the Shellcracker

FLORIDA CHAPTER OF THE AMERICAN FISHERIES SOCIETY

http://www.sdafs.org/flafs

January, 2008

President's Message:

As a young buck in the fisheries profession, I often look to "senior" researchers, managers and educators to assist me with historical perspective and council. Learning and then passing on what was learned is imbedded in all trades, and this association between master and apprentice is common in fisheries as well. As I reflect on all the masters that have influenced me so far, some are in the prime of their careers, several are near the end of their careers, and others have since retired.

The slideshow that Mike Allen presented to us at our 25th annual meeting reminded us of who the Florida chapter was and who we are now. By and large, the same scientists that composed our leadership and membership then, and made major contributions to our profession, such as the publication of our book, "Florida Aquatic Habitat and Fishery Resources," still serve as fisheries professionals and compose our membership today. Yet as new recruits fill the shoes of the masters, they do so researching and managing Florida's aquatic resources with new approaches and analysis techniques, built upon past approaches and information, all while facing perhaps different challenges and issues.

Our meeting in February will be the Florida Chapter's 28th gathering. When you consider our parent chapter has been organized for nearly 140 years, it pales in comparison. But 28 years placed in the perspective of one's career is a lifetime of contributions and achievements to the fisheries profession. The contributions "our" fisheries professionals make to aquatic resources in Florida are great. As you know, our chapter meetings serve as a forum for hearing these new ideas and successes first hand, interacting with our peers, and a place for new cohorts to interact with the stock. But I also think our chapter could recognize these noteworthy accomplishments made by our members. As such, I propose two awards for your consideration: (1) Outstanding Achievement Award, and (2) Career Excellence Award. I provided a brief description of each proposed award (see page 6), so please be ready to discuss these as new business at the chapter meeting in February. I believe both of these awards have a place in our chapter, given the amount of past, current and present talent that attends our chapter meetings each year. Let's hear what you think.

Speaking of our annual meeting, have you done everything necessary to present and/or attend? Such as: Completed a meeting registration form and sent to our secretary-treasurer, Linda Lombardi-Carlson. Sent your oral or poster abstract to our president-elect, Will Patterson if you plan to present. Completed your student travel grant and/or Rottmann Scholarship applications and sent to our scholarship chair, Chuck Cichra. Solicited vendors or searched in your garage, shed or car seats for raffle item donations. All of these things are important to ensure that the meeting runs smoothly. So get them the information they need as soon as possible. For more information about our upcoming meeting, refer to the October 2007 issue of the Shellcracker at our website.

See you in February.

Eric Nagid, President FL AFS

Getting in Touch

President
Eric Nagid
FWC
7922 N.W. 71st St.
Gainesville, FL 32653
phone: (352) 392-9617 ext. 242
email: eric.nagid@myFWC.com

President-Elect
Will Patterson
University of West Florida
Department of Biology
11000 University Parkway,
Pensacola, FL 32514
Phone: (850) 857-6123
Email: wpatteson@uwf.edu

Secretary/Treasurer
Linda Lombardi-Carlson
NOAA/NMFS/SEFSC
3500 Delwood Beach Road
Panama City, FL 32408
Phone: (850) 234-6541 ext. 213
Email: linda.lombardi@noaa.gov

Newsletter Editor
Jaclyn Debicella-Leonard
Madison Middle School
3375 Dairy Road
Titusville, FL 32796
phone: (321) 264-3120
Email: jackiedebo@hotmail.com

Past President
Chuck Cichra, PhD.
University of Florida
Department of Fisheries and Aquatic Sciences
7922 N.W. 71st St.
Gainesville, FL 32653
Phone: (352) 392-9617 ext.249
Email: fish@ifas.ufl.edu

Upcoming Events

Jan 16-18 - Eighth National Conference on Science, Policy, and the Environment—Climate Change: Science and Solutions, Washington, DC.

Jan 16-18 - Texas Aquaculture Association 38th Annual trade Show and Conference, El Campo, Texas.

Jan 21-23 - Alaska Marine Science Symposium, Anchorage Alaska.

Jan 23 - 28th Annual, Ecological Farming Conference, Pacific Grove, California.

