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March 1, 2004 Volume 28, No. 3

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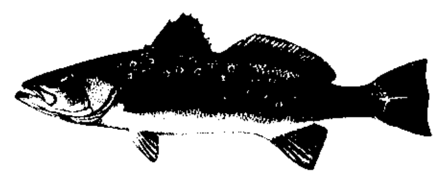


Every few years, old man winter provides enough of a shock to Louisiana waters that numbers of speckled trout become stunned, with many of them dying. Research indicates that water temperatures do not have to drop to freezing to kill specks. In fact, water temperatures below 45° F can kill, and water temperatures of 45 to 50° F are considered stressful to the species. Speckled trout can recover from short-term exposures to 45° water, and they have the ability to swim to seek slightly warmer temperatures, which can be the difference between life and death. However, a 24-hour exposure to 45°F has been shown to be lethal. If the low temperature doesn't kill the fish, follow-up infections by bacteria, fungi and dinoflagellates on the stressed fish may.

Some research indicates that the rate of temperature change may be more important than temperature of the water itself. Rapid changes are more stressful than gradual ones. Salinity also seems to play a role, with speckled trout being better able to survive low temperatures in high-salinity water than in low-salinity water. Also, low temperatures seem to affect the ability of trout to tolerate salinity changes.

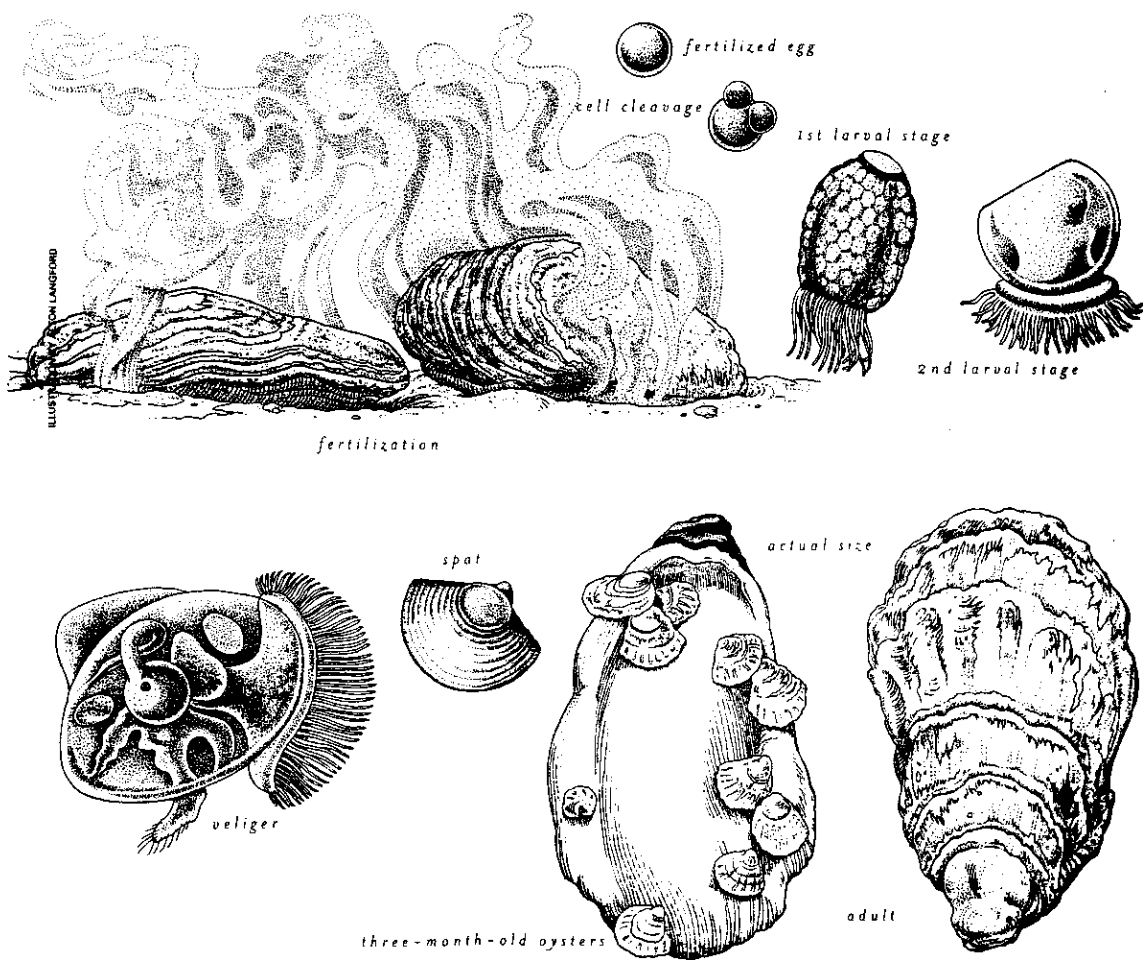
Source: *Diseases and Parasites of the Spotted Seatrout.* Reginald B. Blaylock and Robin W. Overstreet. Biology of the Spotted Seatrout, pp 197-225. CRC Press. 2003.

