 71 fish were caught and of those 10 were recaptured. Using a closed-model approach with data collected in 2015, the population size in the Escambia River was estimated at 212 Alligator Gar (95% C.I. = 95-328). Low catch rates combined with a population estimate of < 500 individuals indicated low abundance in the Escambia River. Continued research on other rivers within the Florida-range for Alligator Gar is needed to determine this species' status and will be helpful in re-evaluating the current regulation.

Wiley, C[1], D Dutterer[2], K Woodside[1] & C Paxton[1]
Contributed oral presentation
[1]Florida Fish and Wildlife Conservation Commission, Division of Freshwater Fisheries Management, Northwest Regional Office, 3911 Highway 2321, Panama City, FL 32409
[2]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Gainesville Fisheries Office, 7386 NW 71st St., Gainesville, FL 32653
Chris.wiley@myfwc.com

Evaluation of the harvest regulation for Redear Sunfish on Merritt's Mill Pond

The resource at Merritt's Mill Pond in Northwest Florida provides anglers with the unique opportunity to catch trophy-sized (> 330 mm TL) Redear Sunfish. Redear Sunfish are a popular sportfish in Florida and were the most-sought fish species at Merritt's Mill Pond during a 2013 angler survey. Two different harvest regulations for Redear Sunfish have been established during the past 20 years with the goal of increasing the number of trophy-sized Redear Sunfish in the population at Merritt's Mill Pond. The minimum length limit for Redear Sunfish was last changed during 2002 from 356 mm TL to 254 mm TL (10 fish bag limit for both). During a 2012 angler survey 70% were rated the fishing opportunities for Redear Sunfish at Merritt's Mill Pond as "excellent" but were 54% not satisfied with the 254 mm TL minimum length limit. Resource managers are faced with the challenge of justifying the current regulation for Redear Sunfish to a user group that is satisfied with the fishing for Redear Sunfish but dissatisfied with the current harvest regulation. To address this challenge, we calibrated an age-structured population model with data collected from Merritt's Mill Pond during spring 2014. We estimated the outcome of yield-per-recruit based on a range of length limits and exploitation rates to provide inference regarding the optimum length limit for Redear Sunfish. Results indicate that the current harvest regulation is relatively equivalent to other length limits within the range tested for maximizing yield-per-recruit for the entire population and for trophy-sized Redear Sunfish. If exploitation were to exceed 50% at Merritt's Mill Pond, then the current harvest regulation would be the most effective regulation for maximizing yield-per-recruit of trophy-sized Redear Sunfish. We recommend that the harvest regulation for Redear Sunfish remain unchanged on Merritt's Mill Pond at this time.

Woodside, K[1], C Wiley[1], C Paxton[1], A Strickland[2], T Alfermann[2], & S Bisping[2]
Poster presentation
[1]Florida Fish and Wildlife Conservation Commission, Division of Freshwater Fisheries Management, Northwest Regional Office, 3911 Highway 2321, Panama City, FL 32409
[2]Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Joe Budd Field Office, 5300 High Bridge Road, Quincy, FL 32351
Katie.woodside@myfwc.com

Changing largemouth bass regulations from a minimum to a maximum on Lake Jackson, Florida

Lake Jackson is a 1620 ha lake located near Tallahassee, Florida that experiences periodic drydowns through sinkholes. Length frequency analysis and an age and growth study in 2010 indicated that approximately 90% of the Largemouth Bass population was less than 18 inches and 62% of the population was male. The black bass regulation on Lake Jackson was changed from an 18-inch minimum to a 16-inch maximum (with one bass greater than 16 inches permitted) in September 2013. The bag limit for both regulations was five fish per person, per day. The 2013 regulation was intended to encourage harvest of smaller surplus bass and limit harvest of large females. Roving peak season creel surveys were conducted in 2011, 2014, and 2015 to obtain effort, catch, and success estimates and angler opinions. Angler

satisfaction regarding regulations increased from 39% (2011) to 87% (2015). In 2011, 73% of anglers reported they would harvest bass under a new regulation; less than 30% of anglers harvested bass in 2014 and 2015. Post regulation change, effort directed at bass increased and estimated harvest of bass increased. Although anglers began harvesting bass less than 16 inches, only one bass less than 12 inches was reported as kept. Insight from implementation of the 2013 regulation may be beneficial to management if Florida adopts the proposed statewide regulation allowing harvest of five largemouth bass, one of which could be 16 inches or greater in total length.

*Student Presentation, Presenter