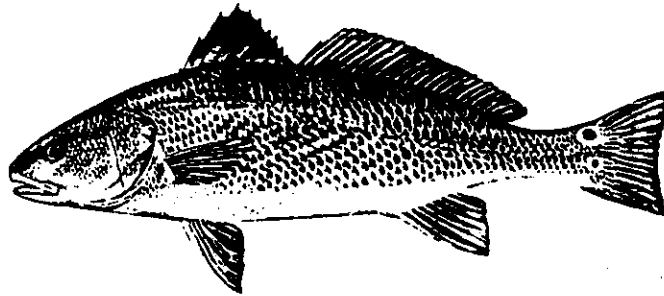




February 3, 1999
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SEA GRANT PROGRAM



LAGNIAPPE

REDFISH AND BLACK DRUM RESEARCH

Red drum and black drum are important and popular coastal fish in Louisiana. Both species spend part of their life cycle in inshore marshes, bays, and lakes, and part of it in offshore waters.

Researchers in the early 1990's at Louisiana State University studied both of these fish in detail. Fish were obtained from purse seines, haul seines, gill nets, trawls, and fishing tournaments. Some redfish were also obtained from a commercial red snapper fisherman. Several hundred fish were weighed and measured, and were aged by counting the growth rings in their otoliths (ear bones). Samples were also taken from their reproductive tissue.

Their research showed that some female redfish become mature enough to spawn at 3 years old, 26.8 inches long and 7.5 pounds. By 4 years old, around 28 inches long (9.1 lb.) half of them are mature. All females more than 32 inches long and 13.4 pounds in weight were capable of spawning. These were 6 year old fish. Male redfish matured about one year earlier and at a slightly smaller size.

Studies of their reproductive organs showed the spawning season in Louisiana to be an eight week period during the months of August, September and October. During that period the study showed that females spawned on average of every 7.6 days.

The study also indicated that migration from inshore areas out to offshore schools probably does not occur at the same age for all redfish. Some redfish as young as 2

years old were caught in offshore waters. Once in offshore waters, the younger, smaller fish grouped into separate schools from older fish.

This partially explains where the missing fish were that so alarmed some scientists in the 1980's. These fish were no longer available to sample in inshore waters but were not in the schools of "bull reds either."

The black drum research was also interesting. Only one of 97 females in the 2 to 3 year old age group was mature enough to spawn. Seven of 22 fish aged 4 were mature. All females 5 years old and older were able to spawn. Half of all females at 25 inches and 9.4 pounds were mature. All females were mature at 27 inches and 12.8 pounds. Like male redfish, male black drum begin spawning at a slightly younger age and smaller size than females.

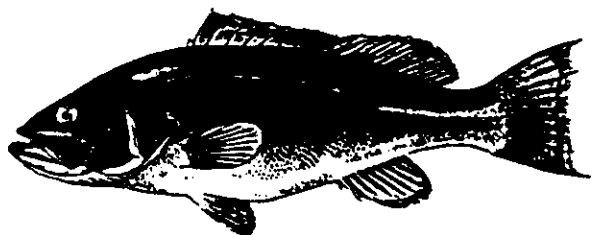
Spawning season for black drum was estimated to be at least 14 weeks long during January to April, with a peak in March. There was a good indication that some spawning also occurred in December. It was determined that an average female black drum could spawn as many as 40 million eggs a season.

In spite of the huge number of eggs produced, some spawns in some years are much more successful in producing fish than other years. It appears that these strong year classes occur every 4 to 5 years.

Source: *The Variation of Year Class Strength and Annual Reproductive Output of Red Drum Sciaenops ocellatus, and Black Drum Pogonias cromis, from the Northern Gulf of Mexico and Age Structure and Reproductive Potential of the Northern Gulf of Mexico Offshore Population of Red Drum not Vulnerable to Purse Seine Capture: The Missing Fish?* C. Wilson, D. Beckman, D. Nieland and A. Stanley. Coastal Fisheries Institute, Center for Wetland Resources, LSU. 1992.

SHE'S A HE!

While it is a relatively well known fact that oysters can change sex during their lifetime, few fishermen realize that some species of fish may also do so. Like other vertebrates (animals with backbones), most fish have separate sexes (called gonochorism). But there are exceptions. Among the several hundred families of fish, at least 14 families have species that can change from female to male (called protogyny). Change from male to female (called protandry) is less common and is known in 8 families of fishes. Least common are simultaneous hermaphrodites — fish that can produce both eggs and sperm at the same time.



