Seasonal Abundance, Age Structure, GSI, and Gonad Histology of Yellow Bass in the Upper Barataria Estuary, Louisiana

Cynthia N. Fox, *Mississippi State University, College of Forest Resources, Department of Wildlife, Fisheries and Aquaculture, Box 9690, Mississippi State, MS 39762*

Allyse M. Ferrara, *Nicholls State University, Department of Biological Sciences, Bayousphere Research Laboratory, Box 2021, Thibodaux, LA 70310*

Andy Fischer, *Louisiana Department of Wildlife and Fisheries, 2000 Quail Dr., Baton Rouge, LA 70808*

Quenton C. Fontenot, *Nicholls State University, Department of Biological Sciences, Bayousphere Research Laboratory, Box 2021, Thibodaux, LA 70310*

Abstract: The yellow bass (*Morone mississippiensis*) is a common, yet lesser known species of the Mississippi River drainage basin; few life history studies on the species have been published throughout its range. To describe population level gonad development, seasonal abundance, and age and growth, yellow bass were collected every 7–14 days with monofilament gill nets from 14 November 2008 to 17 November 2009 from the upper Barataria Estuary (UBE) in south Louisiana. Mean catch-per-unit effort (CPUE) was highest from February–April, indicating that yellow bass used the UBE seasonally. Yellow bass abundance peaked as temperatures reached 18–22 C. Total length, weight, and gonadosomatic index (GSI) were measured from each whole fish collected ($n = 1043$). Age was estimated using sagittal otoliths and annulus formation was confirmed by marginal increment analysis. Although yellow bass ranged from age 1 to age 4, the population was dominated (95%) by age 2 fish. Gonad samples ($n = 200$) collected throughout the year were examined histologically to determine spawning period. Spawning activity was confirmed by the presence of post-ovulatory follicle complexes in female gonads collected from January 2009–April 2009. Similarly, GSI noticeably decreased as temperatures reached 18–22 C, indicating spawning had occurred. The use of the UBE by yellow bass was related to spawning activity. The paucity of information on yellow bass throughout its range led to the development and conduction of this study which provides important seasonal use, age structure, and reproductive data for yellow bass in the lower Mississippi River drainage basin.

Key words: Morone mississippiensis, otoliths, marginal increment analysis, spawning periods

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Yellow bass (*Morone mississippiensis*) is a temperate freshwater species found throughout most of the Mississippi River drainage basin (Douglas 1974, Page and Burr 1991). This species is found mostly in freshwater, but can occur in low-salinity Gulf of Mexico estuaries between Mobile Bay, Alabama, and Galveston, Texas (Mettee et al. 1996, McEachran and Fechhelm 1998). Yellow bass are a schooling species common in lentic regions of river systems (Etnier and Starnes 2001), but typically move into upstream lotic systems to spawn (Bulkley 1970, Becker 1983). Yellow bass are often popular with anglers because of their feisty nature and wide range of lure acceptance and several states encourage the harvest of yellow bass to reduce angling pressure on other fish populations residing in the same areas (Cook 1959, Becker 1983, Timmons et al. 1989). Although yellow bass can be locally abundant and may play an important ecological role, few life history studies have been published (but see Darnell 1961, Van Den Avyle et al. 1983, Driscoll and Miranda 1999) compared to other congeners such as striped bass (*Morone saxatilis*; Conover et al. 1997), white bass (*Morone chrysops*; Van Den Avyle et al. 1983), and their hybrids (Woiwode and Adelman 1991). This lack of information about yellow bass, both locally and throughout its range, was the impetus for this study.

Reliable fish age estimation requires validation of the frequency of annulus formation on hard structures (i.e., otoliths, vertebrae or fin rays) compared to the formation of non-annuli marks such as checks that may be related to spawning events (Casselman 1983). Annulus validation has been conducted using known-age fish (Secor et al. 1995) or marginal increment analysis (Wilson and Nieland 2001, Fischer et al. 2004, 2005). Marginal increment analysis, determines the periodicity of annulus formation by examining the appearance of the otolith edge throughout the year.

Gonad development can be used to determine spawning periods of fish and aid in defining management goals for fish stocks by assessing reproductive capabilities (Weber et al. 2000, Brown-

Peterson et al. 2002). The gonadosomatic index (GSI) measures seasonal changes in gonad weight in relation to total fish weight (GSI = [ovary weight x 100]/fish weight) and is used to determine spawning periods (Nieland and Wilson 1993, Jons and Miranda 1997). Gonad histology can be used to classify individuals into specific reproductive stages (Blazer 2002, Lowerre-Barbieri et al. 2003). Histological analysis can also accurately classify male and female fish as immature or mature (Brown-Peterson et al. 2007). Mature individuals can be more specifically classified into reproductive stages using the developmental state of germ tissue. For female fish, the development of oogonia is used to determine reproductive stage based on the proximity of a spawning event. The development, location, and amount of spermatogonia are used to classify males (Brown-Peterson et al. 2007). Thus the combination of GSI and histological analyses provides an accurate description of the annual reproductive cycle of fish (Brown-Peterson et al. 2001, 2002). Although histological analyses of other moronids were examined in earlier studies (Berlinsky and Specker 1991, Berlinsky et al. 1995), there have been no published studies on yellow bass gonad histology to date.