THE LIFE OF THE OYSTER

Oyster reefs are incredibly important to the health of coastal lakes and bays, and in fact, oysters have been called the "keystones of inshore marine life". They are living pumps that feed by filtering microscopic phytoplankton (one-celled plants) from the water. One oyster can filter up to six gallons of water per hour. Oyster reefs are also prime locations for recreational fishermen who pursue speckled trout and redfish. Finally, of course, the oysters are valuable to the oysterman whose living depends upon them and to the restaurants and markets that sell them. Oystermen try to maintain existing reefs and build new ones in the face of constant salinity changes and a seemingly endless number of oyster predators.

Oysters are a "protandric" species, meaning that they start life as males, with many changing sex to females later in life. In their first year, larger oysters are more likely than smaller oysters to change to females. The change seems to be heavily dependent on the food supply available. Food limitations lead to a greater number of males in the population. Females need a good food supply to produce eggs in large numbers. A single female can produce 10-20 million eggs per spawn, with occasional spawnings of 100 million. In one season, a female can produce as many as 500 million eggs. Spawning typically begins when water temperatures warm to about 77°F and continues until the fall. The eggs are released into the water and fertilized at random by sperm released by male oysters on the reef.

Within a couple of days of development, a veliger larva is produced from each fertilized egg that survived. These swimming larvae use the hairs (cilia) on their shell to



move in the water and to gather the single-celled algae on which they feed. Only a few veligers make it to a suitable site. Huge numbers are eaten by predators. Currents sweep them far and wide. Too much or too little salt in the water will kill them.

The veligers seem to find hard surfaces by following a chemical trail or signal that some researchers believe is given off by a bacterial film that develops on hard surfaces. Once the veliger receives the signal, it begins to change into a spat, which will cement itself to the hard surface and begin growing into a recognizable oyster. The best surface for spat is oyster shell, but spat will cement to almost any hard surface.

Oysters have many natural enemies. Oyster drills — snails with tube-shaped, rasp-like tongues — drill holes through their shells. Both blue crabs and stone crabs dine heavily on small oysters. Finfish eat oysters too. While sheepshead will eat small oysters, black drum will eat oysters of any size, being stymied only by oysters in big clusters.

The number one enemy to oysters is the microscopic disease-causing parasite *Perkinsus marinus,* often called dermo. This protozoan favors higher-salinity waters. During periods of drought or reduced freshwater inflow to an area, it can rapidly multiply and infest many oysters. Older oysters are most susceptible, but severe dermo infestations have been known to kill entire reefs.

Source: *The Oyster's Odyssey.* Larry Bozka. Texas Parks and Wildlife Magazine. September 2003.

PROJECTED WORLD SEAFOOD TRENDS

If only we could see the future as well as the past. In just a little over 20 years, seafood trade has gone global. Imported seafood has challenged one domestic fishery after another – canned oysters, canned shrimp, frozen, peeled crawfish, crabmeat, farm-raised catfish fillets, and frozen shrimp. In 2003, the International Food Policy Research Institute published a detailed outlook for worldwide supplies and demand for seafood through the year 2020.

The report divided the world's countries into two categories, developed and developing. Developed countries are those with strong modern economies and include the U.S., Western European countries, Canada, and Japan. Developing countries are those with weaker economies, such as China, countries in Southeast Asia, including Vietnam, and much of Africa and Latin America.