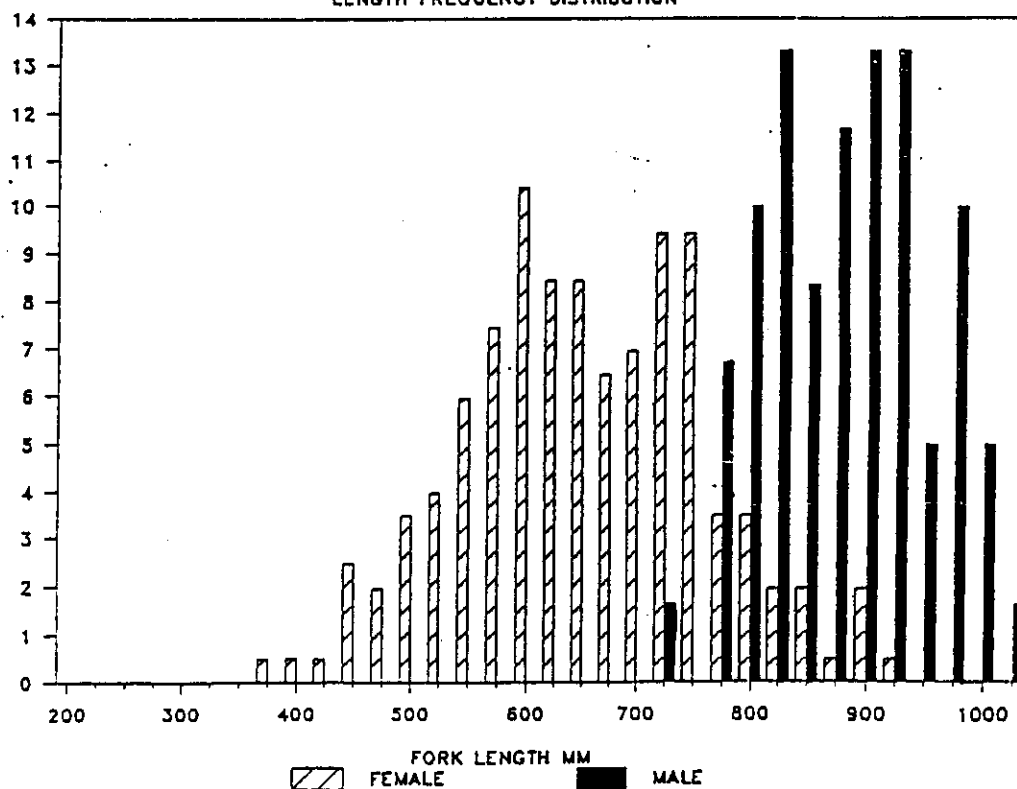
Groupers are almost all, if not all, protogynous, changing sex from female to male as they grow to a larger size. In the late 1980's, Don Baltz, a researcher at the Louisiana State University Coastal Fisheries Institute conducted preliminary research into sex change in the yellowedge grouper, *Epinephelus flavolimbatus*. These good-sized (up to 40 pounds) groupers were the

predominant grouper species being landed by Louisiana's deepwater longline fleet from waters 300 to 700 feet deep.

Baltz collected the reproductive organs and otoliths (ear bones) from over 400 yellowedge groupers taken by longline off of the Louisiana coast. All fish were also weighed and measured. While the groupers were almost impossible to age by counting the growth rings in the otoliths, the other information was very interesting.

YELLOWEDGE GROUPER

LENGTH FREQUENCY DISTRIBUTION



The largest yellowedge groupers, those over 32 inches (800 millimeters) were almost all males. Groupers under 30 inches (750 millimeters) were almost all females. Not one male was smaller than 29 inches long and 13 pounds in weight. A few of the larger fish were females, with the largest being 37 inches long and weighing 24 pounds.

Scientists have long been puzzled as to why a few families of fish have developed the ability to change sex or be both sexes at the same time. Unfortunately, the large groupers so favored by commercial and recreational fishermen have been studied very little. Other groups such as wrasses and small seabasses have been more carefully studied and some theories have been developed.

As fish get larger, their ability to produce eggs or sperm and their fighting ability both increase. In species where the male keeps and defends a harem of females or where males stake out the best spawning sites, large males have most opportunity to mate because of their ability to dominate smaller males. Therefore, changing sex from female to male as they grow larger is to their advantage and evolution has favored those that change sexes.

On the other hand, for species that pair up at random with no regard to size, being a female at a larger size is an advantage. Sperm are small and eggs are bulky. A small male can produce enough sperm to fertilize any female, but a large female can produce many more eggs because of her size. For these species, evolution should favor fish that change from male to female as they grow larger.