The goal of this study was to describe life history characteristics of yellow bass in the upper Barataria Estuary (UBE) in southern Louisiana. Yellow bass are seasonally common in the UBE, although the life history of this population has not been described. The specific objectives of this study were to 1) describe seasonal abundance, 2) determine age structure, and 3) describe seasonal gonad development of yellow bass in the UBE. Additionally, we validated annulus formation in yellow bass otoliths using marginal increment analysis and provide the first description of yellow bass gonad histology.

Study Area

The Barataria Estuary is located in southern Louisiana, stretching from just south of New Orleans to the Gulf of Mexico (Figure 1). It is a 628,600-ha hydrologic network of interconnected waterways that drain wetland forests, comprising freshwater, intermediate, brackish and salt marshes (Braud et al. 2006). Mississippi River floodwaters were historically transported into the estuary via distributaries and interdistributaries during the annual spring floodpulse, but this ceased following construction of flood protection levees beginning in the early 20th century. As a result, water levels in the Barataria Estuary are now primarily a function of local precipitation (~ 156 cm yr^{-1}) and wind direction (Hopkins and Day 1987, Inoue et al. 2008).

The UBE makes up approximately 30% (170,370 ha) of the Barataria Estuary and primarily consists of freshwater swamps, marshes, and lakes (Nelson et al. 2002). Our study was conducted in Bayou Chevreuil and Lac des Allemands (Figure 1). Bayou Chevreuil is one of the two major streams in the UBE that drains into Lac des Allemands, with an average velocity of 14 cm sec^{-1} (Day et al. 1976). The bayou and lake are turbid with average secchi disk depths of 30 cm and 41 cm, respectively (Day et al. 1976). The interconnectedness of waterways allows aquatic organisms to migrate between the upper (fresh) and lower (saline) regions of the Barataria Estuary (Dantin et al. 2009, Fontenot et al. 2009). Given that yellow bass are a seasonal migratory species and can occur in low-salinity estuaries, they may have an effect on the overall ecology of Barataria Estuary and affect management strategies of other species, thus an understanding of yellow bass life history in the UBE is paramount.

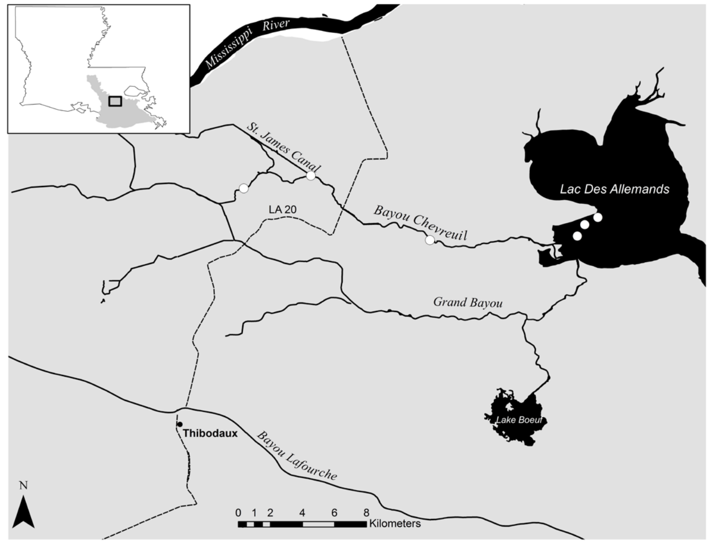

Figure 1. Location of the six study sites (circles) located in Lac des Allemands and Bayou Chevreuil in the upper Barataria Estuary (insert).

