the Shellcracker

FLORIDA CHAPTER OF THE AMERICAN FISHERIES SOCIETY **_http://www.sdafs.org/flafs_**

October, 2014

President's Message:

Greetings from St. Petersburg! As the year goes on we see everyone get busier with school starting and the analysis of lots of data from summer sampling seasons. This time of data analysis is a great time to start planning talks for meetings and symposia during the winter months. With this in mind, the next Florida Chapter of the American Fisheries Society annual meeting has been scheduled for February 17-19, 2015. Our president-elect, Dr. Jennifer Rehage, has prepared a great symposium. The first call for papers and more information about the meeting will be included in this issue of the Shellcracker, but feel free to contact Jennifer rehagej@fiu.edu or myself if you have any questions.

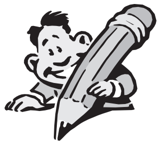
It is also a good time to encourage students that you mentor/advise to start thinking about preparing a talk or poster for their work. The chapter meeting is a great opportunity to share what you've been up to or to talk about what you are currently working on. I can't count the number of times I've heard people figure out a different way to look at their data because of a talk with a fellow scientist (both during breaks and around the campfire). I personally feel that being able to present the work we do is a critically important part of science today. There is a lot of great information/knowledge out there and we need to make sure we share it with each other and any stakeholders we can get our hands on. There are always people who are surprised on how well their work is received by fishing clubs, environmental groups, and other local groups that are interested in the natural world around them. Go out and share what you know!

The Florida AFS chapter has a lot to be proud of from the Quebec annual meeting with our student subunit receiving the AFS Outstanding Student Sub-unit Award for 2014 and Ron Taylor being honored with the William E. Ricker Resource Conservation award. I appreciate all the hard work that everyone does and it is nice to see it recognized by others.

Remember that the AFS annual meeting in Tampa is still on the horizon in 2017. A notable change is that The Wildlife Society (TWS) will not be joining us for this meeting. So the focus goes back to where it belongs, fisheries. There will be plenty of work coming up and we will need all the support that we can get from you all. If you are interested in being involved in this process or taking a leadership role, please contact me at Chris.Bradshaw@myfwc.com or Kerry Kerry.Flaherty@myfwc.com.

Sincerely,

Chris Bradshaw
Florida Chapter President



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Interested in contributing something to the Shellcracker? Email Chris Wiley at *chris.wiley@myfwc,com* with any articles or information that you would like to have included in the next issue. The Shellcracker is a great resource for informing folks about ongoing and proposed research. The deadline for the next issue is December 15th, 2014, so start fishing...

Feature Article

Assessing Impacts Angling for Nesting Florida Bass has on Annual Recruitment

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Introduction

Anglers in Florida spend more than 14 million angler days per year pursuing black bass *Micropterus* spp. Most of this angler effort is directed at catching Florida Bass *M. floridanus;* the most commonly targeted fish in the state (USFWS 2006). Florida Bass are only native to peninsular Florida. This fishery puts more than $1.2 billion dollars into Florida's economy annually. Florida Bass grow faster and larger than other black bass species, bringing anglers from all over the world to Florida for their chance at a trophy fish. In order to conserve and promote Florida's bass fisheries, the Florida Fish and Wildlife Conservation (FWC) released its Black Bass Management Plan in June 2011. This document is a long-term, science-based, and citizen-guided plan to ensure Florida is the undisputed "Bass Fishing Capital of the World".

The goal for this plan was to use public and agency input to determine the most important issues to address to more successfully manage and conserve Florida's bass fisheries. The public was involved in multiple ways putting this document together. A technical advisory group consisting of marina owners, tournament directors, professional anglers, university professors, tourism development professionals, fishing guides, and outdoor writers had input into the development of the plan. Also, a survey was sent to all freshwater fishing license holders in the state of Florida asking what they felt were the most important issues . Not surprisingly the most common issue was aquatic plant control. Surprisingly, the impact of bed fishing was the second most common issue.

Bed fishing, the act of actively targeting bass on spawning beds, has been common for decades among recreational and tournament anglers in Florida. Although there have been several studies done in northern states (Philipp et al. 1997, Suski and Philipp 2004, Hanson et al. 2007, Parkos et al. 2011, and Diana et al. 2012), no research has been done to determine impacts that bed fishing for Florida Bass may have on nest success rates or annual recruitment. In order to assess whether bed fishing in Florida could have negative impacts, biologists from FWC's Fish and Wildlife Research Institute (FWRI), Division of Freshwater Fisheries Management (DFFM), Florida's Bass Conservation Center (FBCC), and multiple labs from the University of Florida's Department of Fisheries and Aquatic Sciences teamed up to determine: the impact of bed fishing on the number of young Florida Bass recruiting to the fall, the effects of bed fishing on nest abandonment and nest success rates, and the effects of fishing on the number of spawning pairs that successfully contribute to a year class. This is an ongoing study, but we present some the interesting results that we have learned to this point.

Methods

The study was conducted in 2013 and 2014. In each year, nine 1-acre hatchery ponds were used to simulate natural lakes with natural fish communities. Ten evenly spaced, 3 x 2-m brush piles (oak and maple branches from 25 - 100 mm diameter at the base) were submersed in shoreline areas around the perimeter of each pond. In addition, ten concrete blocks were evenly spaced in the middle of each pond to provide vertical structure because black bass frequently spawn on or in close proximity to such structure in natural systems (Figure 1).

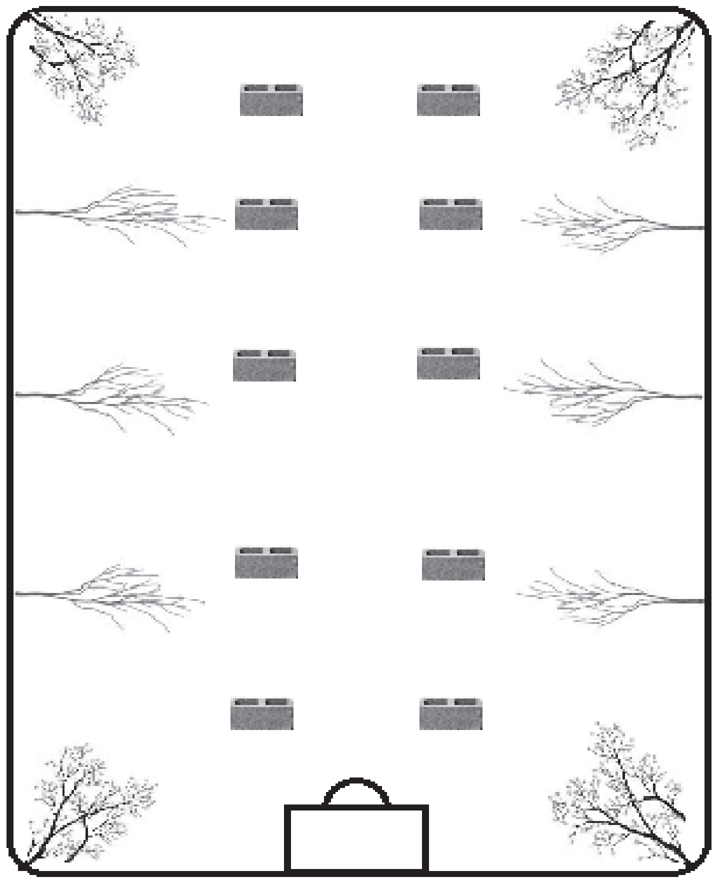

Figure 1. Positions of brush piles and concrete blocks in each research pond.