For species in which the males and females form spawning pairs matched by size, or when males compete with each other to fertilize eggs in group spawning, no advantage is gained by sex change and the males and females remain the same sex for life.

Most, but not all simultaneous hermaphrodites (those that are both male and female at the same time), are very deep sea species where fish populations are very low, and therefore chances of finding a mate of the same species are also very low. Under these conditions it helps a great deal for a fish to be able to mate with whatever member of its species that it meets.

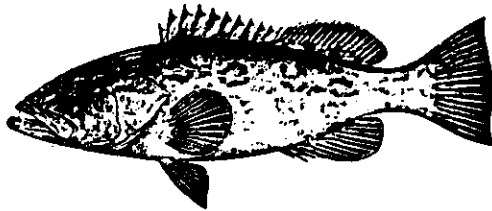
This subject is very complex and for the sake of understanding, I've made it somewhat simpler than it really is. There are many exceptions to the general rules. Very little is known about the effects of fishing on these species when the fishery targets either the larger or the smaller members of a sex-changing species. Most sex-changing species are reef fish and as more is learned about reef fish behavior and ecology, more information will become available on sex-change in fish.

Sources: *Age, Growth, Population Structure, and Reproduction of the Yellowedge Grouper, Epinephelus flavolimbatus, in Louisiana Offshore Waters.*

Unpublished progress report. Donald M. Baltz. Coastal Fisheries Institute, LSU. 1987. *Mating Behavior and Hermaphroditism in Coral Reef Fishes*. Robert R. Warner. *American Scientist*. Vol. 72. *The Evolution of Sexual Patterns in the Seabasses*. Eric A. Fischer and Chris W. Peterson. *Bioscience*. Vol. 37, No. 7. Special thanks to Donald Baltz on this subject.

GAG

Ya ever wonder how fish get their names? I'd like to know the story behind how this wonderful tasting fish got its name. Gag are a relatively common species of grouper in waters offshore of Louisiana, and are avidly pursued by both recreational and commercial fishermen.



Gag are a mottled gray color with no real distinguishing features. They are most similar to scamp grouper, but lack the streamer points that scamp have on their dorsal (back), anal (belly), and caudal (tail) fins, and the scamp's bright yellow markings around its mouth.

Because of its popularity and its biology, gag are susceptible to overfishing and the National Marine Fisheries Service is considering regulatory changes to lower the harvest of the fish. Gag, like many groupers, change sex, starting life as females and changing to males as they become older and larger. This means that there are fewer males than females in any population, so fishing pressure can affect one sex more than the other.

Gag have been well-researched on the south Atlantic coast, but very little work has been done on their biology in the Gulf of Mexico. One gulf study, done in the late 1980's took place off of the west central Florida Gulf Coast. A total of 1331 gag ranging in size from 0.7 to 48.9 inches long were captured. Larger fish were captured by recreational and commercial fishermen from waters 119 to 594 feet deep. Smaller fish nearshore and in Tampa Bay were captured using seines, pushnets, hooks, traps, and spearguns. All fish were weighed and measured, and their age determined by counting the rings in their otoliths (ear bones).

Gag in the study increased in size as the water become deeper, out to 264 feet deep. For example, the average size was 20 inches at 33 foot depths and 40 inches at 264 feet. This may be due to more fishing pressure in shallower waters, or to the fact that gag migrate to deeper waters as they mature.

The oldest fish in the study was 21 years old and 45.6 inches long. The largest fish (48.9 inches) was 17 years old. Gag grew rapidly until they were 10 years old and an average size of 44 inches. From 10 to 21 years old, growth rates were very slow. Growth

rates were most rapid the first year, with the average gag being almost 17 inches long by its first birthday.

Overall, females outnumbered males by over 6 to 1. Gag under 32 inches and 5 years old were all females. By 42 inches and 11 years old the sex ratio was about even. Between 5 and 11 years old, male fish were larger than female fish, most likely because the larger fish in each age group had changed sex from female to male. After 11 years old, the average size of males and females was about the same.

Females usually became mature enough to spawn between ages 3 and 4. At 4 years old, 70% were mature. By age 6, all females were mature. Spawning takes place between December and May, with a peak in February and March.

Source: *Age, Growth, and Reproduction of Gag, Mycteroperca microlepis (Pisces: Serranidae) in the Eastern Gulf of Mexico.* Peter B. Hook and Rodric A. Schlieder. *Bulletin of Marine Science*, 51 (3): 337-352, 1992.