Methods

Field Sampling

Yellow bass were collected every 7–14 days at six sites (Figure 1) in the UBE from 14 November 2008 to 17 November 2009, using monofilament gill nets. Two nets were 22 m long and 1.8 m deep, one with 25.4-mm bar mesh and the other with 35-mm bar mesh. A third net of the same dimensions had equal-length sections of 25.4-mm bar and 51-mm bar mesh. Nets were deployed between the hours of 0800–0900 for approximately 3 h at each site during each sampling period. Nets in the bayou were set at a 45 degree angle downstream from shore. In the lake, nets were set at the surface in open water parallel to the western shore approximately 2700 m from the mouth of Bayou Chevreuil. To determine if temperature (C) or salinity (ppt) affected yellow bass abundance in the UBE,

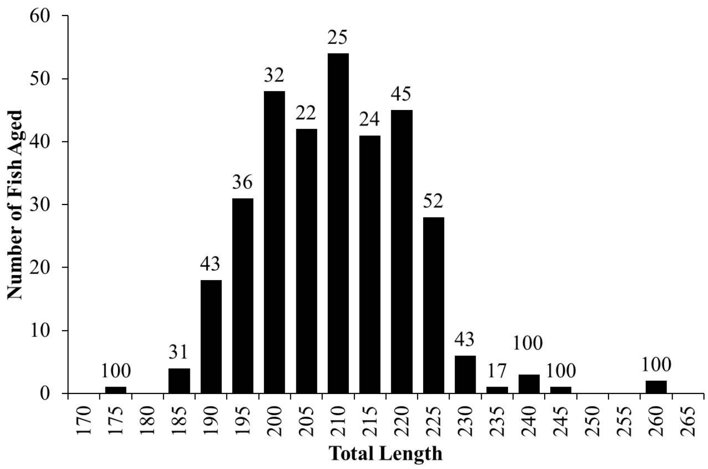

Figure 2. Number of yellow bass aged per 5-mm length group collected in the upper Barataria Estuary from 14 November 2008 to 17 November 2009. Numbers above columns are the percent of yellow bass aged in the corresponding length group.

Table 1. Description of reproductive classification system for male yellow bass according to histological characteristics of gonads (as modified from Brown-Peterson et al. 2007). Terms that were abbreviated are spermatogonia (SG), spermatocysts (CY), spermatids (ST), spermatozoa (SZ), and germinal epithelium (GE).

Stage	Description
Immature	Only primary SG present. No lumens.
Developing	Continuous GE throughout testis. Spermatogenesis begins giving rise to the formation of CY which may contain SG, primary and secondary SC, ST and SZ. As SG develop into SZ, the cells become smaller and increase in number. No SZ will be in lumen.
Spawning capable	SZ scattered throughout lumens and sperm ducts. Some CY present which may contain all stages of spermatogenesis (SG, SC, and ST). Histologically indistinguishable from "actively spawning" stage. No free-flowing milt.
Actively spawning	SZ scattered throughout lumens and sperm ducts. Some CY present which may contain all stages of spermatogenesis (SG, SC, and ST). Histologically indistinguishable from "spawning capable" stage. Free-flowing milt present.
Regressing	Residual SZ present in lumens. Some CY containing ST scattered near periphery. Primary SG begins forming at periphery as GE regeneration also begins.
Regenerating	No CY present. Lumens are small and difficult to see. Primary SG dominant with some secondary SG present. Residual SZ may be present.

we measured these two parameters 0.3 m below the surface of the water at each sample site using a YSI handheld oxygen-conductivity-salinity-temperature meter (Yellow Springs Instruments, Yellow Springs, Ohio). All yellow bass were removed from gill nets, kept on ice and transported to the Bayousphere Research Laboratory at Nicholls State University for processing.

Annulus Validation and Age Determination

Total length (mm) and weight (g) were measured for each fish. Sagittal otoliths were removed, washed, and stored dry in labeled vials until processed. Fish were separated into 5-mm length groups by month to be selected for age estimation and marginal increment analysis. Up to 30 individuals from each length group were aged for each month ($n = 325$; Figure 2). For age estimation, a 1270-µm thick transverse section containing the nucleus of the sagittal otolith was cut using a Buehler isomet low speed diamond blade saw (Buehler, Lake Bluff, Illinois; Quist et al. 2012). Otolith sections were mounted on microscope slides with thermoplastic cement, then sanded with 600-grit sandpaper for about 20 sec and polished with 800-grit sandpaper for about 20 sec. Two independent readers viewed the sections using a dissecting microscope with transmitted light at varying magnifications without knowledge of fish length or capture date. For marginal increment analysis, the edge of the otolith section was coded as opaque or translucent to determine when annulus formation occurred (Fischer et al. 2004, 2005). The periodicity of opaque annulus formation in yellow bass otoliths was examined by plotting percentages of otoliths with opaque margins by month of capture. Any discrepancies in number of annuli or edge classification were discussed between the readers until an age was agreed on. If the readers could not come to an agreement, the otolith sample was discarded from analysis.