The report points out that global consumption of seafood has doubled between 1973 and 1997, with the developing countries accounting for much of the growth. China's growth in consumption is dominating. In 1973, it consumed 11% of world seafood production; in 1997, it consumed 36%. India and Southeast Asia accounted for another 17% in 1997. In the developed countries, consumption declined during this time, much of it due to lower fish consumption in the old "Iron Curtain" countries of Eastern Europe. Amongst developing countries, fish consumption has also declined since the 1980s in African countries south of the Sahara Desert.

In spite of the fact that the price of meat had by 1997 fallen to half of what it was in the early 1970s and the price of fish and seafood remaining the same, fish accounted for 20% of the animal protein eaten in developing (poorer) countries, but only 13% in the developed (richer) countries. Increased demand for seafood in developed countries is predicted to continue.

Both freshwater fish and anadromous fish (such as salmon) have shown huge increases in consumption. In China alone, consumption per capita (per person) increased by 10 times between 1981 and 1997. Per capita worldwide consumption of crustaceans (such as shrimp, crab and lobster) has tripled since 1990. So has consumption of mollusks, such as oysters and clams. China consumed 13 times as many mollusks per person in 1997 as it did in 1987.

Fish and seafood are either wild-caught or aquacultured. Wild fish harvests grew rapidly, from 44 million tons in 1973 to 65 million tons by 1997, but worldwide harvests of wild fish have now leveled off and are expected to grow only slowly to 2020. Aquaculture has grown, making up over 30% of global seafood production in 1997, compared to just 7% in 1973. Asia accounts for 87% of global aquaculture, with China alone producing a stunning 68% share, up from 32% in 1973. Worldwide, aquaculture production is 58% freshwater, 36% marine and 6% brackish water.

Nearly one-third of the world's wild-caught fish are caught to be processed into fishmeal and fish oil. Both are heavily used in aquaculture. In 1988, 10% of the world's fishmeal was used in aquaculture feeds; by 2000 it was up to 35%. Many aquacultured fish and crustaceans will not grow and survive well if fed feeds based on soybeans and other plants, instead of fishmeal-based feeds. Strong supplies of wild-caught fish for meal are very important to aquaculture.

Since the 1980s, developing countries have taken the lead in production of wild-caught and aquacultured seafood, and now produce 70% of all fish and seafood. Some of this is due to a shift in wild fish harvest after the establishment of 200-mile exclusive economic zones (EEZs) in coastal waters. In 1973, Japan was the world's largest producer with 18% of the catch. By 1997 its share dropped to 7%. China's official share (in spite of suspicions about the accuracy of their figures) rose from 9% to 21%. Production from the Soviet Union and its associated Eastern European countries also dropped steeply as their fleets were no longer subsidized after the Cold War ended. Other Southeast Asian countries, especially Thailand and Indonesia, also increased their wild fish catch, doubling it from 5.0 million tons in 1973 to 10.3 million tons in 1997.

The projection is for global wild fish harvests to remain stable, with only the Indian Ocean showing any growth, and for aquaculture to increase. Aquaculture's course is far from certain though, and has major challenges Other users will compete for land and water space, freshwater will become more scarce, diseases may be a problem, fishmeal and fish oil shortages may occur, and strong financial investment will be needed.

Seafood is truly a global commodity. Roughly 40% of the world's production is traded across international borders, compared to 10% for meat. This is astounding for such a perishable food item. Under an economic model (International Model for Policy Analysis of Agricultural Commodities and Trade), real prices for seafood are most likely expected to continue to rise through 2020 — 6% for low-value finfish, 15% for high-value finfish, crustaceans 16%, mollusks 4% and fishmeal and fish oil 18%. This compares to projected declines of -3% for beef, pork, sheep, and eggs, -2% for poultry and -8% for milk. The model also has projections under the scenarios of faster and slower aquaculture growth, lower Chinese production, improved fishmeal and fish oil supply, and a collapse of wild fish harvests.

The model predicts that per capita seafood consumption will stay the same in developed nations and Africa south of the Sahara Desert. In the rest of the developing nations, per capita consumption will increase. Growth in consumption will be so strong, that even China, a major aquacultured shrimp producer, will become a big importer of crustaceans by 2020.

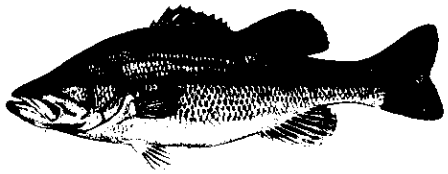
The model predicts that world seafood production will increase by 40% from 1997 to 2020 and that aquaculture's share of the total will increase from 31% to 41%. Seafood and fish production from the developing countries will increase from 73% of the total to 79%. Even with this production increase, prices of seafood should remain strong, primarily because growing demand within the developing countries themselves will outstrip their supply.