IODOFORM SHRIMP

Shrimp marketers, fishermen and gourmets have long recognized that brown shrimp caught in offshore waters of the Gulf of Mexico often have an unusual taste identified as "iodine" or "iodoform." This taste and odor is most pronounced after they have been boiled. While in some parts of the country, the taste is expected or even preferred, enough preference for shrimp without it exists that white shrimp (which don't develop the taste) bring a slightly higher price, size for size, than brown shrimp.

Most fishermen assume that the iodoform taste is caused by something in the diet of offshore brown shrimp. Occasionally, seaweed is blamed, as it is well known that seaweeds are rich in iodine.

I found that very little research has been done on this subject. The best explanation for iodoform shrimp that I have found was proposed in 1937. This biologist proposed that the taste developed due to shrimp eating a certain worm-like marine animal, the acorn worm, or to give it its scientific name, *Balanoglossus*.



This animal, in spite of looking and behaving like a worm, is not a worm, but a hemichordate, a very primitive relative of animals with backbones. It gets its name from the acorn shaped proboscis or snout.

Acorn worms are very common in sand or mud bottoms in high salinity waters, there they behave much like earthworms on land, eating their way through the mud and digesting anything possible in it. In spite of being very common, even scientists may overlook them. They stay buried

all their lives and are so soft and fragile that almost any attempt to remove them from the mud breaks them into pieces.

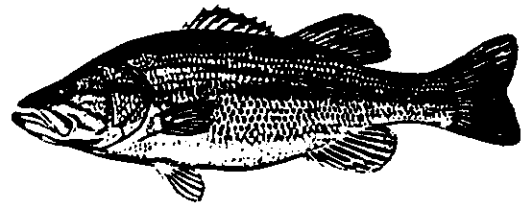
Scientists handling the worm have noticed their remarkably strong iodine odor. Even repeated washing will not remove it from their hands. Scientists on the south Atlantic coast have also noted that when fish such as croaker or pigfish feed on acorn worms, they develop an iodoform taste and odor.

The development of the iodoform taste in fish that feed on the worm, the fact that brown shrimp are known to spend much of their time buried in the sea bottom where the worms are, and the fact that brown shrimp don't develop this taste until they migrate to the high salinity waters where the worms live, all point to the acorn worm as the cause of iodoform taste.

Sources: *The Probable Cause of "Iodine Shrimp.* James Nelson Gowanloch. Louisiana Conservation Review. December, 1937. *Guide to Identification of Marine and Estuarine Invertebrates.* Kenneth L. Gosner. John Wiley and Sons. 1971.

BASS AND OXYGEN

Largemouth bass, like all fish, need oxygen to survive. As bass fishing has become more sophisticated, some bass fishermen have rigged their boats with oxygen meters.



During periods of warmer water temperatures bass need more dissolved oxygen in the water. At the same time, the warmer that water becomes, the less dissolved oxygen it can hold. In Louisiana, in cold winter months, levels of oxygen in flowing water can reach 10 or 11 parts per million (ppm), but not much more.

Research conducted in the Kissimmee River in Florida by Florida Game and Fresh Water Fish Commission biologists showed that largemouth bass do indeed move to avoid areas of low oxygen.

For the study, bass ranging from 2 to 6 pounds had radio transmitters surgically implanted in them. After they were released where they were originally caught, the biologists located them with a radio receiver twice a week to follow their movement.

The largemouth bass tracked in this study did not seem to be affected by gradual changes in dissolved oxygen as long as it stayed above 2 ppm. During the summer, some were located at dissolved oxygen levels of 1-2 ppm, but almost none were found below 1 ppm.

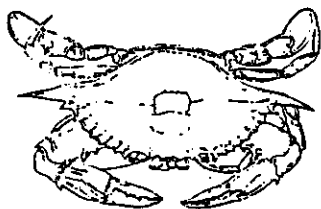
Bass were seen to move in response to low oxygen much more commonly between June and October. During the fall, some bass moved as much as 825 yards a day for a period of time. When dissolved oxygen levels decreased to below stressful levels, the bass returned to their home area. That bass are homebodies was shown by the fact that most of them didn't move 100 yards during all seasons when they had enough oxygen.

Source: *Habitat Use and Movements of Largemouth Bass Associated with Changes in Dissolved Oxygen and Hydrology in Kissimmee River, Florida*. J. B. Furse, L. J. Davis and L. A. Bull. Proceedings of the Fiftieth Annual Conference, Southeastern Association of Fish and Wildlife Agencies. 1996

BLUE CRAB ECOLOGY

Blue crabs, *Callinectes sapidus*, are an important commercial and recreational species in Louisiana and elsewhere on the U. S. east coast. They are found as far north as Massachusetts and south to northern Argentina. Blue crab population biology has been most heavily studied in the Chesapeake Bay on the Atlantic Coast. While much is also known about blue crab ecology in the Gulf of Mexico, most of the research has been done in bits and pieces and much of it based on studying the catches of commercial fishermen.