Ponds were filled with water on December 13, 2012 for the first year of the study and on December 19, 2013 for year two. Once filled, ponds were stocked with Grass Carp Ctenopharyngodon idella. In 2012, Grass Carp fingerlings were stocked at a rate of 20 fish/acre. Surplus fingerlings were kept in raceways and grown to larger sizes for stocking later in the study for plant control. In 2013, larger Grass Carp (300-450 mm) were stocked at a higher rate of 30/acre to more effectively manage aquatic plants in the research ponds. To simulate a natural fish community, fish prey, fish predators, and egg predators were stocked into the ponds. Stocking densities were determined based on historical blocknet data from the Ocklawaha Chain of Lakes (FWC unpublished data). In both study years, 1.36 kg (approximately 1,200) of juvenile Bluegill Lepomis macrochirus (up to 60 mm total length [TL]) were stocked into each of the nine research ponds. We also stocked 21 adult Bluegill >150 mm TL, 420 Seminole Killifish Fundulus seminolis (90-130 mm TL), and 1.36 kg (approximately 1,600) of Eastern Mosquitofish Gambusia holbrooki (10-40 mm TL) into each pond (Table 1). The Seminole Killifish and mature Bluegill were collected via boat electrofishing from the Ocklawaha Chain of Lakes and transported to the hatchery. Juvenile Bluegill and Eastern Mosquitofish were produced in ponds at the hatchery.

Table 1. Stocking rates for 0.40-hectare research ponds used to simulate a natural fish community. *Bluegill <150 mm and Eastern Mosquitofish were stocked by weight (1.36 kg/acre for each species), and numbers were estimated based on subsample data.

Species	**Size Range**	**Number Stocked per Acre**
Florida Bass		
Males	356-457	10
Females	406-559	10
	0-9	16*
	10-19	409*
	20-29	538*
	30-39	128*
	40-49	68*
	50-59	4*
	≥150	21
Eastern Mosquitofish	10-40	1,600*
Seminole Killifish	90-130	465

For both study years, adult Florida Bass were collected in November via boat electrofishing (November 15-16, 2012 from the Ocklawaha Chain of Lakes, November 12-13, 2013 from Mosaic Fish Management Area Lake S8 East) and then held in a raceway at the Florida Bass Conservation Center. Later in the month (November 29, 2012 for the first year of the study and November 26, 2013 for year two) fish were sexed using a catheter, pit tagged, and fin clipped The fin clips provided nuclear DNA that would be used to assign parental contribution to year classes that had been produced during each year of the study. In year-one (January 24, 2013) each bass was disc tagged in the back below the rear dorsal fin for visual identification and stocked at a rate of 10 males and 10 females per pond. Adult bass were stocked at the same rate during year-two, but were not disc tagged because the tagging process was extremely stressful for the fish in year one, and algal growth made it very hard to read the tags while snorkeling (which was the reason they were originally used). Males and females ranged between 336 - 468 mm TL and 366 - 559 mm TL, respectively.

Temperature loggers were placed in each pond to monitor water temperature throughout the study period. Dissolved oxygen (DO), Secchi depth, pH, conductivity, and percent area covered (PAC) with aquatic plants were also recorded two to three times per week for each pond. Water levels in each pond were maintained at maximum capacity. If PAC exceeded 40%, additional Grass Carp were stocked or the ponds were treated with various aquatic herbicides depending on the plant species . Southern naiad Najas guadalupensis was treated with Sonar® (fluridone) and Reward® (diquat), muskgrass Chara spp. and filamentous algae with Cutrine Plus® (copper), and torpedo grass Panicum repens with Rodeo® (glyphosate).

Snorkel surveys were conducted every other day beginning on January 30, 2013 of the first year of the study and February 3, 2014 in year-two. For each survey, seven passes were made lengthwise across each pond so that every brush pile and concrete block could be checked. Nests were considered active when eggs or fry were present, and data were recorded for each active nest (Suski and Philipp 2004; Diana et al. 2012; Hanson et al. 2007; Suski et al. 2003; Parkos et al. 2011). When an active nest was located, it was observed for two minutes from a distance as far away as water clarity would allow, usually 2-3 m. This was done to minimize the disturbance to the nest to record that the presence or absence of nest predators. Each nest was given an identification number, marked with a float, and plotted on a map of the pond. Brood size was subjectively ranked using a scale of one (smallest) through five (largest) (Diana et al. 2012; Parkos et al. 2011). A circular egg mass with a diameter of about six inches was given a score of three (the midpoint) and used as a reference or benchmark to score brood size in each nest. Five to ten eggs were collected from each nest for genetic analysis using a small pipette. If possible, disc tag identification numbers were recorded from the parental fish guarding the nest (2013). Nests were observed and evaluated on subsequent snorkel surveys to determine whether the nest was successful or abandoned. A successful nest was defined by swim-up fry over the nest andan abandoned nest was defined as having no eggs or guarding fish. Snorkeling surveys continued until no active nests were found for three consecutive weeks.

Nest detection rates were determined every two to three weeks when active nests were present. One biologist would complete the snorkeling surveys in a subsample of the ponds while a second biologist completed the surveys in the other ponds; each recording active nests as they found them. The snorkelers would then switch ponds without communicating with each other, resample all transects, and document any nests missed by the first snorkeler. Nest detection rate (NDR) was calculated using the equation:

$$NDR = (N_1/(N_1+N_2))*100$$

Where N_1 was the number of nests located by snorkeler #1, and N_2 was the number of nests located by snorkeler #2.

Ponds were split into two treatment groups, control ponds (no fishing) and fished ponds. In ponds that were fished, every active nest was fished after it was located. Anglers used a lure of their choice and fished each nest until they caught the fish off the nest or spent 30 or more minutes targeting the nest. Once fish were caught, biologists recorded the pit tag identification number, disc tag number, lure type, and hook location. Fish were then placed in a cylindrical cage (1-m deep x 1-m diameter) within the pond for one hour to simulate a tournament experience before they were released as was done in similar studies (Hanson et al. 2007). In 2013, water clarity in three ponds (two fished and one unfished) declined during the study period and reduced the ability to locate nests from the shoreline and while snorkeling. After this occurred, anglers began blind casting into all fished ponds for 30-minute time periods, three times per weekto ensure all of the “fished” ponds received at least this minimum level of fishing pressure. In 2014, all nine ponds became turbid in May three weeks before the end of the snorkeling survey season. During this period of reduced visibility, all five fished ponds were fished by blind casting for 30-minute time periods once a week.