GSI and Gonad Histology

Sex was determined macroscopically by examination of gonads, which were removed and weighed to calculate GSI. For the months of December through July (period expected to encompass spawning) the gonads from 100 male and 100 female randomly selected yellow bass were preserved in 10% neutral buffered formalin for histological analysis. Gonads were selected randomly and independent of otolith selection, thus the age (maturity) of gonads selected for histological analysis was unknown prior to processing and stage classification. Histological processing of gonads followed the methods of Brown-Peterson et al. (2007). A modification of their reproductive classification system was used to provide descriptions specific to male (Table 1) and female (Table 2) yellow bass gonad histology. For histological analyses of both sexes, the "spawning capable" and "actively spawning" stages were combined (Smith 2008) because in females these stages occurred intermittently until a female completed spawning for that year and in males the two stages are histologically indistinguishable and can only be separated by the observation of free flowing milt at the time of capture. Additionally, the "regressing" and "regenerating" stages were also combined due to histological similarities.

Statistical Analyses

Due to the short net set time (average soak time 3.5 h) catch-per-unit effort (CPUE) was calculated as number of fish per net-hour (Hubert et al. 2012). Catch-per-unit effort was calculated as

Table 2. Description of reproductive classification system for female yellow bass according to histological characteristics of gonads (as modified from Brown-Peterson et al. 2007). Terms that were abbreviated include primary growth oocytes (PG), cortical alveolar oocytes (CA), vitellogenic oocytes (Vtg), post-ovulatory follicle complex (POC), oocyte maturation (OM), germinal vesicle migration (GVM), final oocyte maturation (FOM), and macrophage aggregates (MA).

Stage	Description
Immature	Only PG present. Usually no atresia. Thin ovarian wall.
Developing	CA larger than PG. Cortical alveoli are small spheres that form a circle inside the CA. Primary Vtg are similar in size to CA but contain small granules and yolk oil droplets. Granules line outer edge of oocyte while droplets surround nucleus.
Spawning capable	Tertiary Vtg prominent. Secondary and primary Vtg common, CA present. Thin layer of thecal cells surrounds all Vtg oocytes. Ovarian wall will start thinning. Old (> 24 h) small POCs present and appear grainy and folded.
Actively spawning	OM present with lipid and yolk coalescence occurring with GVM. Tertiary Vtg prominent. Some FMO may be present with fused yolk that looks smooth or layered. Vitelline envelope will be thick. Some new (<24 h) POCs, atresia and PGs may be present.
Regressing	Atresia dominant. Some FMO, POCs, and PG scattered throughout ovary. MA present. Some Vtg and CA oocytes present.
Regenerating	Only PGs present. Blood vessels enlarged. Some late stage atresia and MA may be present. Thick ovarian wall.

the number of yellow bass collected per net-hour and was used as a measure of relative abundance. Although mesh sizes varied among nets the same net combinations were used at all six sites; therefore, mean CPUE was calculated for each date by combining all 18 nets from all six sites and compared using repeated-measures analysis of variance (PROC GLM, SAS Institute 2008). Pearson's correlation coefficients (PROC CORR, SAS Institute 2008) were computed to determine if yellow bass CPUE was related to temperature or salinity. Catch-per-unit effort, GSI, and histological stages were grouped by month for statistical analyses. Analysis of covariance (ANCOVA; PROC GLM, SAS Institute 2008) was used to compare overall and age specific size difference between the sexes. A significance level of $P \leq 0.05$ was used for all analyses.

Results

A total of 1061 (male $n=769$, female $n=292$) yellow bass were collected; however, 18 individuals (10 males and 8 females) were partially consumed by scavengers while in the nets and therefore were excluded from all analyses except CPUE. Mean yellow bass CPUE did not differ among sites ($F=1.80$, df$=5,18$; $P=0.1637$); therefore, CPUE for all sites were combined by date to describe temporal changes in yellow bass abundance. Yellow bass CPUE increased from November–February, peaked in March when water temperatures reached 18–22 C, and declined and remained low throughout the rest of the year with the exception of a small increase on 22 July 2009 (Figure 3 top/middle). Nearly 80% of the yellow bass in this study were collected in February, March, and