One detailed study was done over a 3 year (1980-1983) period in Tampa Bay on the Florida Gulf Coast. This estuary has much in common with typical Louisiana estuaries. It is large (412 square miles) and has bottom types that vary from sand to silt and clay. Like most Louisiana estuaries, the salinity ranges from completely fresh at its upper end to full strength seawater at its lower end near the Gulf of Mexico.

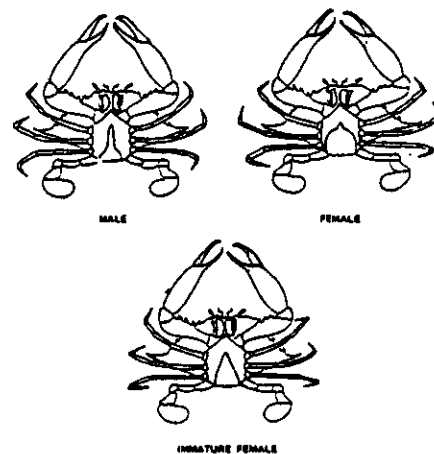


The biologists sampled the crab population using 1½-inch mesh crab traps fished at regular stations throughout the bay on a weekly basis. Data recorded for each crab included its date of capture, sex, its carapace width (measured from point to point of the shell), its molting condition, and if it was a female, whether it was carrying eggs or had already spawned. Water salinity and temperature, and bottom type for each sample was also recorded. A total of 29,502 blue crabs were captured during the study.

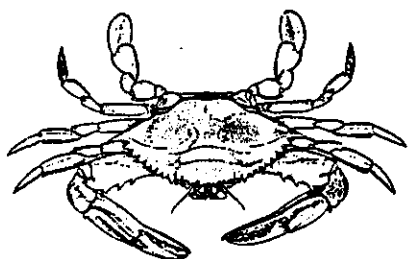
The mix of males and females at different areas of the bay was interesting. Overall, the percentage of the catch that was males was highest from the spring through early fall and was lowest in the winter. The decline in the number of males occurred in October or November and may have been due to them becoming dormant (hibernating).

Males were also more common in the fresher waters of the upper part of the bay, especially during periods of cooler temperatures (below 68°F). As temperatures warmed, the catch of males increased somewhat in higher salinity areas.

Low salinity waters also produced large catches of juvenile or young crabs, especially females. These young females may have moved to these areas to mate with the abundant mature male crabs. Males can only mate with females when the females are in the softshell stage after molting. After this mating molt, the female's apron (belly flap) changes from its juvenile triangular shape into a broad rounded shape.



Large mature females and juvenile males tended to be more common in the high salinity part of the lower bay. It should be noted, however, that the researchers did find some high salinity nursery grounds where both young males and females were found, and also certain areas where large crabs of both sexes were common.



The average size of males in the fresher waters of the upper bay was also larger than in the lower bay. Female size was not associated with either the upper or lower bay, but rather some areas consistently produced larger females than other similar areas.

For both sexes, the average size was largest during October-December, and smaller during March-September. The smaller average size in spring and summer was due to increasing numbers of young crabs coming into the fishery. It also seems that small crabs came out of winter hibernation and began feeding (and therefore appearing in catches) earlier than larger crabs.

Two periods of high molting (shedding) activity for both sexes were found, one in spring-early summer and one in late summer-early fall. Molting males were collected at nearly all salinities when temperatures were at or above 61°F, but were most common at 61-68°F in salinities in the 11-20 part per thousand (ppt) range. For comparison, full strength sea water is 35 ppt.

Higher percentages of females molted at all salinities at temperatures of 79-86°F and at 11-15 ppt in the 61-77°F range. Most molting activity for both sexes took place at temperatures under 86°F.

Molting males were found scattered throughout the bay, but molting females used specific locations. For both sexes, molting was connected to the phase of the moon, with more molting taking place on or near the full moon or the declining half-moon.

Most female crabs were mature by 5.2 inches. Most egg-bearing females were caught in the high salinity waters near the Gulf of Mexico at temperatures of 61-77°F. The biologists did not record whether the spawning female was on its first or its second spawn. They did find some evidence that a small percentage of mature females did shed again after reaching maturity. Most people assume (and in most cases it's true) that a female does not shed again after developing the mature apron.