Statistical analysis was completed using SAS. The 2013 and 2014 datasets were combined to increase sample size and statistical e power. The number of nests produced per pair of bass was compared between fished and unfished ponds using a traditional 2-factor ANOVA with year and status and their interaction as fixed factors. To compare nest success rates, a generalized linear model assuming a binomial distribution was used. Total egg production scores were calculated by summing the scores of all nests for each pond.

Genetic analysis was used to estimate the number of adult bass contributing to recruitment during the 2013 trials. (Second year trials not yet complete.) Samples of DNA from all of the broodfish and as many as 200 juvenile bass from each pond were extracted using a glass-fiber plate extraction protocol (Ivanova et al. 2006). When ponds contained more than 200 juveniles a subsample was selected by taking a proportional subsample of fish based on length classes. To calculate subsamples, all offspring from each pond were counted, measured to the nearest cm, and placed into 1- cm bins. A proportional subsample from each size class was calculated by taking the total number of individuals per size bin divided by total number of all juveniles in that pond, multiplied by 200. Ten previously developed microsatellite DNA loci (Seyoum et al. 2012) were amplified for all potential parents and offspring.

Parentage analysis was performed using the categorical assignment methods implemented in COLONY (Jones and Wang 2010). This full-pedigree approach was selected as it clusters individuals into family groups and evaluates the likelihood of the clusters to identify the most parsimonious configuration (Harrison et al. 2013). Simulation studies have determined that this approach increases the accuracy of assignments relative to other categories of parentage analysis (Wang 2007). Outputs from COLONY were used to create profiles for individual fish that included the total number of matings and the number of offspring produced per mating.

Results

Nest Activity and Nest Success Results (2013 and 2014):

During year one of the study, active nests were located from February 7 through May 9, 2013 (Figure 2). During this time period, nest detection rates were 100% with a total of 56 active nests located. Twenty five active nests were observed in fished ponds and 31 in unfished ponds. Nest success rates averaged 52% for fished ponds and 45% for unfished ponds (Table 2). Of the 25 active nests located in the fished ponds, fish were caught from 12 (12 males and 2 females, with one female caught twice). Bass were hooked but not landed from eight nests. There were only five active nests in which fish were neither hooked nor caught by angling. Of the 12 nests from which fish were caught and held for one hour, six returned and nested successfully. Four of the other six angled nests were abandoned and two were unknown due to poor water visibility. Peak spawning occurred when water temperatures increased with the most active period at water temperatures between 20 and 21°C (Figure 2). Nests with a relative brood size of three or four were more likely to be successful than nests with smaller or larger brood sizes (Figure 3). However, we had a very small sample size of nests that were given a score of five. Only four of 14 (29%) nests where egg predation was documented were successful. We documented juvenile bass preying upon eggs in two active nests and all other observed egg predation events were by Bluegill. Zooplankton counts remained similar between ponds throughout the spring.

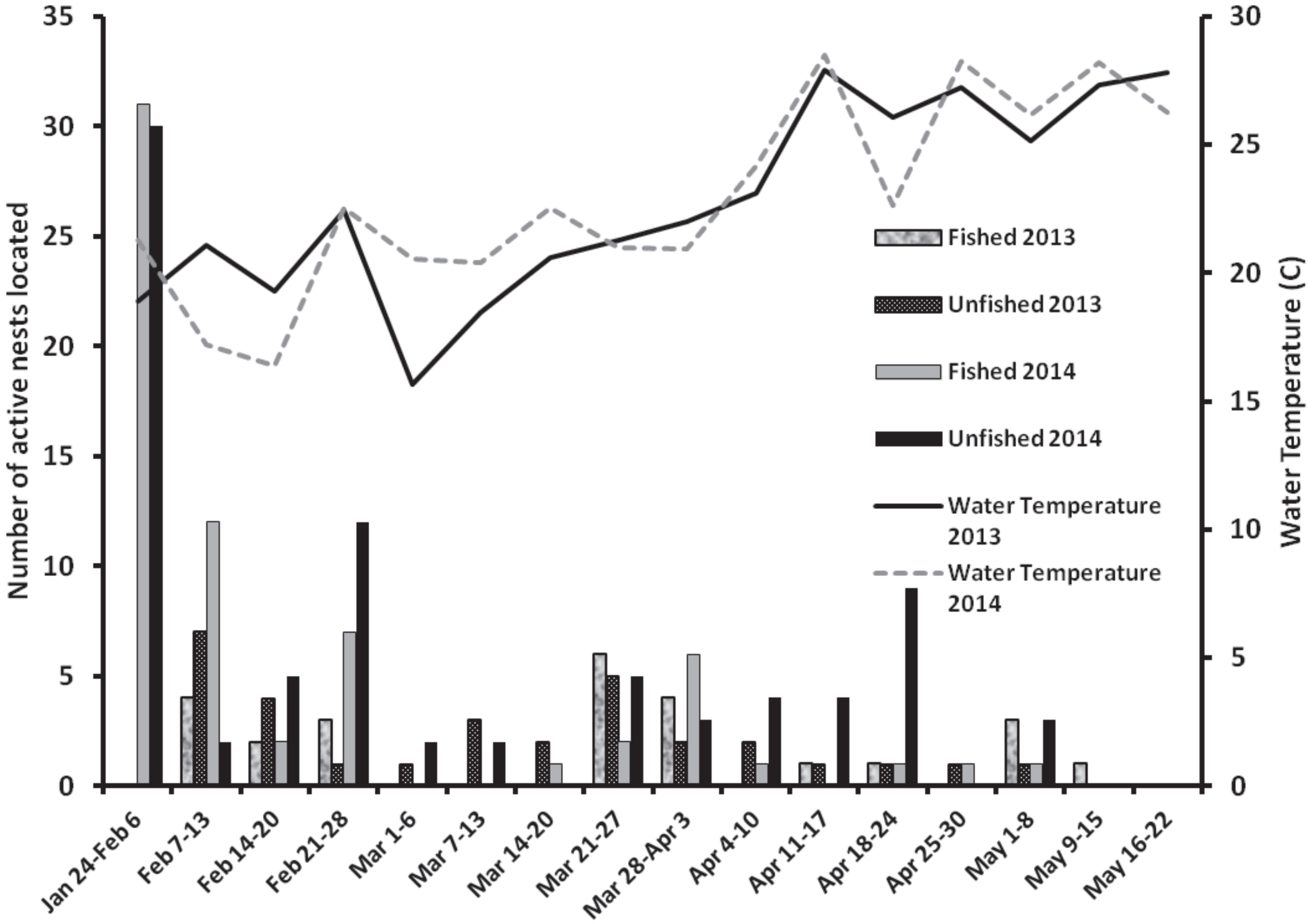

Figure 2. Number of active nests located in fished and unfished ponds and mean water temperature (°C) for each week from January 24 to May 22, 2013 and 2014.