Feb 4-8 - 15th Western Groundfish Conference, Santa Cruz, California.

Feb 9-12 - Aquaculture America, Lake Buena Vista, Florida.

AFS Feb 19-21 - 28th Annual Meeting of the Florida Chapter of the American Fisheries Society. Ocala 4H-Camp, Altoona, Florida.

AFS Feb 24-28 - Advances in Tagging and Marking Technologies in Fisheries Management and Research, Auckland, New Zealand.

AFS Feb 28-Mar 2 - Southern Division of the American Fisheries Society and West Virginia Chapter of AFS, Wheeling, WV.

Mar 2-7 - 2008 Ocean Sciences Meeting, Orlando, Florida.

Mar 30-Apr 2 - 20th Northeast Recreation Research Symposium, New York Adirondack Park, New York.

Check out our Parent Society's calendar at http://www.fisheries.org/Calendar.shtml for other events not listed here!

Feature Article

Effects of Red Tide on Fish Abundance and Community Structure in a Florida Estuary

Elizabeth Berens, Damon Gannon, and Sandy Camilleri
Mote Marine Laboratory, Sarasota, Florida

People living along Florida's Gulf coast have become quite familiar with harmful algal blooms (HABs). The most prevalent HAB in Florida is the Florida red tide, primarily caused by the dinoflagellate *Karenia brevis*. *K. brevis* produces brevetoxins, a suite of neurotoxins that can kill fishes, birds, and mammals. In fact, fish kills are common during red tide events; kills of up to 100 tons of fishes per day have been estimated during severe red tides.

While the precise factors that trigger *K. brevis* blooms remain a mystery, the economic costs of these blooms are considerable. The St. Petersburg/Clearwater Visitors and Area Convention Bureau in Florida estimated local economic losses in the Tampa Bay region of $240 million due to a severe and prolonged red tide event in 2005. To date, the ecological and economic impacts of red tide on Florida's $7.5 billion recreational fishing industry have not been determined.

Most red tide research has focused on oceanographic factors related to the formation, transport, and persistence of blooms; the acute effects of red tide toxins on individual organisms; public health; and economic consequences. Very little research has been conducted on the ecological impacts of red tides on food webs or on fisheries. To the best of our knowledge, Smith (1975, 1979) published the only study on the ecological effects of red tide on a fish community. He observed the damage and subsequent recovery of a reef fish community in the Gulf of Mexico, off central Florida, resulting from a single red tide event. Smith's data were qualitative and limited in scope, and therefore provided little insight into the mechanism of community-level response and little guidance on how management agencies should address *K. brevis* HABs. The lack of information on how HABs affect food webs and fisheries is a significant problem for marine resource managers. We know that Florida red tides kill fishes. But what we do not know is whether these fish kills result in significant changes in abundance or community structure.

In 2004, we initiated a fisheries-independent, habitat-specific, stratified random survey of the fish communities in the Sarasota Bay region during summer (June-September) and winter (December-March). Among the objectives of this research are to: 1) assess how the abundance and distribution of fishes vary in response to red tide events, and 2) determine whether diversity or community structure changes in response to red tide (caused by differing susceptibility to brevetoxin among species, differing rates or mechanisms of population recovery, changes in the dominant source of primary production, changes in prey availability, or changes in predation risk). Two major red tide events (in 2005 and 2006) have occurred in the study area since starting this research, both of which resulted in massive fish kills.

We are focusing our sampling on five discrete habitat types: 1. open bay (Sarasota Bay waters >2.5 m deep, >400 m from shore, and lacking bottom vegetation); 2. sand/mud flat (depth <2.5 m with no bottom vegetation); 3. seagrass beds; 4. mangrove fringe; and 5. gulf (nearshore Gulf of Mexico waters between 1 and 4 meters deep). Our primary sampling gear is