While aquaculture certainly faces a number of challenges, the report states that if developing countries adopt aquaculture subsidies like China and the developed countries have, large-scale, high-investment aquaculture operations are likely to grow and develop at the expense of traditional and small-scale commercial fishing.

Source: *Outlook for Fish to 2020: Meeting Global Demand.* Christopher L. Delgado, Nikolas Wada, Mark W. Rosegrant, Siet Meijer and Mahfuzuddin Ahmed. International Food Policy Research Institute. 2003.

MARSH BASS FISHING SURVEY

Each year, LSU fisheries scientists conduct a fisheries survey for the Louisiana Department of Wildlife and Fisheries. The 2002 survey focused on largemouth bass fishing in coastal marshes. Survey forms were mailed to 8,013 licensed anglers from parishes south of Interstate Highway 10. A total of 1,817 useable surveys were returned. Because the subject of the survey, fishing for marsh bass, was so narrow, it can be assumed that some people who didn't fish for marsh bass simply threw the survey form away.



Twenty percent of the respondents said that they did not fish the previous year, in spite of holding a license. Forty-six percent of the persons reported that they had fished for bass in 2001, and 27% said that they had fished for marsh bass. When asked how many days they fished for bass, 56% of the bass fishermen reported 10 days per year or less, although 12% said that they bass fished over 40 days. Marsh bass anglers were slightly less active, with 66% fishing 10 days or less and 9% fishing over 40 days.

When asked about their catches, the big majority, almost 82%, said that they catch an average of 1-10 bass per trip. A little over 10% reported averaging 31-40 bass, the highest average. The anglers in the survey reported that a little more than half of the marsh bass that they caught were under 12 inches in length.

Marsh bass anglers were asked if they thought that marsh bass sizes had changed over the past five years. Almost 68% said that they had remained the same, 15% said that size has increased and 17% said that size has decreased. Of the anglers who reported that size had increased, the following four reasons were most commonly given: (1) restocking/Florida bass, (2) catch and release, (3) food, and (4) freshwater diversions. When the anglers who reported decreased sizes were asked their view of why the change has occurred, the three most numerous answers were: (1) saltwater intrusion, (2) increased fishing pressure, and (3) bad weather.

Fishermen were then asked about marsh bass numbers. Only 31% reported that numbers had stayed the same during the previous five years, with 27% reporting that numbers had increased and 42% saying that they had decreased. The anglers reporting an increase gave the top three reasons as: (1) elimination of gill nets, (2) freshwater diversions, and (3) improved water quality/spawning habitat. From the people that reported a decrease, the most common reasons given were: (1) marsh loss/saltwater intrusion, (2) weather (drought/storms), (3) high fishing pressure, and (4) deteriorated water quality/spawning habitat.

Marsh bass anglers were next asked what was the most important reason that they fished for marsh bass. Almost 48% said that the main reason is that they can catch bass, drum and trout in the same location. Other answers were that the fish are abundant, easy to catch and they eat their bass catch (14%), less travel time (13%), and the fish are abundant, easy to catch and they release their catch (9%).

The fishermen were asked to identify their favorite marsh bass fishing location by general area. The top five spots were as follows:

1) Morgan City, Gibson, Lake Palourde, Lake Verret, 12.2%.
2) Houma south, Lake Theriot, Lake Penchant, Lake De Cade, 11.9%.
3) Venice, Mississippi River Delta, Pointe a la Hache, Wagon Wheel, 11.6%.
4) Lake Salvador, Bayou Segnette, Lafitte, Lockport, Lake Des Allemands, 10.4%.
5) Lake Arthur, White Lake, Lacassine NWR, Rockfeller WR, Grand Lake, 8.7%.

Finally, marsh bass fishermen were asked about regulations. Slightly less than 25% said that no length limit should be placed on marsh largemouth bass. The other fishermen recommended minimum length limits ranging from 4 inches up to 21 inches. The majority (56%) recommended 11-12 inches, followed by 14-15 inches (21%), and 10-11 inches (13%). Seventeen percent of the fishermen recommended some type of slot limit management, ranging from 3-8 inches to 24-28 inches. There were no clear trends in these recommendations.