During year two of the study, nest detection rates were 100% with 148 active nests located between February 3, and May 5, 2014 (Table 2, Figure 2). Sixty six active nests were observed in fished ponds and 82 in unfished ponds. Nest success rates were 37% for fished ponds and 58% for unfished ponds (Table 2). Of the 66 active nests located in the fished ponds, fish were caught from 31 (27 males and 15 females). Fourteen of the 31 nests where fish were caught and held for one hour were successful and 17 were abandoned. Fish were hooked and lost off of five other nests, and of these, three were successful. Thus, there were 30 nests (45%) where parental fish were never hooked or caught. Similar to the previous year, peak spawning occurred when water temperatures increased with the most active period between 20–21°C (Figure 2). Also, nests with a brood size of three or four were again more likely be successful than nests with smaller brood sizes (Figure 3). Egg predation was only documented on six nests through the entire spring, and two of these (33%) were successful. Both Bluegill and young-of-year bass preyed on eggs. Zooplankton counts remained similar between ponds throughout the spring.

Table 2. Number of successful and unsuccessful Florida bass nests observed in fished (N = 5) and unfished ponds (N = 4) in spring of 2013.

	Year	Fished Ponds	Unfished Ponds
Successful Nests	2013	13 (52%)	14 (45%)
	2014	24 (36%)	47 (57%)
Unsuccessful Nests	2013	12 (48%)	17 (55%)
	2014	42 (63%)	35 (42%)
Nests Fish were Caught from and Held for One Hour	2013	12 (48%)	NA
	2014	32 (48%)	NA
Successful Nests after Fish Capture and Return	2013	6 (50%)	NA
	2014	14 (45%)	NA
Total Nests	2013	25*	31*
	2014	66	82

*Nests were difficult to locate and may have been missed in two “fished” ponds and one “unfished” pond due to poor visibility.

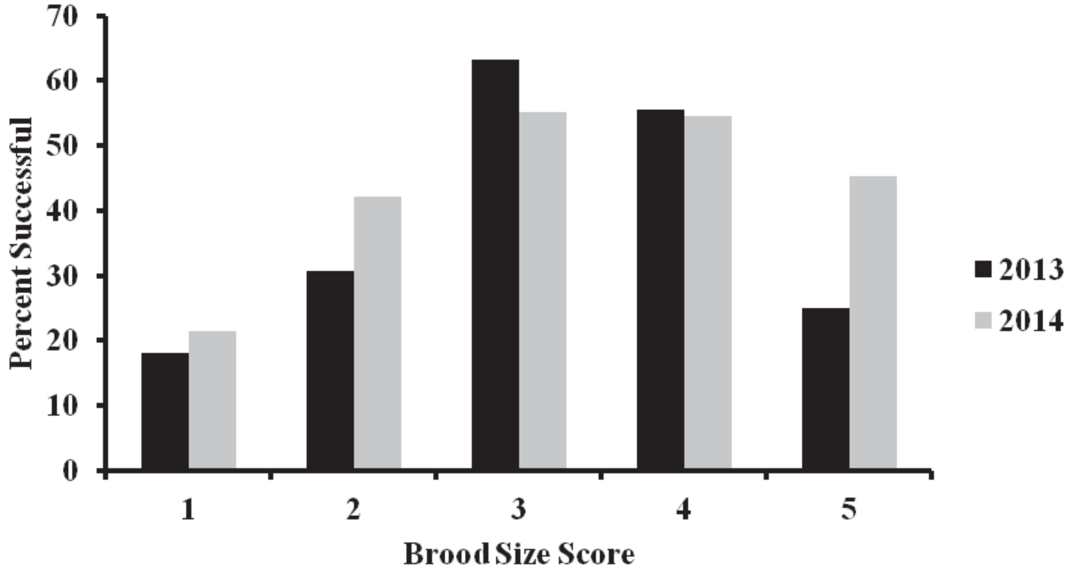

Figure 3. Nest success rates of Florida Bass with different brood sizes . The fished and unfished ponds were pooled for each of the two study years (2013 and 2014). Brood size was scored from 1 (smallest) to 5 (largest) for each nest.

Nesting rate comparisons for both years combined are summarized in Table 3. Though, there were more nests made and eggs produced in unfished ponds during 2013, there were no significant differences in recruitment between treatments. This analysis will be conducted for the second year of the dataset and for pooled study years when the 2014 recruitment data has been collected. Although total egg production and mean egg production per pond throughout the two years of the study was greater in unfished ponds there was no significant differences (P = 0.25). Mean nest size was the same (2.7) between fished and unfished ponds throughout the study. When comparing nest success rates there was a significant interaction ($F_{1,12}$ = 4.07, P = 0.0667) between the two treatments. Within-year, t-tests show that in 2013 the nest success rate in the fished ponds (52% +/- 10.34%) and unfished ponds (45% +/- 8.9%) (t_{12} = 0.82, p = 0.43), did not differ significantly from one another but in 2014 the unfished ponds (57% +/- 5.5%) had a higher nest success rate than the fished ponds (36% +/- 5.9%) (t_{12} = 2.52, p = 0.03).

Table 3 Nest summary data for 2013 and 2014 combined.

	Fished	**Unfished**
Number of nests/pair	1.0*	1.4
Mean nest size	2.7	2.7
Total egg production	291	368
Mean egg produciton	32.3	40.9

* signficant

When data for estimated brood sizes was combined for 2013 and 2014, nest success generally increased with brood size (Figure 6), similar to the trend for individual years. The catchability of a fish on a nest increases with brood size (Figure 4). This suggests that the larger the brood size, the more likely fish are to protect it.