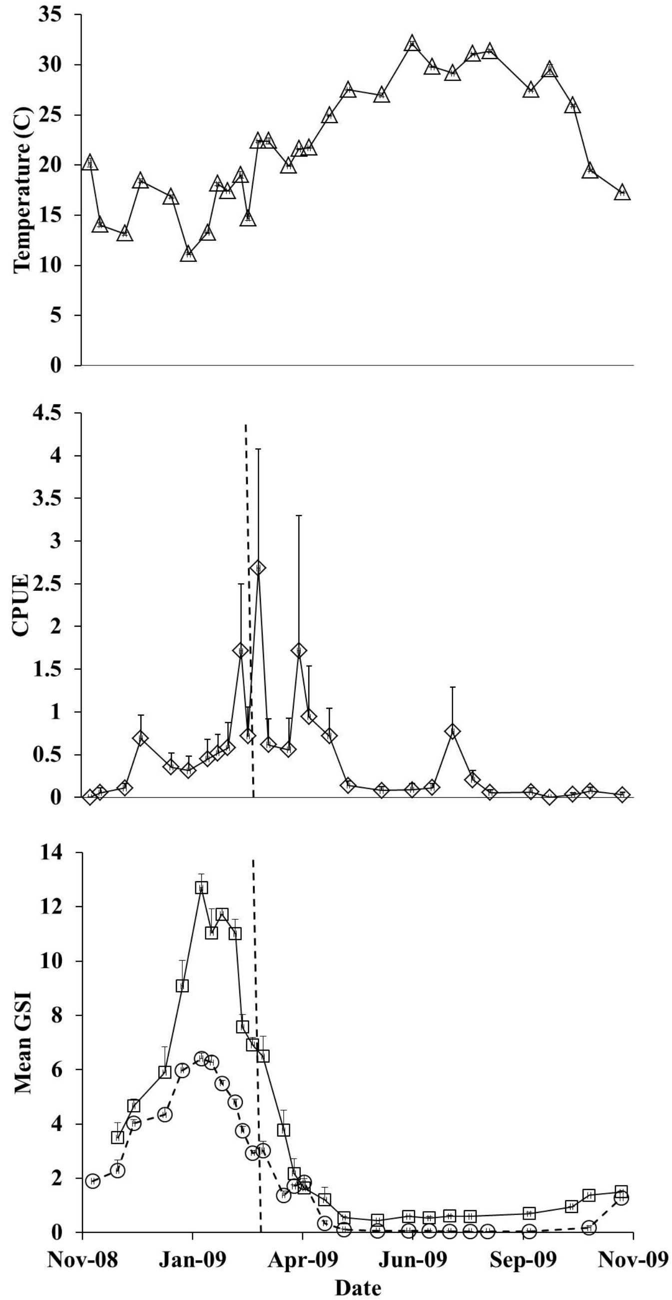

Figure 3. Seasonal changes in temperature and yellow bass abundance and GSI. Top: Mean (± SE) temperature in the upper Barataria Estuary from 14 November 2008 to 17 November 2009. Middle: Mean (± SE) yellow bass CPUE in the upper Barataria Estuary. Bottom: Mean (± SE) male GSI (◊) and female GSI (□) collected from the upper Barataria Estuary. Vertical dashed line indicates when temperatures reached 18 C (the temperature at which yellow bass spawning is reported to occur; Bulkley 1970).

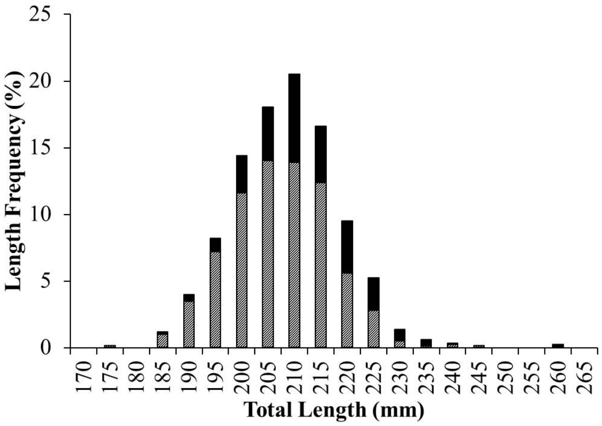

Figure 4. Length-frequency distribution of male (*n* = 759; crosshatch bars) and female (*n* = 284; solid bars) yellow bass collected from the upper Barataria Estuary.

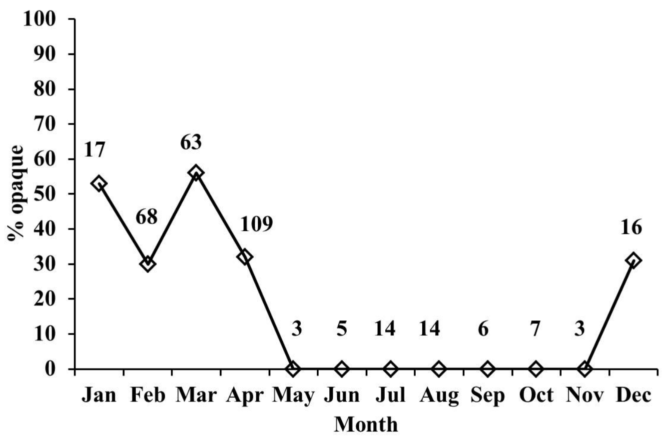

Figure 5. Marginal increment analysis of yellow bass otoliths (*n* = 325) collected from the upper Barataria Estuary. Numbers above data points indicate the number of otoliths analyzed for each month.