a 183 × 7 m purse seine with 2.5-cm mesh. In addition to collecting basic information on fishes (abundance, species composition, and length measurements) at each sampling station, we also count the number of dead fish observed within 100 m of our sampling station; record temperature, dissolved oxygen, and salinity at the surface and on the bottom; measure secchi depth; and collect a water sample so that we can quantify the density of *K. brevis* cells (cells/l). The lethality of brevetoxin differs depending on whether it is held within *K. brevis* cells or has been released into the water by dead cells that have been ruptured. Work by Jerome Naar and colleagues showed that free brevetoxin appears to be more lethal than intracellular toxin. However, accurately measuring the concentrations of free brevetoxin in the water and within the *K. brevis* cells from field samples is difficult. So the *K. brevis* cell count data serve as a proxy for the total amount of brevetoxin in the water. We supplement the stratified random data with additional *K. brevis* cell counts conducted biweekly at 10 fixed stations and daily at two fixed stations (daily sampling is conducted by Mote Marine Laboratory's Phytoplankton Ecology Program). To measure brevetoxin concentrations in the tissues of fishes, we have also collected fish for toxicologists working at several institutions.

Since 2004, we have conducted 4 summer and 3 winter field seasons, during which we have made 798 purse seine sets and captured 268,291 fishes from 132 species. For the sake of brevity, we will focus on results from the summer surveys. For some analyses, data were grouped into non-red tide and red tide periods based on a *K. brevis* cell count threshold of 100,000 cells/l. Using this definition, the entire summers of 2004 and 2007 and June 1 to August 9, 2006 were considered non-red tide conditions, whereas the entire summer of 2005 and August 10 to September 30, 2006 were designated as red tide periods. Preliminary results indicate that:

- Fish kills correlate temporally and spatially with red tide
- Red tide corresponds with significant decreases in densities of live fishes for most species. Decreases in CPUE (the number of fish caught per seine set) of 40-70% are typical, with a few species approaching 100% and a few showing no significant change (Table 1, Figs. 1a & 1b).
- Stepwise multiple regression and regression tree analyses indicate that *K. brevis* abundance is negatively correlated both with abundance of live fishes (except clupeids) and with species diversity in all habitats, and that other water quality parameters are not related to changes in fish communities.
- MANOVA and canonical correspondence analysis show that *K. brevis* occurrence is associated with changes in community structure in all habitats
- Regression tree analyses suggest that measurable changes in fish communities may occur at *K. brevis* densities much lower than 100,000 cells/liter (Fig. 2).

It can be difficult to identify the specific cause of a decline in fish abundance from observational field studies because many factors can affect population size. However, in this case, the overwhelming weight of evidence seems consistent with the hypothesis that the *Karenia brevis* red tides were a major causative factor contributing to the changes in fish abundance. The fact that nearly every species showed the same pattern of changes in abundance indicates that a large-scale environmental perturbation was at work rather than simply species-specific changes in vital rates.

Much work still remains if we are to adequately understand the physiological and ecological effects of HABs on fishes. Answering questions on the effects of HABs should become a priority as HABs in general appear to be increasing in frequency and severity in many regions of the world. In fact, Brand and Compton (2007) suggest that *K. brevis* blooms in southwest Florida are showing similar increases. Information regarding fish abundance, distribution, and community structure will become increasingly vital to marine resource managers as they attempt to safeguard economically important fish stocks in an environment subjected to increasing levels of natural and anthropogenic perturbation.

Stepping into the HAB research arena has been an interesting experience. The cultural differences between the HAB research community and the fisheries community are vast. Therefore it has been difficult to get the attention of agencies that traditionally fund HAB research. Hopefully as more fisheries ecologists become interested in studying the effects of HABs, these agencies and the HAB community in general, will better appreciate the importance of understanding the ecological effects of HABs on upper trophic level organisms.

Literature Cited

Brand, L.E. and Compton, A. 2007. Long-term increase in Karenia brevis abundance along the Southwest Florida Coast. Harmful Algae 6(2): 232-252.

Smith, G.B. 1975. The 1971 red tide and its impact on certain reef communities in the eastern Gulf of Mexico. Environmental Letters 9(2): 141-152.

Smith, G.B. 1979. Relationship of eastern Gulf of Mexico reef-fish communities to the species equilibrium theory of insular biogeography. Journal of Biogeography 6:49–61.