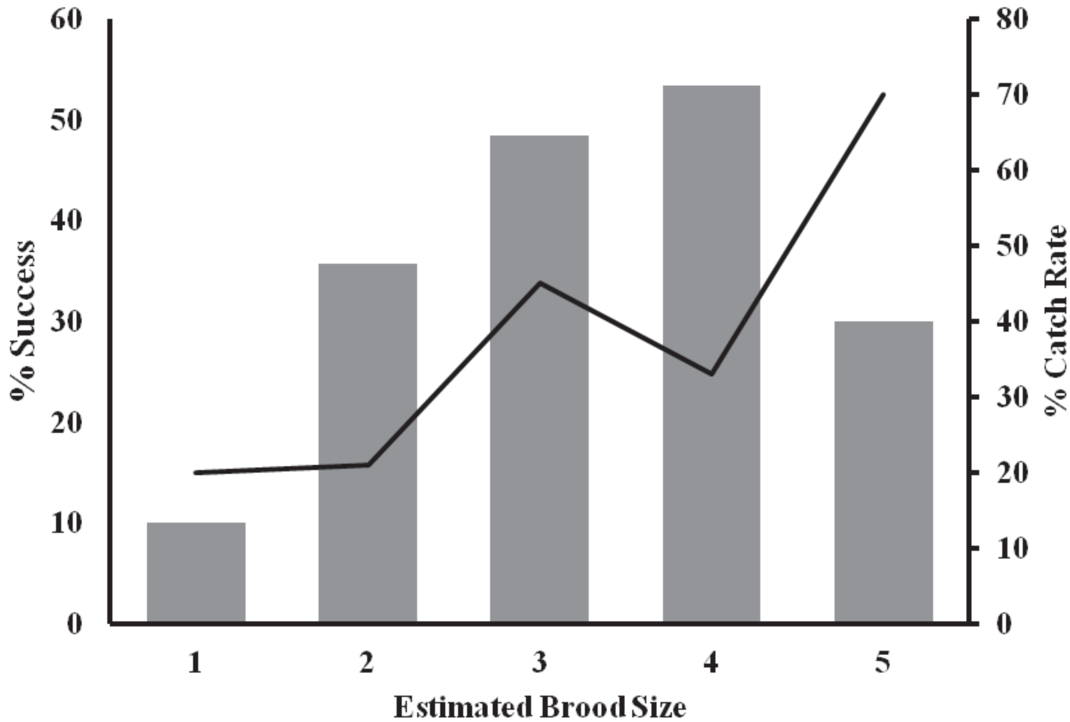

Figure 6. Nest success rates (Gray Bars) and angling catch rates (Black Line) of Florida Bass with different estimated brood sizes (scored 1(smallest) to 5 (largest). Nests from all the fished ponds were combined for the two study years (2013 and 2014).

Recruitment and Parental Contribution:

The first year research ponds were drained and fish harvested from October 14-16, 2013. Second year ponds will be drained in October 2014. The number of young-of-year bass ranged from 561-3479 (mean = 1504) for unfished ponds and from 34-1775 (mean = 777) for fished ponds (Table 4). Due to high variability, there was no significant difference in number of recruits produced between fished and unfished ponds in 2013.

Table 4. Number of young-of-year (recruits) recovered from research ponds drained in October 2013.

Treatment	Pond #	# of recruits
Unfished	23	1177
	28	561
	57	801
	61	3479
	Mean	1505
	SE	670
Fished	27	135
	29	34
	56	707
	58	1236
	60	1775
	Mean	777
	SE	330

Parentage analysis was performed on a total of 1,669 offspring sampled in 2013. The proportion of offspring analyzed from individual ponds ranged from 7.2% to 100% of all recruits. The average number of families (or pairings of distinct mother-father combinations) was 5.50 in unfished populations and 3.80 in fished populations (Table 5). On average, 3.00 females and 3.80 males contributed to reproduction in unfished populations and 3.00 females and 2.40 males for fished populations (Table 6). Although more males contributed to reproduction in unfished populations, these differences were not statistically significant based on a two sample t-test (Females: $t = 0.00$, $df = 6.19$, $p = 1.00$; Males: $t = -1.67$, $df = 6.22$, $p = 0.15$).

Table 5. The number of Florida Bass offspring sampled per pond, the number of nests detected by snorkelers, and the number of families detected using full-pedigree likelihood analysis for the 2013 study year. Numbers in parentheses indicate the percentage of the total number of recruits analyzed for each population.

Pond #	Number (%) of offspring analyzed	Number of nests	Number of families
Unfished			
23	221 (18.7%)	5	9
28	177 (31.6%)	15	6
57	211 (26.3%)	1	3
61	252 (7.2%)	10	4
Total	**861 (14.3%)**	**31**	**22**
Fished			
27	135 (100%)	4	2
29	34 (100%)	0	1
56	209 (29.6%)	2	3
58	213 (17.2%)	5	7
60	217 (12.2%)	14	6
Total	**808 (20.7%)**	**25**	**19**

Table 6. Average numbers of female and male fish that genetically determined to have contributed offspring to 2013 fall recruitment in fished and unfished ponds. The average numbers of offspring produced by males and females is also presented. Numbers in parentheses arestandard errors.

	Average number of contributing adults	Average number of offspring produced per adult
Fished		
Female	3.0 (0.7)	53.2 (11.7)
Male	2.4 (0.5)	66.5 (20.2)
Unfished		
Female	3.0 (0.4)	67.8 (16.9)
Male	3.8 (0.6)	54.2 (10.9)

In unfished populations, the average contribution was 68 (SE = 16.96) and 54 (SE = 10.93) offspring per parent for females and males, respectively. In fished populations, females contributed an average of 67 offspring (SE = 11.68) and males contributed 53 offspring (SE = 20.21) (Figure 5; a and b). The numbers of average offspring in fished versus unfished populations for females or males were not significantly different (Females: $t = -0.70$, $df = 20.32$, $p = 0.49$; Males: ($t = 0.53$, $df = 17.22$, $p = 0.59$). The individual contributions by adults (pooled across sexes) were right skewed in both fished and unfished populations indicating that most fish produced few offspring (Figure 5; c and d).