Concerning creel limits, 22% recommended no limit, and 88% recommended creel limits ranging from 2-50 fish. As expected, the current 10-fish creel limit was the most popular response by marsh bass fishermen (37%), but there was more support overall for creel limits of fewer than 10 fish (38%) than for creel limits of more than 10 fish (25%).

Source: *The 2002 Louisiana Fishing Survey — Marsh Largemouth Bass.* William E. Kelso, D. Allen Rutherford, Jonathan C. Fisher, Melinda J. Ragsdale, Rebecca R. Sweany, Debra G. Kelly. LSU Agricultural Center.

UNDERWATER OBSTRUCTION LOCATIONS

The Louisiana Fishermen's Gear Compensation Fund has asked that we print the coordinates of sites for which damage has been claimed in the last two months. The coordinates are listed below:

Loran Sites

27954	46849	TERREBONNE
28015	46864	TERREBONNE

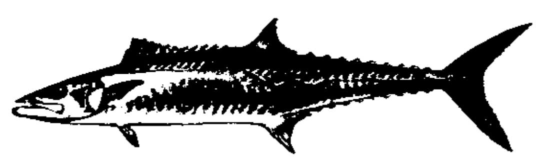
Lat. & Long. Sites

29 28.920	90 02.470	JEFFERSON
29 05.560	90 47.868	TERREBONNE
29 09.930	90 03.980	JEFFERSON
29 18.360	89 35.303	PLAQUEMINES
29 24.494	90 02.438	JEFFERSON
29 37.279	90 07.751	JEFFERSON

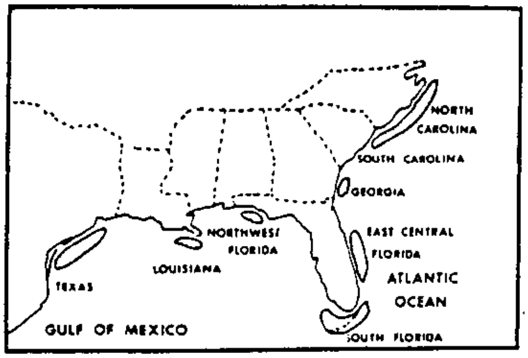
Lat. & Long. Sites

29 01.877	90 26.920	LAFOURCHE
29 17.676	89 52.545	JEFFERSON
29 23.112	90 01.330	LAFOURCHE
29 25.365	90 33.049	TERREBONNE
29 30.320	92 20.920	VERMILION
29 37.498	90 05.231	JEFFERSON
29 49.534	91 54.292	VERMILION
29 47.030	89 51.360	PLAQUEMINES
29 47.145	92 07.481	VERMILION
29 50.016	89 35.186	ST BERNARD

KING MACKEREL FOODS



King mackerel, *Scomberomorus cavalla,* are a valuable commercial and recreational fish found along the Atlantic and Gulf of Mexico coasts of North America. Studies of the food of king mackerel have been done in many places (none in Louisiana), but none compared the diets of king mackerel in different areas until 1983, when two researchers with the National Marine Fisheries Service did so.



The biologists obtained 11,766 stomachs from fish taken by gill nets, seines and recreational fishermen from 7 areas as follows: 2,863 from North and South Carolina, 549 from Georgia, 589 from east central Florida, 1,472 from south Florida, 3,778 from northeast Florida, 1,007 from Louisiana, and 1,508 from Texas.

A total 6,977 stomachs (59.3%) contained food. Comparisons between the three major food categories (fish, shrimp, squid) clearly showed that fish was far more important than invertebrates (animals without backbones) as food for king mackerel. By volume of food eaten, the percent that was fish ranged from a low of 84.9% in northwest Florida to a high of 99.6% in Louisiana.

The breakdown on food items for Louisiana king mackerel measured by the percentage of stomachs the item was found in was as follows:

FISH

Food Item	Percentage of Stomachs
Herrings (including menhaden)	32.7
Atlantic bumper (a small jack)	3.7
Blue runner	1.6
Round scad (cigar minnow)	1.3
Other jacks	4.7
Seatrout	15.4
Spot	5.9
Star drum	1.3
Porgies	0.6
Atlantic cutlassfish (silver eels)	6.1
Unidentified fish remains	41.2

INVERTEBRATES

Food Item	Percentage of Stomachs
Shrimp	4.0
Snails and clams	2.1
Squid	2.0
Trematode worms	2.6

The one family of fish that was eaten by king mackerel in all 7 areas was herrings. They were also the most commonly eaten family of fish in each area. Interestingly, a small percentage of bird bones was found in king mackerel stomachs from Louisiana, south Florida and Texas.