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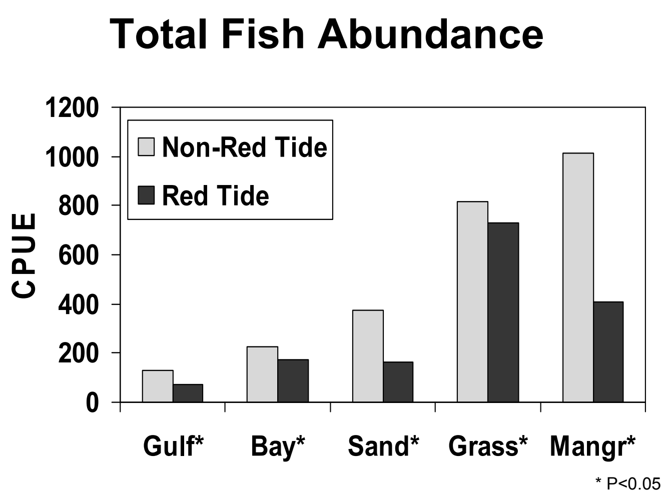
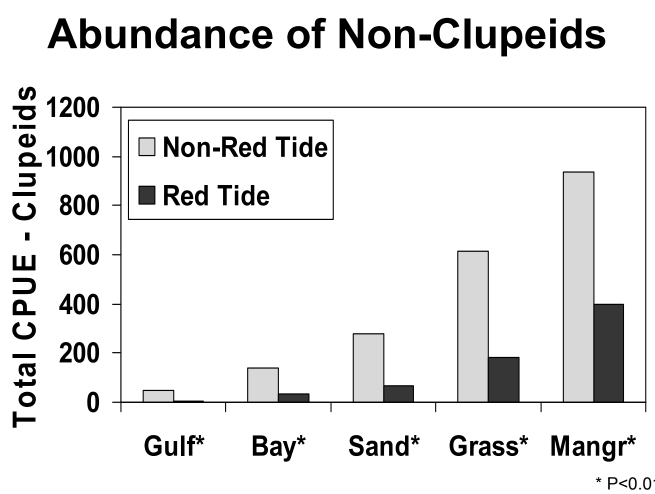
Table 1. Percent difference in relative densities between red tide and non-red tide periods for selected fishes during summers of 2004-2007 in three habitats within Sarasota Bay. (Negative values indicate lower CPUEs during red tide periods than non-red tide periods and bold numbers indicate statistically significant results of t tests at the P<0.05 level. Dashes indicate habitats in which the species was never caught.)

Species*	Man-grove	Open Bay	Sea Grass
Threadfin	-96	-19	130
Snook	73	--	0
Pigfish	**-78**	**-91**	**-97**
Pinfish	**-72**	**-75**	**-72**
Silver Perch	-20	-100	**-95**
Spotted Seatrout	-55	--	**-86**

*Atlantic thread herring ("threadfin"), *Opisthonema oglinum*; common snook, *Centropomus undecimalis*; pigfish, *Orthopristis chrysoptera*; pinfish, *Lagodon rhomboides*; silver perch, *Bairdiella chrysoura*; spotted seatrout, *Cynoscion nebulosus*.



A.



B.

Figure 1. Overall densities (CPUE of all species combined, A) and densities of all non-clupeid species (B) during red tide and non-red tide periods in the summers of 2004-2007 for five discrete habitats within and adjacent to Sarasota Bay, Florida. "Bay" = open bay, "Sand" = sand flat, "Grass" = sea grass, "Mang." = mangrove fringe (see text for habitat descriptions).