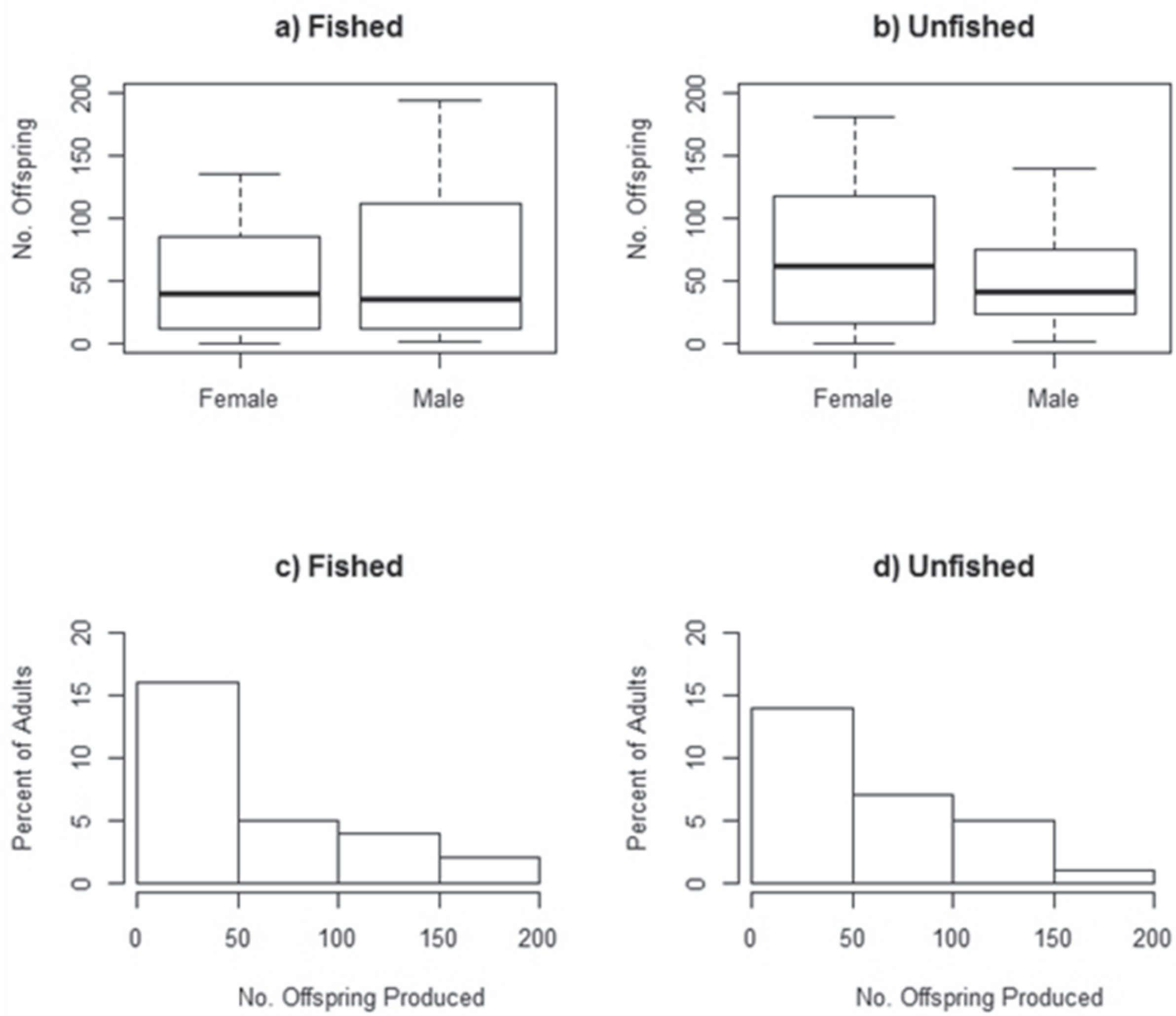

Figure 5. The number of offspring produced in 2013 by female and male Florida Bass in fished (a) and unfished (b) ponds. The thick mark denotes the median number of offspring and the bottom and top of the boxes represent the 25th and 75th percentiles respectively. Whiskers identify minimum and maximum offspring production. Also shown is the proportional contribution of offspring for male and female fish (combined) in fished (c) and unfished (d) ponds.

Parentage assignments were related to individual catch histories to determine if being removed from nests affected the number of offspring surviving to fall recruitment. Only 10 males contributed to the year class in the fished ponds. Of these, seven were caught; five once and two twice. Eleven females contributed to the year class in fished ponds. Of these, two were caught once, and another two were caught twice. In all, 70% of contributing males and 36% of contributing females were caught during the spawning season. Females spent less time on the nests making them less vulnerable to angling, so lower contribution rates for angled females was expected. Combined, the genetic analysis indicates that although not statistically significant, a greater number of males contributed to recruitment in unfished ponds than fished ponds. In both fished and unfished populations there were few fish that contributed large numbers of offspring while the majority of fish contributed little or none to recruitment. However, capture of nest guarding fish (both males and females) did not prevent individuals from producing viable offspring.

The effects of fishing on parental contribution and recruitment during 2014 will be determined following completion of pond harvesting in the fall of 2014 and subsequent genetic analyses.

Discussion:

Over all, the numbers of active nests during year one of the study were lower than expected. This was likely due, in part, to the extremely cold weather during March 2013, and stress due to disc tagging prior to stocking. Two to four weeks after stocking, half of the bass died. These original fish had been in the ponds for four weeks before the first active nest was recorded. We replaced dead bass with unused broodfish from the Richloam Fish Hatchery, (these fish were pit tagged and sexed at least one year prior to this study and not disc tagged) and the new fish began nesting within two days. Thus, it appears that stress at the beginning of the study delayed bass spawning and was likely the cause of the mortality event. On disc tagged fish that did survive, tags were quickly covered with algae and became unreadable. For these reasons, fish in 2014 were not disc tagged and nesting rates were much higher. Nest were abundant enough in year two to document that Florida Bass will spawn multiple times during one season.

The ponds in this study were set up to simulate a natural waterbody and fish community. Egg predation rates on nests appeared to be lower in research ponds that was documented in some preliminary studies on natural lakes. This could cause nest success rates to be higher in research ponds than in the wild. We saw in year-two that nest fishing could significantly lower nest succes rates. Also, in fished ponds, we saw lower parental contribution from males that were most frequently caught off of nests. Another possible negative impact was decreased nesting rates in fished ponds. Our fished ponds demonstrated that lower nesting rates could lead to lower total egg production rates.

Although there were a few differences between fished and unfished ponds, there were also a lot of similarities. Estimated brood sizes of nests were similar between the two. In both groups fish were more protective of nests with larger estimated brood sizes. There were also no differences in the number of females contributing to the year class or the average number of offspring each fish contributed to the year class. We did see high variability in year class size within ponds, but statistically there was no difference in recruitment between fished and unfished ponds.

Our study design was created to simulate the worst case scenario for bed fishing. Every nest in fished ponds was angled. We do not know what percent of nests are located and fished by anglers in natural waterbodies in Florida but it is likely low. After spending at least 30 minutes fishing every active nest, fish were only able to be caught off of 48% of nests during both years. This shows much lower vulnerability than other black bass species on nests (Diana et al. 2013, Philipp et al. 1997, and Suski and Philipp 2004). Interestingly, of the fish that were caught and then held in a cage for one hour, we saw 45% the first year, and 50% the second year, return and successfully guard the nest until swim up fry left. Also, during year one, 70% of males and 36% of females contributing to the year class in fished ponds were fish that were caught at least once, indicating that fish that are caught and released can still successfully spawn during the season they were caught.

Results for recruitment and parental contribution are not yet in for year-two of this study which could change things. However, data from year one indicates that nest fishing for Florida Bass may not have population level impacts. Although nest fishing may cause individual nest failure, survival from other nests will compensate as recruitment was similar between fished and unfished ponds. Also, density-dependent survival may limit year class strength no matter how many successful nests are made. If results from year two are similar, this would mean that closing spawning seasons to angling in Florida would have no impact on current fish populations.