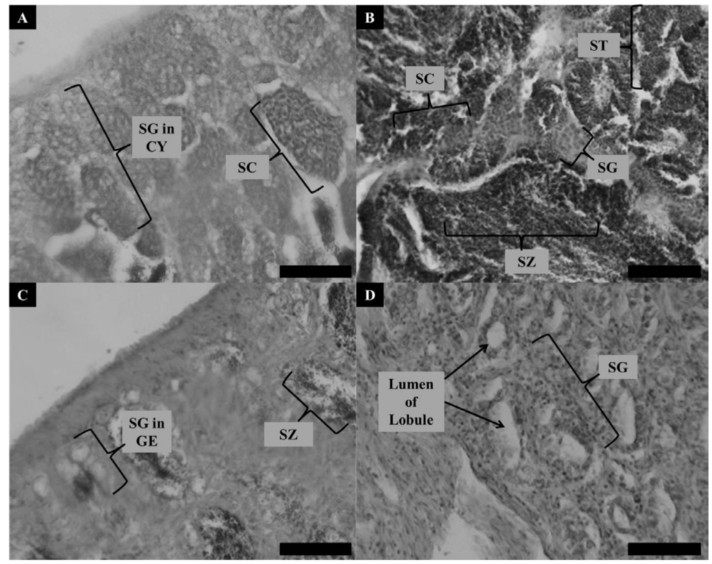

Figure 6. Histological sections of yellow bass testes collected from the upper Barataria Estuary. A. "Developing" (TL = 195 mm) testis with spermatogonia proliferation in spermatocysts at the periphery of the testis collected 8 December 2008. B. "Spawning capable/actively spawning" (TL = 209 mm) testis with spermatozoa throughout lumens and sperm ducts collected on 17 February 2009. C. "Regressing" (TL = 205 mm) testis with germinal epithelia and spermatogonia proliferation at the periphery of testis collected 15 April 2009. D. "Regenerating" yellow bass (TL = 200 mm) testis with empty lumens and spermatogonia throughout collected 03 June 2009. All bars = 5μm. SG – spermatogonia; SC – spermatocytes; ST – spermatids; SZ – spermatozoa; CY – spermatocyst; GE – germinal epithelia.

April. Temperature followed expected seasonal patterns and salinity was low (< 1.0 ppt) for the duration of the study, but neither parameter was correlated to yellow bass relative abundance (temperature: r = – 0.068, $P = 0.09$; salinity: r = 0.03; $P = 0.47$).

Total lengths of yellow bass ranged from 175 to 264 mm (Figure 4) and 79.5 to 347.5 g. Overall, mean length and weight of females was greater than males ($F = 1192.03$, df = 3, 1039, $P < 0.0001$). Otoliths with opaque marginal edges occurred during the months of December through April and remained at zero from May through November indicating opaque annulus formation began in December and ceased by the end of April (Figure 5). Yellow bass ranged from age 1 to age 4. Only one age 1, no age 3, and four age 4 individuals were collected. The catch was dominated by age 2 fish ($n = 320$). Due to missing age classes, von Bertalanffy growth parameters were not calculated. Female yellow bass were larger than male yellow bass for age 2 ($F = 26.09$, df = 1, 318, $P < 0.0001$) and 4 ($F = 23.40$, df = 1, 2, $P = 0.040$).

Similar to CPUE, yellow bass GSI increased from November to January, peaked in February, declined through April, and then remained low the rest of the year. Peak GSI occurred on 3 February 2009 for both males and females approximately one month before abundance peaked on 10 March 2009 (Figure 3). Individual male GSI ranged from 0.03% to 7.87% (mean = 2.88%, SE = 1.90). Individual female GSI ranged from 0.39% to 16.74% (mean = 5.70%, SE = 4.34).

All 200 fish examined histologically were considered to be sexually mature. The majority of males ($n = 71$) were classified as "spawning capable/actively spawning" (Figure 6) and were collected December through April (Table 3). All "regressing" ($n = 10$; Figure 6) and "regenerating" ($n = 18$; Figure 6) males were collected April through July (Table 3). Only one male, collected in December (Table 3), was classified as "developing" (Figure 6). Similar to the males, most of the females ($n = 59$) were classified as "spawning capable/actively spawning" (Figure 7) and collected from December through April (Table 3); however, one "actively spawning"

Table 3. Number of reproductive stages for male and female yellow bass collected per month in the upper Barataria Estuary. "Immature" and "Developing" individuals grouped together as Pre-Spawn, "Spawning Capable" and "Actively Spawning" individuals grouped together as Spawning, and "Regressing" and "Regenerating" individuals grouped together as Post-Spawn.