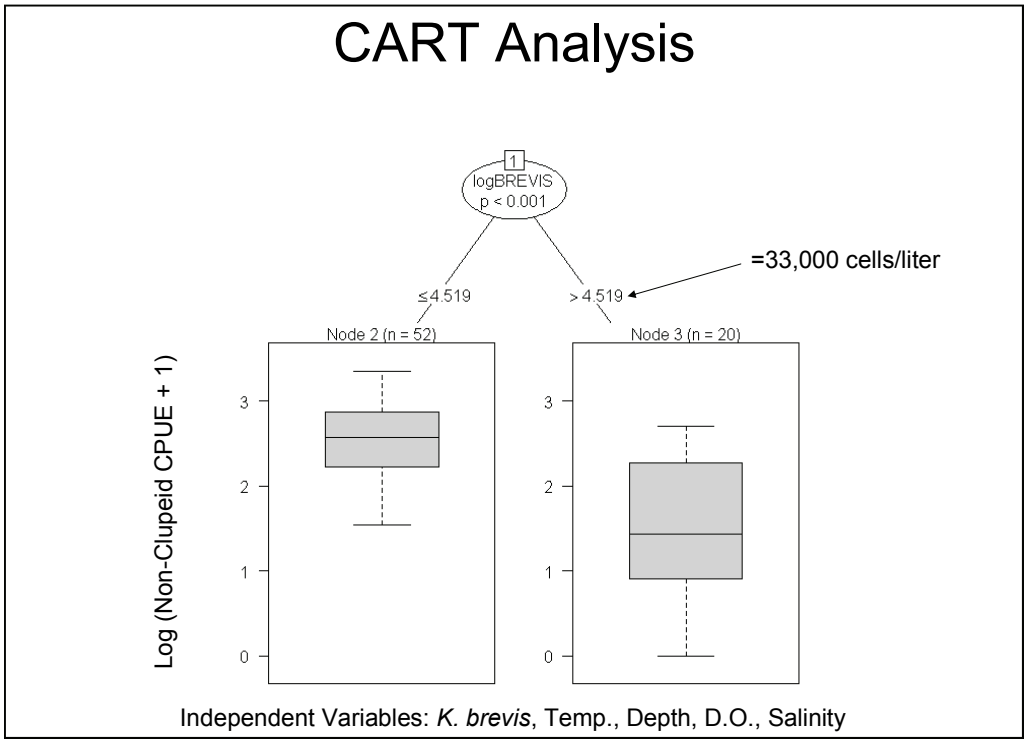


Figure 2. Regression tree analysis of the combined CPUE for all non-clupeid species (dependent variable) on *K. brevis* cell count, water temperature, depth, dissolved oxygen concentration, and salinity (independent variables) in the sea grass beds of Sarasota Bay during summers 2005-2007. The model partitioned the catch data based on a *K. brevis* threshold density of 33,000 cells/liter. None of the other independent variables had a significant relationship to catch. CPUE and *K. brevis* cell count data were log + 1 transformed.

Announcement

New Business —Proposal for new Florida Chapter awards

Outstanding Achievement Award

The purpose of the Florida Chapter's Outstanding Achievement Award is to recognize individuals for singular accomplishments and contributions to fisheries, aquatic sciences, and the Chapter. The award aims to honor individuals for distinct contributions to the fisheries profession and enhancing the visibility of the Chapter. The Outstanding Achievement Award is the highest honor Florida AFS may bestow upon an individual member.

Career Excellence Award

The purpose of the Career Excellence Award is to recognize individuals who have maintained a long-term commitment to research, management, and conservation of Florida fisheries and aquatic resources. This award aims to honor individuals for their career contributions to the fisheries profession and enhancing the visibility of the Chapter. Eligible individuals shall have a history of involvement and leadership with the Florida Chapter of the American Fisheries Society.

Annual Meeting and Symposium Announcement
2nd Call for Papers

28th Annual Meeting of the
Florida Chapter of the American Fisheries Society
February 19-21, 2008

We look forward to getting together at the 2008 annual meeting. The symposium for this year's meeting is "Ecology and Conservation of Florida Reef Fishes". The purpose of the symposium is to bring together research biologists and fisheries managers to present and discuss broad issues and themes that apply to a range of species and regions throughout the state. These include, but are not restricted to, reef fish population structure and connectivity, regional differences in population demographics, unique challenges to reef fish management, and the roll and function of marine protected areas. Several speakers are already onboard to give platform presentations for the symposium, and abstracts on other topics are currently being received and welcomed. **Remember: Presentations and posters can be submitted on any fisheries-related topic!**

Details for abstract format, program highlights, directions to the venue, etc., are available on our website (www.sdafs.org/flafs/) and in the October 2007 issue of the Shellcracker. The following is intended simply to outline the meeting and upcoming deadlines:

- **Abstracts are due** to Will Patterson (wpatterson@uwf.edu) by Friday, **January 11, 2008**.
- **Pre-registration forms are due** to Linda Lombardi-Carlson by **January 11, 2008**.
- You can lock-in your **shirt size** by writing it in on a completed pre-registration form.
- Contact Will Patterson at the email address above with any questions about the **symposium or general program**
- Contact Chuck Cichra about **student travel grants** at Fish@ifas.ufl.edu

The meeting will be held at the Ocala 4-H Camp (www.sdafs.org/flafs/doc/ocala4h.html), along Sellers Lake in the Ocala National Forest, east of Ocala, south of SR40, and just off SR19. Directions are available on page 8 and on our website.

The meeting begins with lunch on Tuesday, February 19 and ends with lunch on Thursday, February 20 (see Draft Program Overview in this newsletter).

Accommodations are open cabins, with four twin beds to a bathroom. There are several images of this facility on our website home page.

*** Plan to bring your own bedding (sheets/blankets/sleeping bag, towels, pillow) and towels if you are sleeping overnight (bedding and towels are available in limited supply for a fee).

Hope to see you in February!

Interested in contributing something to the Shell-Cracker? Email Jackie Debicella-Leonard at *jackiedebo@hotmail.com* with any articles or information that you would like to be included in the next issue. The deadline for the next issue is March 30th, 2008, so start fishing...

DRAFT Program Overview

Tuesday, 19 February, 2008
11 am to 1:00pm - Registration (also during the session breaks or see Secretary-Treasurer, Linda Lombardi-Carlson)
12:00pm - Lunch 1:00pm – Welcome: Chapter President, Eric Nagid
1:10pm to 5:10pm - Contributed Papers
5:10pm to 6:00pm - Break
6:00pm - Dinner
5:30 to 7:00pm - Registration / Poster Set Up
7:00pm - Formal Poster Session (Drinks, snacks, and presenters will be available)
8:00pm - Bonfire Social

Wednesday, 20 February, 2008
7:30am to 8:10pm - Registration
7:00am - Breakfast
8:00am – Welcome: Symposium Organizer, Will Patterson
8:10am to 11:50am - Symposium: Ecology and Conservation of Florida Reef Fishes
12:00pm - Lunch
1:00pm - Announcements
1:10pm to 5:00pm - Symposium-related papers/ Contributed papers
5:00pm – Student subunit meeting
6:00pm - Dinner
7:00pm - A short business meeting (Student Travel and Rottmann Award Presentations)
7:30pm - Raffle followed by a Bonfire Social

Thursday, 22 February, 2007
7:30am to 8:10 am -- Registration
7:00am - Breakfast 8:00am - Welcome/ Announcements
8:10am to 11:50am - Contributed Papers
12:00pm - Lunch 1:00pm - Awards for Best Papers, Best Posters, Power Tie Award, & Lampshade Award

Directions to Ocala 4-H Camp

The Ocala 4-H Center is located in the Ocala National Forest on Sellers Lake. Directions are provided below for those traveling from different parts of the state. Mileage estimates are to be used for general reference only.

From SW:
Take I-75 N to 44 E, head towards Leesburg, turn right onto 441 S, in Eustis, take exit for 19 N (on right), turn left at light and head north on 19 N for ~19 mi., turn left onto NFS 535 at the Fire Control Center/Camp Ocala 4-H Center sign. Center will be on the right about 1/2 mi.

From SE:
Take Turnpike N to 429 N towards Apopka, turn left onto 441 N, once in Eustis, take a right onto 19 N., go for ~19 mi. and turn left onto NFS 535 at the Fire Control Center/Camp Ocala 4-H Center sign. Center will be on the right about 1/2 mi.

From NW:
Take I-75 S to Ocala, take the exit for 326 E, when 326 ends, turn left onto 40 E, turn right onto 19 S, go for ~4.5 mi. and turn right onto NFS 535 at the Fire Control Center/Camp Ocala 4-H Center sign. Center will be on the right about 1/2 mi.

From NE:
Take 17 S to Palatka, turn right onto 19 S, go for ~42 mi. and turn right onto NFS 535 at the Fire Control Center/Camp Ocala 4-H Center sign. Center will be on the right about 1/2 mi.