After two years in a hatchery pond setting, this study is scheduled to shift to natural lakes. Researchers will look at nest success rates for three treatment groups in natural water bodies: controls, catch and immediate release, and catch and hold for one hour prior to release. Using population estimates and genetic tracking experiments, we will look at parental contribution rates in both fished and unfished small natural lakes. Data from these studies will also be combined with creel and electrofishing data from large waterbodies around the state to model if nest fishing could have negative impacts on Florida Bass populations there.

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Florida Chapter of the American Fisheries Society
4H Camp Ocala, Florida
Annual Meeting Registration: February 17-19, 2015

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 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 boxes below.

PRE-REGISTRATION: registration form postmarked by Friday, January 9, 2015

☐$ 30.00 One-day Registration ☐$ 40.00 Full Registration

LATE-REGISTRATION: registration form postmarked after Friday, January 9, 2015

☐$ 35.00 One-day Registration ☐$ 47.00 Full Registration

Meals and Lodging

Tuesday, February 17, 2015	Wednesday, February 18, 2015	Thursday, February 19, 2015
☐ $8 Lunch	☐ $6.50 Breakfast	☐ $6.50 Breakfast
☐ $14.50 Dinner	☐ $8 Lunch	☐ $8 Lunch
☐ $27.00 Lodging	☐ $14.50 Dinner	
	☐ $27.00 Lodging	

Full Meals and Lodging ☐ **$120.00**

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

Florida Chapter dues (calendar year 2015) ☐ **$10.00** ☐ FL Chapter dues paid via AFS annual membership.

Total Amount: ________________

Total Enclosed: ______________ ○Cash ○Check
(Minimum $10)

Balance Due: ________________ ○Cash ○Check ○Credit

Please Make Checks Payable to Florida Chapter, AFS and mail to:

Cheree Steward
FWC
601 W. Woodward Ave.
Eustis, FL 32726

Phone: (352) 800-5003
Fax: (352) 357-2941
Email: cheree.steward@myfwc.com

*Checks not payable to 'Florida Chapter AFS' will be returned to sender.

Registration Forms may be sent via fax (attention: Cheree) or via email: (subject: 2015 AFS FL).

A minimum amount of $10 must be mailed to validate your registration.

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 as soon as possible.
Registrations will still be accepted at the meeting, but with a late registration fee.
We can accept VISA, MASTERCARD, cash or check at the meeting.
If you would like to pay your meeting fees with a credit card, then please send a $10 check for your deposit.

We invite you to submit abstracts for the 2015 annual meeting of the Florida Chapter of the American Fisheries Society meeting. The meeting will take place February 17-19, 2015 at the Ocala 4H-Camp. We hope you can join us!

The meeting will consist of both invited and contributed oral presentations and posters. The 2015 symposium on February 18 is titled **'Fisheries-dependent vs. fisheries-independent: common ground, dissimilarities and insights gained'**

> The **2015 symposium** will focus on how fisheries-dependent (FD) and fisheries-independent (FI) data are used to tackle important ecological and management questions, and whether we get the same or different answers. Presentations will tackle examples of successful use of both or one dataset to address an important issue, or of cases when one data type is more appropriate or insightful than another. If we have both types of data available, what do both datasets say? Are they in accordance or not? Do we gain any knowledge by looking at both concurrently or do we learn different things by using one vs. the other? Which one is most appropriate, and why, and what are the caveats for each dataset?

We invite submissions for the symposium, if you would like your presentation to be part of the symposium, please indicate it in your abstract submission.

Deadline for abstracts submission & registration: **Friday, January 9, 2015**

Abstract submission

Please submit your abstract as a MS Word document to rehagej@fiu.edu. Please follow these instructions for submission:

- In the email subject line, please enter FLAFS2015: followed by the author names in your abstract (e.g., FLAFS2015 SmithTaylorRosen)
- Use the same name for the abstract file, e.g. FLAFS2015 SmithTaylorRosen.doc
- Please include the associated information requested above with the abstract

Abstract format
Abstract *word limit is 300 words* and should include the following information:

Presenter: Williams, Brian
Email: BrianWilliams@FloridaFish.net
Author(s): Williams, B.[1], K. Rowley[1], and P. George[2]
[1]Affiliation with address.
[2]Affiliation with address.

Title: Recommendations for New Limits on Some of Florida's Most Targeted Fish Species

Abstract: 300 word maximum

Student Presentation: No or Yes (work presented was completed while a student)

Presentation type: Oral or Poster

Would you like to be considered for the symposium? Yes or No

Are you willing to be a moderator? Yes or No

Are you willing to be a judge? Yes or No If so, oral presentation or poster?

Presentation details
Speakers will be given 20 minutes for talks (15 minutes for presentations and 5 minutes for questions and/or discussion). We will have PowerPoint 2007 on a laptop capable of accepting your presentation on a flash-drive or other.

All posters will be presented on *Tuesday evening, February 17,* and can be left up for the entire meeting. Posters should be no larger than 150 X 100 cm (60" X 40"), but they can be set up either as portrait or land-scape format on an easel. If you require other options for projection or poster formats, please contact the annual meeting's Program Chair, J.S. Rehage, rehagej@fiu.edu.

Meeting details
The 2015 meeting will again be held at the Ocala 4-H Camp, on Sellers Lake in the Ocala National Forest. This venue is located east of Ocala, south of SR 40, just off SR19. Maps and directions will be available in the next issue of the Shellcracker or can be found at 4-H Camp Ocala's website 4-H Camp Ocala.

The meeting's schedule will be similar to past meetings. We will begin at noon on Tuesday, February 17th. Lunch will be served and then followed by the presentation of contributed papers. The poster session will take place following dinner on Tuesday evening. The '**Fisheries-dependent vs. fisheries-independent: common ground, dissimilarities and insights gained'**' symposium will start on Wednesday morning. The business meeting and raffle will follow dinner on Wednesday night. We will hear more contributed papers on Thursday morning, followed by lunch and the presentation of awards immediately following lunch.

Registration details

Registration deadline is **Friday, January 9, 2015.** Please note the lower registration costs if you register by this deadline. Registration covers housing and meals at the camp. Please remember to bring your own linens or sleeping bag if you are planning to sleep at the camp. Linens will only be available in limited supplies and for a small fee.

For your convenience, we are will have registration available online: 2015 FLAFS Meeting Online Registration. Once you fill out the online form, you can either pay online through PayPal or print the completed form and mail it in with your check, cash, or money order. A hard copy of the registration form can found in this issue of the Shellcracker or on the Chapter's website: Florida Chapter AFS

Opportunities for students support

As in previous years, student travel awards will be available for the annual meeting. Master's and doctoral students are also eligible for the Roger Rottmann Memorial Scholarship, for which the recipient(s) will be announced at the annual meeting. More information and the application materials are available at FLAFS Awards and Scholarships.