The researchers suggested that high water temperature was the cause of the strong decreases in both spawning and molting in July. They did stress that all blue crab activities affected by water temperature may take place at different times in areas with a climate cooler than Florida.

Source: *Population Ecology of the Blue Crab: Callinectes sapidus Rathbun, in a Subtropical Estuary: Population Structure, Aspects of Reproduction, and Habitat Partitioning.* Philip Steele and Theresa M. Bert. Florida Marine Research Institute. 1994.

ENDANGERED STURGEON

Louisiana has few fish listed as threatened or endangered under the Endangered Species Act. One is the Atlantic Sturgeon. While this large fish is found on the whole Atlantic Coast of



the United States, the gulf race, *Acipenser oxyrinchus desotoi*, was historically found only between Tampa Bay Florida and the rivers east of the Mississippi River, including the Pearl River. Two smaller, closely related sturgeons, the shovelnose and the pallid are found in the Mississippi, Atchafalaya and Red Rivers. All are protected from harvest and the gulf sturgeon is listed as a threatened species under the Endangered Species Act.

Gulf sturgeon spend the cooler months of October to April in brackish estuaries such as Lakes Ponchartrain and Borgne and the rest of the year in freshwater rivers where they spawn in the spring. Research in Florida indicates that they must be 9-12 years old before they are able to spawn. These fish can reach a maximum size of well over 200 pounds and on the Atlantic coast, some have been recorded at over 800 pounds and as old as 60 years old.

Very little is known about the biology of the gulf sturgeon in eastern Louisiana. In an effort to learn more, fisheries scientists conducted a study from 1992 to 1995. Gill nets

of various mesh sizes were fished in the Bogue Chitto River, West Pearl River, Pearl River Canal, Holmes Bayou, West Middle River, East Middle River, and the Pearl River. All gulf sturgeon captured were weighed, measured and tagged. Some also had radio transmitters attached to track their movements. Thirty-five fish were aged by counting the annual growth rings in their fin rays.

A total of 158 sturgeon were captured. The West Middle River produced 147, East Middle River yielded 6, and 5 were caught at the base of the sill at Bogue Chitto River. None were caught in West Pearl River, Pearl River Canal, Holmes Bayou, or Pearl River. This may in part be due to the fact that gill nets fish better in low current areas than in areas of stronger currents.

The sturgeon captured ranged in size from 15 inches to 5½ feet long. The 35 sturgeon that were aged ranged from 2 to 11 years old, although only 2 were older than 5 years old. This indicates that some spawning is occurring, but the lack of larger fish suggests that very few of the fish are living long enough to reach spawning age. Only one of 153 fish captured was large enough to spawn.

Based on recaptures of tagged fish, the size of the population was estimated to be quite low. Radio-tagged fish showed some movement between rivers, although most fish stayed near where they were tagged. Most were relocated in the deep water of river bends with little current. The scientists did note that other populations which were not located may exist in the river/lake system.

The rarity of the fish was felt to be reason for concern. Wintering habitat for sturgeon in Lake Ponchartrain has been affected by increased human population growth in the parishes north of the lake. The result has been less variety of bottom animals, many of which serve as food to sturgeon. The fish are also occasionally captured in fish and shrimp nets which may result in some deaths. Another factor which may be affecting the fish are two sills, the Pools Bluff Sill on the Pearl River, and the Bogue Chitto Sill on the Bogue Chitto River. These were put into place to keep water levels high enough for navigation, but may possibly be partially blocking upstream spawning migrations, concentrating fish during low flow, and reducing the availability of summer habitat.

Source: *Distribution and Population Attributes of Gulf Sturgeon in the Lower Pearl River System, Louisiana*. J. V. Murrow Jr., K. J. Killgore, J. P. Kirk, and H. E. Rogillio. Proceedings of the Fiftieth Annual Conference, Southeastern Association of Fish and Wildlife Agencies. 1996.

OYSTER LEASE RULES REMINDER

Oyster lease owners are reminded of the Louisiana Department of Wildlife and Fisheries' policies concerning oyster leases in the state. The following is a summary of the department's oyster lease policies pertaining to minors, non-residents, corporations and estates.

No one under 18 years of age can apply for new oyster leases or renew leases that are about to expire. Minors inheriting leases must be 18 years of age or older at the time of renewal.

Non-residents may not own oyster leases. If a person living out of state inherits leases, they will not be able to renew them at the time of expiration.

All corporations owning oyster leases must be authorized to do business in the state of Louisiana. If they are not authorized and now own leases, they will not be allowed to renew them at the time of expiration.