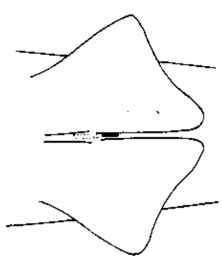
Most species of food fishes taken from king mackerel stomachs were less than 8 inches long, generally averaging between 4 to 6 inches long. Surprisingly, the average length of fish eaten did not change with the size of the king mackerel. In other words, bigger mackerel did not eat bigger fish.

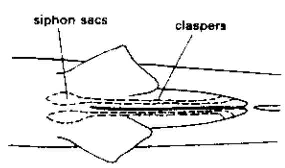
Source: *Food of King Mackerel, Scombromorus cavalla, from the Southeastern United States Including the Gulf of Mexico.* Carl H. Saloman and Steven P. Naughton. Technical Memorandum NMFS-S-SEFC-126. 1983.

MAKING SHARK BABIES

Of the well-over twenty thousand species of fish on earth, only 350 are sharks. Most species of fish reproduce by spawning tens of thousands to millions of tiny eggs, counting on the sheer number of eggs spawned to produce enough survivors to replace them.

Sharks are different. They produce small numbers of large, well-developed young that can fend for themselves and therefore have a high survival rate. Depending on the species, the number of sharks produced per litter is small, ranging from 2 to 25, although large females of a few species can produce litters of 100 or more pups.

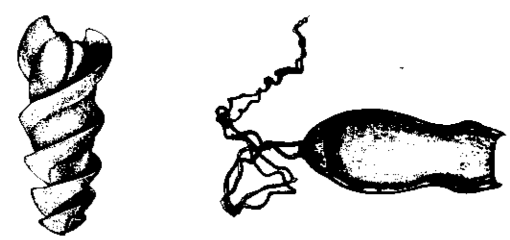

pelvic fins, female (ventral view)



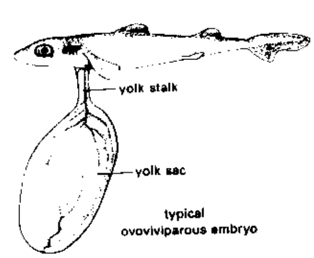
pelvic fins, male (ventral view)

Male sharks are easy to tell apart from females. Males have modified extensions on their pelvic fins called "claspers". During mating, the male shark will turn one of his claspers forward, insert it into the female and fertilize her using the siphon in the clasper. Fertilized females will produce young in one of three ways, oviparity, ovoviviparity and viviparity.

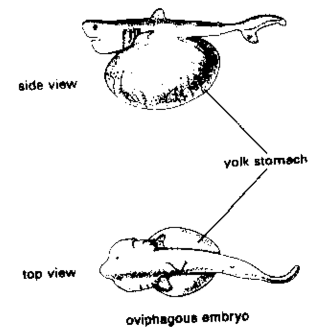
Oviparity is the most primitive form of reproduction in sharks. Oviparous females lay eggs, but the eggs are different from those of other fishes. They are large, with enough yolk to produce fully formed pups, and are in tough leathery cases. The eggs are deposited on the sea bottom, often attached to plants or racks. The eggs are not guarded by the females and hatching may take several months. Compared to other shark pups, those from oviparous sharks are smaller because their growth before hatching is limited by the amount of yolk in the egg. Oviparity is found in only four families of sharks, some nurse sharks, bullhead sharks, catsharks, and whale sharks.