We look forward to seeing everyone at the beautiful 4-H camp for our 2015 annual meeting!

2015 Student Raffle Blurb

Our next raffle is only five months away and the big 2017 National Meeting that we are hosting in Tampa is less than three years away. These two events are closely related because early preparations for the first will greatly help the second by building a bigger foundation than we have now. Since we all live in FLORIDA, there are many opportunities to build up the raffle to an even higher level. It is time for us to contact Disney World, Sea World, Guy Harvey, and many other businesses like your local tackle shops, hotels, restaurants, attractions, fishing guides, etc. One of our most successful Raffle/Silent Auction items are the "Getaways" – we should be able to get at least one Getaway from every city or town where we have FLAFS members. Contacting your local Tourist Development Council or Chamber of Commerce for advertising are worthwhile causes and would greatly benefit us and them. PLEASE do your best to help our Students and Chapter by getting these tax-exempt donations. Just email Andy Strickland (Andy.Strickland@MyFWC.com) or Alan Collins (lac96@bellsouth.net) for help in getting started. We are looking for more volunteers!

Thanks,
Andy Strickland and Alan Collins

Award Nominations!?!

The Awards Committee is seeking nominations for the Florida Chapter's, Outstanding Achievement and Rich Cailteux Awards. Send nominations to Eric Nagid (eric.nagid@myfwc.com) by January 9, 2015. Applications should be limited to one page, but descriptive enough to convey why the individual is deserving of the award. Nomination letters should outline the accomplishments of the individual that meet the criteria of each award below.

Outstanding Achievement Award

The purpose of the Outstanding Achievement Award is to recognize individuals for singular accomplishments and contributions to fisheries, aquatic sciences, and the Florida 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 or collaborating group.

Candidates will be evaluated according to the following criteria:

- Original techniques or research methodology
- Original ideas, viewpoints, or data which contributed to fisheries management or our understanding of aquatic resources
- Important ecological discoveries
- An original fishery research or management program of statewide importance
- Activities in public education and outreach that have statewide impacts

Rich Cailteux Award

The purpose of the Rich Cailteux Award is to recognize individuals who have maintained a long-term commitment to research, management, and/or 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 Florida Chapter.

Candidates will be evaluated according to the following criteria:

- A minimum of 20 years spent in a fisheries related field in Florida
- Substantial career contributions to Florida aquatic resources and the fisheries profession
- An imaginative and successful program in fisheries and aquatic sciences education
- A history of mentoring young fisheries professionals, and involvement and leadership with the Florida Chapter of the American Fisheries Society.

Student Section

Use of Catch at Age Methods for Inland Fisheries

Jordan Skaggs, University of Florida

Fisheries monitoring is an essential component of fisheries management, allowing managers to evaluate the status of stocks and make informed regulatory decisions. Typically, fisheries monitoring provides information on the vital rates of stocks, namely the recruitment of new fish to the population, the mortality rate across the fish's lifespan, and the growth rate of individuals within the population. These vital rates can inform managers of trends in numbers of fish in the population as well as whether regulations should be considered to prevent growth or recruitment overfishing. My research involves comparing the utility of various monitoring tools for assessing recreational fisheries.

Historically, scientists monitor marine fisheries primarily by collecting fishery-dependent (FDM) data gathered within the recreational or commercial fishery. This is practical due to large systems that are difficult to sample, and collection of FDM data involves recording catch size and age directly from the fishers. These data are obtained using on-board observer programs, port sampling for landings records, angler log books, and other angler survey methods (e.g., MRIP). Managers use these data to build catch-at-age (CAA) models, allowing estimation of fishing mortality and recruitment. However, a major concern surrounding this method is that recreational and commercial fishing effort is often concentrated on areas of high fish densities, creating potential for bias when catch-per-unit-effort (CPUE) remains high despite large stock declines, known as (i.e., hyperstability, Hilborn and Walters 1992).

Freshwater recreational fisheries are commonly assessed by collecting fishery-independent (FIM) data gathered outside of fishery operations. Biologists obtain CPUE, size, and age structure data from sampling gears such as trawls or electrofishing. This is cost-effective in freshwater recreational fisheries due to smaller system size relative to marine fisheries. The abundance of fish is inferred from CPUE of the gear, and managers can employ abundance indices from several FIM sampling gears (Olin and Malinen 2003). However, differences in gear selectivity result in variable catchability across size or age groups for each gear (Tuten et al. 2010). This means that FIM methods still contain bias and high uncertainty because they do not select for the entire range of age and size found in a fishery.

Freshwater fisheries managers also use FDM via creel surveys on large, high profile, inland recreational fisheries. Creel surveys monitor catch and effort, and are typically used to monitor temporal trends of both metrics, but age composition of the catch is seldom measured. This prevents the ability to construct CAA models that could improve stock estimates and generate estimates of fishing mortality in freshwater systems. Managers often do not measure fishing mortality sources in inland recreational fisheries until they identify decreasing trends in stock size estimates inferred through FIM data collection, and passive tagging studies are often employed to estimate fishing mortality (Dotson et al. 2009; Hansen et al. 2011; Hightower and Pollock 2013). However, use of CAA methods could allow monitoring of fishing mortality rates through time, possibly at a cost saving over doing regular tagging studies.

The application of CAA methods on freshwater systems is possible using both FIM and FDM data collected by the Florida Fish and Wildlife Conservation Commission (FWC) on Black Crappie *Pomoxis nigromaculatus* fisheries. Due to the erratic recruitment displayed by Black Crappie populations and the harvest orientation of anglers, growth and recruitment overfishing are of concern (Beam 1983; Maceina and Stimpert 1998; Sullivan 2003; Allen et al. 2013). Annual trawl surveys generate abundance estimates and CPUE of juvenile fish for each year. Creel surveys performed during peak fishing season estimate effort, catch, and harvest. Discarded angler carcasses from on-site collection stations allow estimation of age composition of harvested fish. My graduate research will evaluate the utility of CAA methods for monitoring fish abundance and fishing mortality in Black Crappie fisheries. I will reconstruct annual cohort abundances with a CAA model called Virtual Population Analysis (VPA, Hilborn and Walters 1992). Using estimates of trawl selectivity from Binion et al. (2009), I will fit the model results to trawl and creel CPUE data to estimate fishing mortality.

Understanding the benefits of combined use of FDM and FIM data will allow managers to improve their monitoring programs. With enhanced knowledge of population status and fishing mortality rates, managers can evaluate the utility of harvest regulations and habitat manipulations intended to improve the fish stock. This will help ensure sustainable production of fish stocks through management decisions, benefitting recreational angler satisfaction, the economic value of our fisheries, and fisheries science.

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