Only the court appointed representatives of an estate may operate or renew leases held by or through an estate. Only a court ordered judgement of possession placing the heirs in possession of the lease or a court order appointing an executor or administrator of the estate and authorizing him to administer the lease will be acceptable. Anyone attempting to renew a lease without the above court orders will be refused and persons operating leases without the appropriate court orders may be subject to citation. Court orders involve the judicial opening of a succession and take time to obtain. Lease owners are advised to plan ahead and not wait until renewal deadlines approach before starting the process.

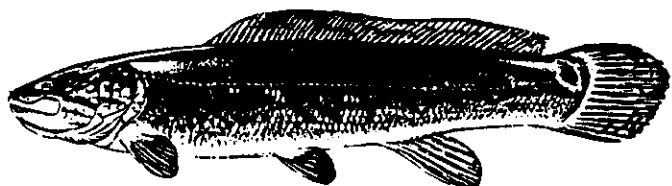


Lease owners must provide proof of residency and of age. Corporation representatives must have proof that the corporation is authorized to do business in the state and proof that they are authorized to do business for the corporation.

Any questions concerning this matter should be directed to Raymond C. Impastato at 504/568-5681.

BOWFIN, CHOUPIQUE, CYPRESS TROUT, GRINNEL, JACKFISH

Bowfish are one of Louisiana's least-valued food fish, yet have the largest number of nick-names or aliases. In spite of the low esteem for its flesh, a small,



but strong market has developed for its greyish-black eggs.

Supplies of true caviar from sturgeon are undependable, and its traditional substitute, paddlefish eggs, are quite limited. Bowfin eggs, or roe as it is more properly known, are very similar to sturgeon roe in color, size, and taste. In the 1980's, a commercial fishery developed for the fish for this roe, primarily with freshwater gill nets. Development of the fishery prompted the Louisiana Department of Wildlife and Fisheries (LDWF) to do research on the species to ensure good management.

Bowfin, or "choupique" as they are usually known in south Louisiana, spawn in winter months with a peak in February. Males have a black spot just in front of the tail which becomes darker as spawning time nears. Males also develop a beautiful, brilliant green coloration on their underside. Females remain a drab color, but develop a swollen belly as their eggs develop. Ten percent or more of their weight will consist of eggs in January and February.

Males prepare a nest in underwater plants. After hatching, young choupique swim in tight schools, guarded by the male fish, until they reach 3-4 inches long. In late April, the schools break up and the young fish are on their own. Young fish (like adults) eat just about anything they can get their jaws around, from microscopic animals, small worms, and insects on up to crawfish, small fish and large insects.

Choupique grow quickly, under ideal conditions reaching 1½ pounds by December. Growth then slows during winter months. Males may be ready to spawn by the following February, but most females won't spawn until their second year.

LDWF research focused on whether the minimum legal mesh size for freshwater gillnets, the main harvesting tool, protected the species. Department biologists fished gillnets of different mesh sizes in the Atchafalaya Basin, Spring Bayou Wildlife Management Area, and Chicot Lake, and also sampled the commercial harvest.

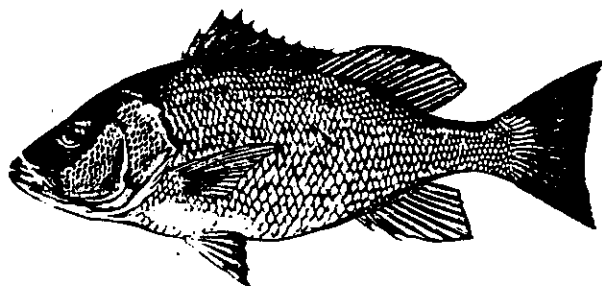
Currently, the minimum legal mesh for freshwater gillnets is 3 inches (bar measurement). In the Atchafalaya Basin, where most of the fishery occurs, the average size of choupique caught in 3-inch mesh gillnets was almost 28 inches long and 6-8 pounds in weight. The smallest fish caught was 22 inches long. Most females begin spawning at 17 to 18 inches in length (1¾ - 2 pounds). This indicates that most choupique have matured and had a chance to spawn at least once before being large enough to be captured in a gill net. The results showed that no change in minimum mesh sizes was required for management purposes.

Other legal gear such as trotlines and hoop nets are capable of capturing choupique before they mature, but their impact was not evaluated in the study.