egg cases of oviparous sharks

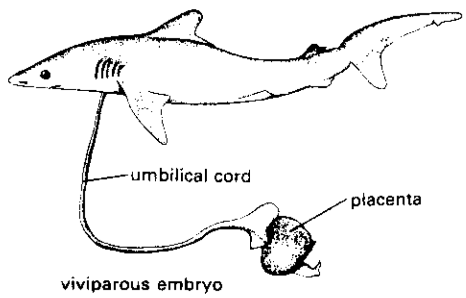
Ovoviparity is a method of reproduction in which the females hold their eggs until they hatch inside their uterus. After hatching, the embryos (babies) continue to grow, using the yolk from their yolk sac. Both the yolk sac and the yolk stalk are completely absorbed before birth. It is though that in some sharks, such as the tiger shark, the lining of the uterus produces liquid foods that are absorbed by the embryos after



typical ovoviviparous embryo



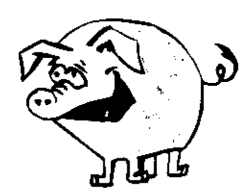
they use their yolk. In some species, such as the sand tiger shark, the young use up their yolk sac very early. After that, they grow by practicing cannibalism, feeding on the eggs and smaller young in the littler. Such sharks are called oviphagus or oophagus and often have huge yolk stomachs from eating other yolks. Usually only 2 pups are produced, one in each uterus. Ovoviparous sharks include the white shark, mako sharks, thresher sharks, sand tiger sharks, and some nurse sharks, dogfish, and cat sharks.



Viviparity is the most advanced form of reproduction in sharks. In viviparous sharks the embryos start out dependent upon a yolk supply but the yolk sac soon develops into a placenta, connecting the embryo to the mother shark's food supply in her bloodstream. In some viviparous shark species, the mother produces liquid nutrients (often called uterine milk) from the lining of her uterus, which bathes the embryos. Viviparity is found in hammerhead sharks, blue sharks, bull sharks, blacktip sharks, and smooth dogfish sharks, among other species.

Sources: *The Sharks of North American Waters.* José I. Castro. Texas A&M University Press. 1983. *Draft Amendment I to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks.* National Marine Fisheries Service. July 2003.

HOGGIN ' IT UP



Fisheries and environmental biologists are increasingly aware that what takes place on the land surfaces around a river or stream is at least as important as what happens in the stream. Watershed management has become a whole new area of study. In much of western and central Louisiana, it is a generations-old custom to run free-ranging hogs in wooded areas. The animals feed on wild roots, shoots, nuts, and fruits. Their owners round them up once a year or so to sell some of them and mark the young animals. Populations of wild pigs are also increasing in Louisiana.

Whether wild or owned, free-ranging pigs tend to concentrate their activities within 50 feet of water. To study the effects of swine on a stream, LSU biologists monitored Mill Stream in Allen Parish in western Louisiana in fall 2002, spring 2003, and fall 2003. They checked the levels of dissolved oxygen, and the numbers of sewage bacteria, disease-causing bacteria, and total bacteria.

The biologists did indeed find that swine being present in a watershed both lowered oxygen levels and increased all types of bacteria in a stream. The hogs were blamed for the reduced water quality in Mill Stream because discharges from local towns proved OK, few domestic animals were present in the watershed, and there was not much evidence of other wild animals.

The biologists recommended control of swine numbers to improve water quality. This wasn't a popular recommendation. Free-ranging hogs are a long tradition. Additionally, while wild hogs are not considered game animals in Louisiana, they are becoming increasingly popular with hunters and are being stocked in many areas that they haven't existed in before.

Source: *Water Quality Degradation in a Southwestern Louisiana Stream: The Impacts of Swine (Sus Scrofa) Activity on Water Quality Parameters.* Michael D. Koller and William E. Kelso. Louisiana Chapter of the American Fisheries Society Silver Anniversary Meeting. February 2004.

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THE GUMBO POT

Shrimp and Corn Soup

This is another recipe from the Kitchen of Jewel Boudreaux of Lafitte. Ordinarily, corn soups are one of my favorite seafood dishes, but when I ate this one, I had to have the recipe to share with you. It is one you won't be disappointed with!

1	stick butter
2	tbsp flour
1	large onion, chopped
¼	cup green onion, chopped
¼	cup Provolone cheese, grated
1	qt milk
2	cans whole kernel corn
2	cans cream style corn
1	can cream of mushroom soup
1½	lb small peeled shrimp
½	tsp Worcestershire sauce
4	bay leaves
	salt & cayenne pepper to taste

Blend flour and margarine over low heat. Add onions and sauté until wilted. Add other ingredients and cook on medium heat for 40 minutes. Stir frequently to prevent scorching. Serves 8.

Sincerely,

Jerald Horst
Associate Professor, Fisheries