Florida Chapter of the American Fisheries Society
4H Camp Ocala, Florida
Annual Meeting Registration: February 19-21, 2008

Official Use Only:
Postmarked:_____
Entered:_____
Deposited:_____

First: _____Last: _____ Student (please check) ____

Affiliation:_____
This address will be used in our mailing list and should be the one where you want to receive newsletters and other materials.

Street Address:_____

City:_____State:_____Zip Code:_____

Work Phone:_____Ext:_____Email:_____

T-Shirt Size: (Select One)	Small	Medium	Large	X-Large	XX-Large	XXX-Large

Arrival Time: (Select One)	Tue Noon	Tue PM	Wed AM	Wed Noon	Wed PM	Thur AM

Please check the appropriate lines below.

PRE-REGISTRATION: registration form postmarked by Friday, January 11, 2008
_____$ 25.00 One-day Registration _____$ 35.00 Full Registration

LATE-REGISTRATION: registration form postmarked after Friday, January 11, 2008
_____$ 28.00 One-day Registration _____$ 40.00 Full Registration

Meals and Lodging

Tuesday, February 19, 2008
_____$7.00 Lunch
_____$13.00 Dinner
_____$25.00 Lodging

Wednesday, February 20, 2008
_____$4.00 Breakfast
_____$7.00 Lunch
_____$13.00 Dinner
_____$25.00 Lodging

Thursday, February 21, 2008
_____ $4.00 Breakfast
_____ $7.00 Lunch

Dietary Needs:
Vegetarian _____
Low Fat _____
Other: _____

Full Meals and Lodging _____$105.00

Linens (please bring own, limited supply) _____$ 6.00

Florida Chapter dues (calendar year 2008) _____$10.00 ____FL Chapter dues paid via AFS annual membership.

Total Amount: _____ __ Cash __ Check

Total Enclosed: _____ (Minimum $10) __ Cash __ Check __ Credit

Balance Due: _____

Please Make Checks Payable to Florida Chapter, AFS and mail to:
Linda A. Lombardi-Carlson
NOAA Fisheries Service
3500 Delwood Beach Road
Panama City, FL 32408
Phone: (850) 234-6541 ext. 213
Fax: (850) 235-3559
Email: Linda.Lombardi@noaa.gov

*Checks not payable to 'Florida Chapter, AFS' will be returned to sender.
Registration Forms may be sent via fax (attention: Linda) or via email: (subject: 2008 AFS FL).

Note: This is a cafeteria-style service and food must be ordered a week in advance.
Since meals are pre-paid, **please** submit your registration form by Monday, February 11th, 2008.
Registrations will still be accepted at the meeting.
We can only accept **non-FWC VISA** or **MASTERCARD** on the meeting date**.**
Credit card charges are submitted by our parent organization, AFS, after the meeting.
If you would like to pay your meeting fees with a credit card, then please send a $10 check for your deposit.

Student Section

DIRECT AND INDIRECT ESTIMATES OF BLACK CRAPPIE SIZE SELECTIVITY TO OTTER TRAWLS

Greg Binion, Graduate Research Assistant
Department of Fisheries and Aquatic Sciences
University of Florida, Gainesville, FL

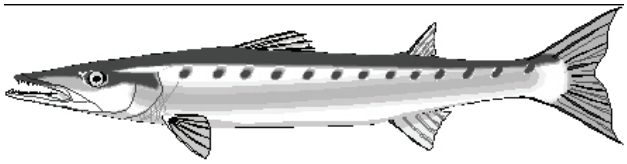
Effective management of fishery resources is dependent on the quality of information available for decisions. To develop optimal management strategies, biologists must be confident that sampling reliably tracks population metrics. These strategies are often reliant on precise estimates of some metric of population size and its corresponding level of production (biomass/numbers). Gear selectivity patterns often influence the precision and accuracy of these measures. Samples collected from many fish populations with a variety of gears often don't accurately describe the true age and size structure of the target population. Gear selectivity is defined as the composition of a sample relative to the true population metric (e.g. size, age, growth rate). Obtaining an abundance index that reflects the actual age/size composition of a population allows managers to monitor population trends such as recruitment, growth, and mortality and evaluate population responses to management policies (e.g., size limits).