		Month							
Stage	**Sex**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**
Pre-Spawn	M	1	0	0	0	0	0	0	0
	F	7	0	1	0	0	0	0	0
Spawning	M	12	13	14	19	13	0	0	0
	F	7	13	13	17	8	0	1	0
Post-Spawn	M	0	0	0	0	10	5	6	7
	F	0	1	0	3	11	4	4	10
Totals		27	27	28	39	42	9	11	17

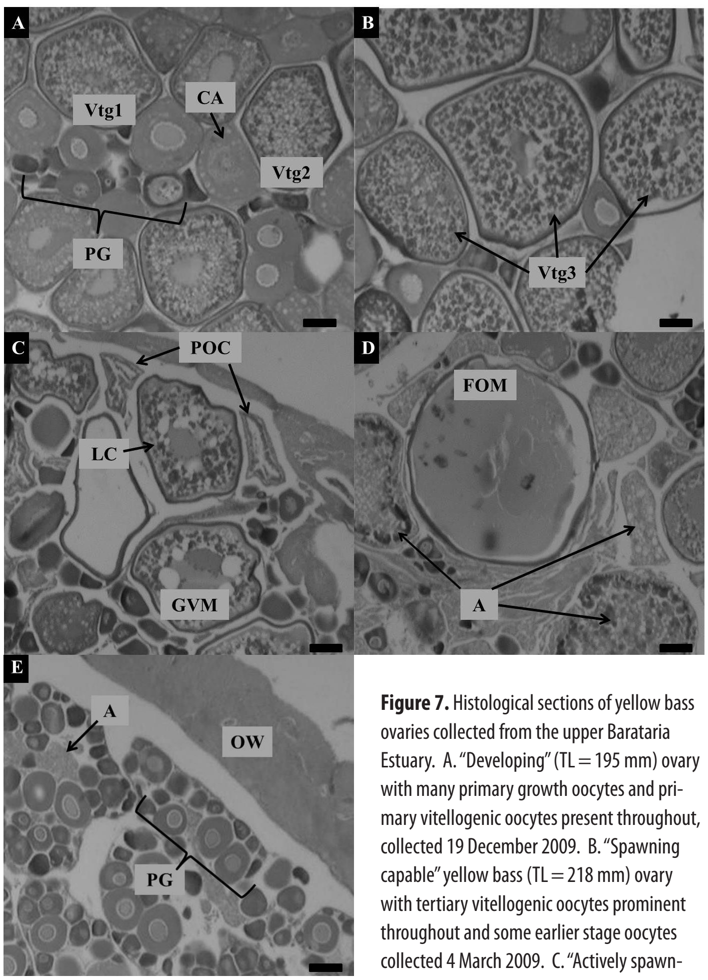

Figure 7. Histological sections of yellow bass ovaries collected from the upper Barataria Estuary. A. "Developing" (TL = 195 mm) ovary with many primary growth oocytes and primary vitellogenic oocytes present throughout, collected 19 December 2009. B. "Spawning capable" yellow bass (TL = 218 mm) ovary with tertiary vitellogenic oocytes prominent throughout and some earlier stage oocytes collected 4 March 2009. C. "Actively spawning" (TL = 235 mm) ovary with <24 hour post-ovulatory follicle complexes, oocytes undergoing lipid coalescence and germinal vesicle migration collected on 10 2009. D. "Regressing" (TL = 230 mm) ovary with mostly atretic oocytes collected on 18 March 2009. E. "Regenerating" (TL = 225 mm) ovary collected 15 April 2009. All bars = 10 µm. PG – primary growth oocytes; CA – cortical alveolar oocytes; Vtg1 – primary vitellogenic oocyte; Vtg2 – secondary vitellogenic oocyte; Vtg3 – tertiary vitellogenic oocyte; GVM – germinal vesicle migration; LC – lipid coalescence; FMO – final maturation oocytes; POC – post-ovulatory follicle complex; A – atretic oocytes; OW – ovarian wall.

female was collected in January and one in June (Table 3). Twelve females, collected January through May (Table 3), were classified as "regressing" (Figure 7), and 21 females, collected from April through July (Table 3), were classified as "regenerating" (Figure 7). "Developing" (Figure 7) females were collected in December ($n = 7$; Table 3) and February ($n = 1$; Table 3).

Discussion

Yellow bass are a ubiquitous yet understudied species of the Mississippi River drainage basin (Carlander 1997). Information gained from this study fills some of the knowledge gaps about yellow bass life history and their role in fish communities. Yellow bass populations vary in abundance and are often dominated by one or two large age classes that may be separated by several years (Harlan and Speaker 1956, Becker 1983, Smith et al. 2011). The yellow bass population in the UBE exhibited an age structure skewed towards younger fish with the majority of fish belonging to one age class, similar to white bass populations in Alabama and Missouri reservoirs (Lovell and Maceina 2002, Colvin 2002). The size range of yellow bass in this study was similar to the size range reported for yellow bass in Iowa (Smith et al. 2011) and Wisconsin (Priegel 1975); however, yellow bass in the UBE were younger with a more narrow range of age classes. Although gill nets are size selective, we only caught one yellow bass in our largest mesh nets and do not believe that we underestimated the abundance of yellow bass larger than our size distribution describes. The majority (89.6%) of yellow bass collected during this study were within a size range of 195 to 225 mm. All but 5 fish that were aged outside of that size range were age 2, thus only 325 of the 1061 yellow bass collected were aged because we were confident we had confirmed all of the age classes that were present in our sample and that the remaining individuals were age 2.