Sources: *Potential Caviar Fishery Impacts on Louisiana Bowfin Populations*. R. Davidson, M. Walker, G. Tilyou and C. Lutz. Proceedings of the Forty-fifth Annual Conference, Southeastern Association of Fish and Wildlife Agencies. 1991. *Notes on Advances in Bowfin Culture at the University of Southwestern Louisiana (Draft)*. J. Huner. Crawfish Research Center. University of Southwestern Louisiana. 1994.

RED SNAPPER MOVEMENT

The amount of movement of red snappers from reef to reef has been an unanswered biological question for some years. Research on this subject was recently (1995-97) done through the University of South Alabama. Researchers caught, tagged, and released 2,836 red snapper at 9 reef sites, 3 at 65 feet deep, 3 at 84 feet, and 3 at 100 feet, located 12-19 miles south of Mobile Bay, Alabama. Tagged snappers were either released at the site of capture or transported to one of the other sites for release.



Of the red snappers tagged, 364 (12.8%) were recaptured after being tagged and released. Tagged red snapper showed very little movement away from the reef where they were released. With one exceptional period (Hurricane Opal), very few fish moved over 3 miles. What movement did occur showed no pattern and there was no relation between how long the

tagged fish were free and how far they moved. Fish captured at one reef site and released at another showed slightly more movement than those released at the site where they were captured. Dramatic movement of red snapper was noted during Hurricane Opal. Most movement was eastward and some was over 150 miles.

The report indicated that because red snapper showed very little movement from reef to reef, that some nearshore sites could be extremely heavily fished and that other reefs in deeper waters further offshore, could hold a larger percentage of older (and larger) fish. This may be especially true now that regulations have limited the number of pounds of red snappers per commercial vessel per trip. These regulations create an incentive for commercial fishermen to fish reefs nearer to port, so that they can make a trip quicker and get back out to make another trip before the overall commercial quota is filled and the season is closed.

The report also concludes that because under ordinary conditions, catchable-sized red snappers don't move much from reef to reef, that red snappers could be managed by dividing the area where they occur into separate management units with separate quotas.

One spin-off of this research project partially answered questions about how many red snappers die (mortality) after being released by hook-and-line fishermen who must return undersized fish to the water. The results indicated that release mortality was no more than 7% at the 65 foot sites, 9% at the 84 foot sites, and 12% at the 100 foot deep sites.

Source: *Site Fidelity and Homing Behavior in Red Snapper (Lutjanus campechanus)*
Robert L. Shipp. University of South Alabama. MARFIN Final Report #
NOAA#NA57FF0054. 1998.

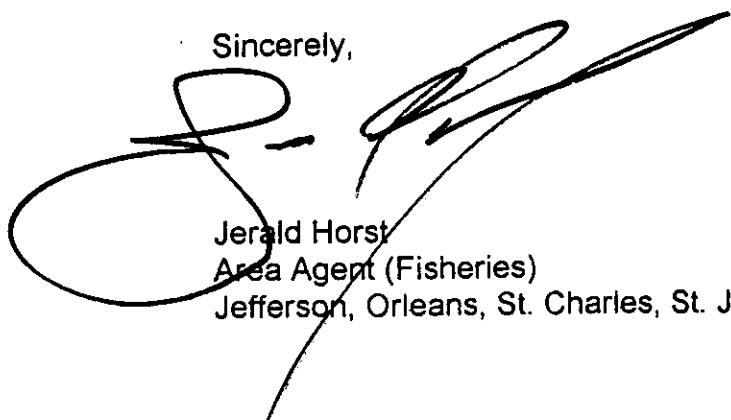
THE GUMBO POT
Carolyn's Louisiana Oyster Soup

I hope that you enjoy this recipe! Jimmy Frickey, a Westwego shrimper, originally reported to me that Andrea Galiano prepared the best oyster soup that he had ever eaten. I wasn't able to locate Andrea, but my detective work found that her mother was Carolyn Kass Falgout, who now lives in Amite, LA. I finally contacted Carolyn and she supplied me with a copy of this recipe. Enjoy!

½	cup cooking oil	1	stalk celery, coarsely chopped
5	medium onions, chopped	2	quarts water
1	small can tomato paste	3	oz. thin spaghetti
1	tbsp sugar	1	quart oysters
6	toes garlic, minced		salt and pepper

Add cooking oil to a large pot and warm. Add onions and saute until medium brown. Add tomato paste and sugar, and simmer over low heat at least 30 minutes. Add garlic, celery and water, and boil until celery is tender. Add spaghetti and oysters. Cook until spaghetti is tender. Season to taste. Serves 6.

Sincerely,



Jerald Horst
Area Agent (Fisheries)
Jefferson, Orleans, St. Charles, St. John