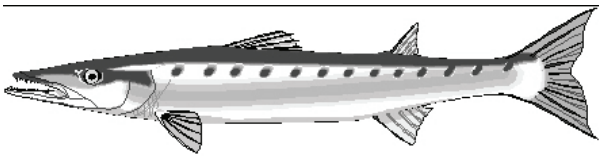
Measurements of the selective properties of fishing gears are often made utilizing direct and indirect methods. Direct methods involve comparing catch composition against a known population structure. The most direct method for estimating selectivity is a mark recapture experiment that creates a known population of marked fish, then calculates the proportion of fish caught by the gear in a given length category from the marked subpopulation. Unlike direct methods, indirect measures of selectivity require no prior knowledge about the age composition of a population. If catch-at-age data from the commercial or recreational sectors are available, age-structured population models like virtual population analysis (VPA) can estimate the age/size selective properties of the fishing gear used. Other approaches incorporate the catch rates of various sizes of fish from different gear types and/or mesh size to compare relative gear selectivity between gears, but such studies do not identify the true selectivity of either gear.

I estimated size selectivity of bottom trawl sampling for black crappie *Pomoxis nigromaculatus* utilizing direct and indirect approaches. I used capture-recapture methods to directly measure the effects of fish size on catchability (q, the fraction of a fish stock collected with a given unit of fishing effort) at Lake Jeffords, Florida. Estimates of q were made for different length-groups roughly resembling age-classes 0 to 3+ (90-119, 120-149, 150-179, 180+ mm) by marking a subpopulation collected using three gear types (bottom trawls, hoopnets, and electrofishing). Recapture sampling with otter trawls occurred two weeks after marking events ended, allowing a direct estimate of q from recaptures of tagged fish from each gear and size class. Indirect estimates of selectivity were obtained with a population model applied to long-term data from lakes Griffin,

Johns, Lochloosa, and Okeechobee. I constructed age-structured models for each lake that predicted annual catches-at-age as a function of measured growth rates, a time series of recruitment anomalies, assumed survival rates, and unknown age/size selectivities. Selectivity parameters were estimated by fitting model-predicted catch-age data to a time series of bottom trawl catches-at-age using maximum likelihood.

Direct measures of selectivity indicated catchability was highest for the 90 to 119-mm length-group and lowest for fish greater than or equal to 180 mm, with *q* declining by a factor of 2 or 3 for large fish relative to small fish. Model simulations from the age-structured indirect approach revealed dome-shaped selectivity patterns with relative selectivities peaking at age-1 for three of four lakes. Lake Johns was the only exception where age-0 fish was the most efficiently captured age-group when survival was low. Overall model trends indicated greater selectivity of younger fish (age-0 and age-1) to the gear followed by decreasing relative selectivity to older age-classes (age-2+). Trawl selectivity patterns suggested that otter trawls would be best for monitoring the abundance of small black crappie. For example, annual trawl catches of age-0 crappie could provide a good index of year-class strength. My results indicate that adult black crappie will likely be underrepresented in bottom trawl samples, which would influence age structure and growth rate estimates and the effectiveness of this gear as an assessment tool for tracking adult crappie populations. For example, crappie age-structure data from trawls would be inappropriate for estimating mortality rates using the catch curve method. These findings should aid in the development of standardized sampling techniques for black crappie in Florida lakes.





Student Subunit Announcements

- Applications for Student Travel Grants to the Annual Florida AFS meeting in February can be found on the website at http://www.sdafs.org/flafs/PDF/travelap.pdf.
- Instructions and applications for the Roger Rottmann Memorial Scholarship can be found at http://www.sdafs.org/flafs/doc/rottmann.html. This is a $500 scholarship available to PhD and Master's level students.
- Subunit officers will be elected at the Chapter meeting in February, consider getting involved!
- Please bring at least one item to raffle off during the meeting. Remember proceeds are used to issue student travel grants to next years meeting!

Florida Chapter AFS
601 W. Woodward Ave.
Eustis, FL 32726

ADDRESS SERVICE REQUESTED

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