In the UBE, male and female yellow bass were sexually mature by age 2 and females were larger than same-aged males. This is similar to white bass in Kansas (Guy et al. 2002) and male yellow bass in other parts of their range, but is early for female yellow bass (Priegel 1975, Carlander 1997). Like white crappie (*Pomoxis annularis)*, lake sturgeon (*Acipenser fulvescens)*, and channel catfish (*Ictalurus punctatus)*, male yellow bass migrate to the spawning grounds prior to females (Becker 1983, Ross 2001, Boschung and Mayden 2004). Spawning occurs among one female and one to several males (Burnham 1909, Mettee et al. 1996) which may explain why male catch rates were nearly three times higher than female catch rates.

Fish spawning can be affected by several environmental factors including water temperature, photoperiod, salinity, and water level. Saline (>1.0 ppt) conditions were not observed during this study; thus, it is unknown if increased salinity would have affected yellow bass abundance in the UBE. Temperature and photoperiod influence fish reproduction by stimulating sensory organs that induce the production of hormones, inducing physiological or behavioral responses (Lam 1983, Norberg et al. 2004). Like other fishes, the photoperiod associated with yellow bass spawning varies throughout the species' range with spawning occurring at shorter light periods or earlier in the year at southern latitudes (Bulkley 1970, Becker 1983, Etnier and Starnes 2001) compared to more northern latitudes. Spawning during this study occurred at an average photoperiod of 12 h of light while yellow bass spawning in more northern latitudes occurred at an average photoperiod of 13.5, 14.5, and 15 h of light in Tennessee, Iowa, and Wisconsin (Bulkley 1970, Becker 1983, Etnier and Starnes 2001, USNO 2009), respectively. Yellow bass abundance increased as temperatures reached 18–22 C, which are similar to the spawning temperatures reported in other parts of the species' range (Bulkley 1970, Becker 1983). This suggests that yellow bass spawning activity in the UBE is influenced more by temperature than photoperiod.

Throughout their range, yellow bass typically migrate upstream to spawn in April and May (Bulkley 1970, Mettee et al. 1996), but the spawning season can extend into June in the northernmost reaches of the yellow bass range (Becker 1983). In the UBE, yellow bass were collected each month, but were most abundant during March and April due to movement into spawning areas. Similar seasonal fluctuations in abundance have been recorded for yellow bass in Iowa (Harlan and Speaker 1956), Illinois (Smith 1979), and Wisconsin (Becker 1983). Yellow bass GSI peaked in early February and decreased through late April suggesting that spawning in the UBE occurred from mid-February through the end of April, which is earlier than in more northern latitudes (Becker 1983, Etnier and Starnes 2001).

The presence of a single post ovulatory follicle complex (POC; Brown-Peterson et al. 2007) verified that spawning activity had occurred on 23 January 2009, and POCs became more common after 10 February 2009. The higher percentages of "regressing" and "regenerating" stages for both sexes in the late spring and summer indicated that both males and females had spawned and were preparing for the next spawning season (Brown-Peterson et al. 2007). Based on GSI values and gonad histology, yellow bass in the UBE spawned from February through the end of April.

Conclusions and Management Implications

The results of this study showed that yellow bass use the UBE seasonally for spawning. We found that female yellow bass matured faster than females of other yellow bass populations, while males matured at about the same age. Marginal increment analysis confirmed annulus formation on otoliths of yellow bass in the UBE began in December and was completed before May. Finally, this study provided the first histological description of yellow bass gonads. This study achieved the goal of filling a major gap in fisheries knowledge by providing basic life history information about yellow bass.

Unfortunately, only the upper reaches of the Barataria Estuary were sampled, therefore, we do not know where yellow bass go when they are not in the UBE. Further research needs to be conducted in other lakes and bayous in the upper and lower reaches of the estuary in attempt to determine yellow bass location outside of the spawning season. Additionally, our results provide baseline information about yellow bass population characteristics that could be used to develop more detailed studies on yellow bass recruitment, age, growth, reproduction, and the role they play in fish communities. Furthermore, information from this study can be used by fisheries managers to aid in the development of best management practices for fish communities in the Barataria Estuary.

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