

**KATHY'S JOURNAL: VERTEBRATES
OF THE MISSISSIPPI GULF COAST**

By

DELLA McCAUGHAN and ZAN SKELTON

Book VI: Marine Discovery Series

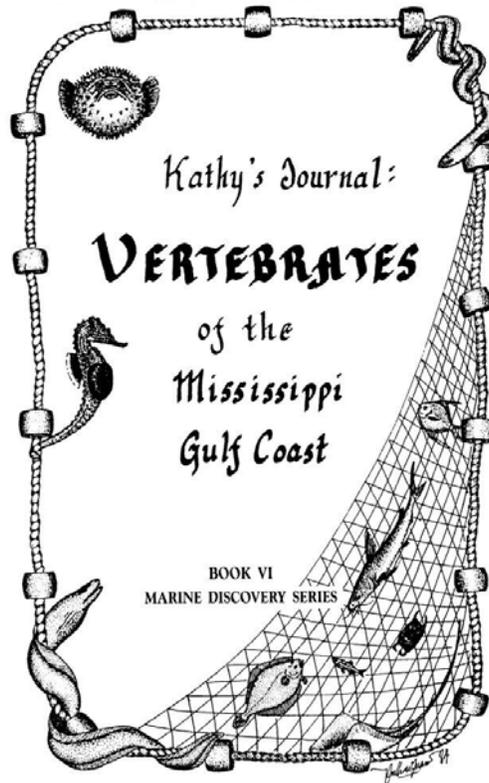
1984

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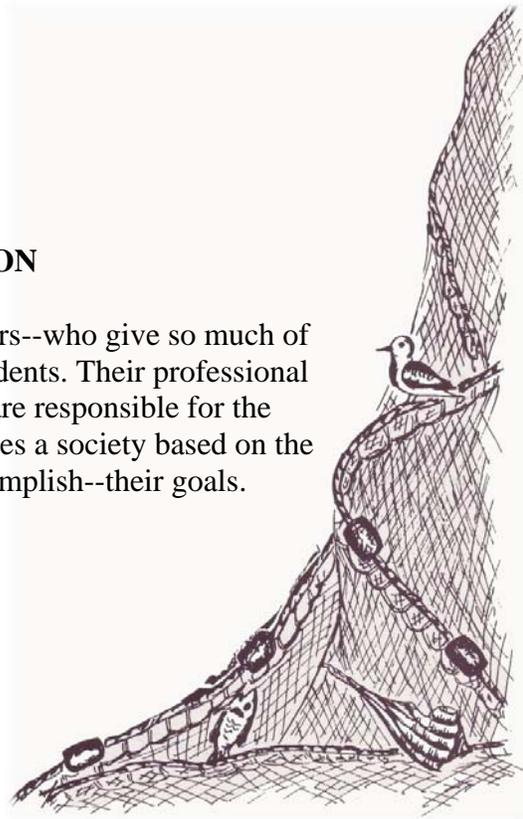
DEPARTMENT OF WILDLIFE CONSERVATION BUREAU OF MARINE RESOURCES

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DEDICATION

This booklet is dedicated to all elementary teachers--who give so much of their time, energy, expertise, and love to their students. Their professional contributions and dedication to their students are responsible for the quality of education in this country, which produces a society based on the belief that all individuals can seek--and accomplish--their goals.

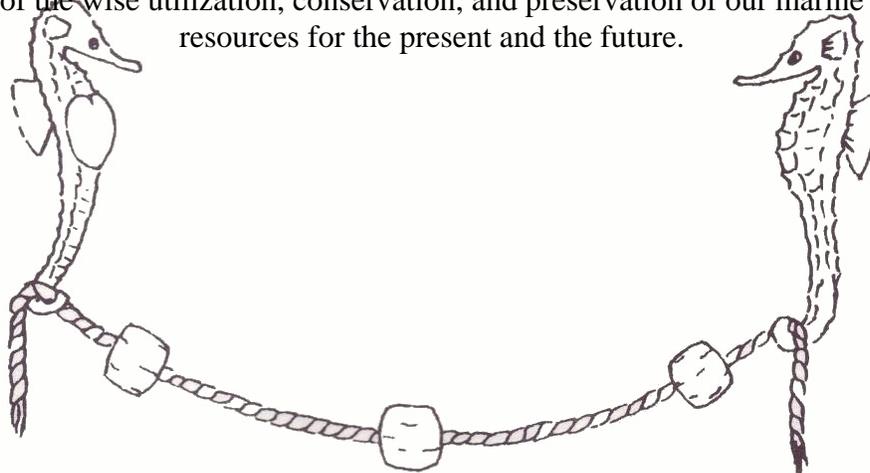


PURPOSE

This elementary booklet has been written on a sixth grade level. It will be appropriate for use with the upper fifth grade level and with the seventh grade life science program.

The material has not been written from the standpoint of a highly scientific publication; rather, it has been presented to give students an overview of the characteristics of the major marine vertebrates of the Mississippi Gulf Coast and to show students how different characteristics are used to identify groups of animals with similar anatomical traits.

The teacher may use this booklet to promote an awareness of Mississippi's marine environment among elementary students. By discovering some important ecological principles, the students will--it is hoped--strengthen their biological backgrounds, helping them to comprehend the importance of the wise utilization, conservation, and preservation of our marine resources for the present and the future.



KATHY'S JOURNAL: VERTEBRATES OF THE MISSISSIPPI GULF COAST

"But I don't understand why we have to move," Kathy Bryant complained, in what seemed like an echo of all her complaints for the past few months. "We've lived here forever--and now we have to leave. I'm not going to like it," she predicted.

Her mother tried to explain once again.

"It's your father's job, Kathy," Mrs. Bryant said softly. "The company has contracts with Ingalls Shipbuilding in Pascagoula and prospects of a new facility at Keesler Air Force Base in Biloxi--and maybe work in the National Space Technology Laboratories in Bay St. Louis. And your father needs to take advantage of this opportunity. It's up to us to help him and be more understanding, dear."

"But I love the city," Kathy said again, while her younger brother Tommy nodded agreement. "Chicago has--it has everything! And what will things be like in a new school--with people I don't even know? Nothing to do and nothing to see. There isn't anything in Mississippi!" she said angrily.

"Maybe we should wait a while before we make that kind of judgment," Mrs. Bryant said, trying to comfort her daughter. She knew that it would be hard for Kathy to leave her sixth grade friends in the Madison Heights school, to leave the security of her comfortable, familiar life and begin a new life on the Mississippi Coast. But Mrs. Bryant had high hopes that their new life would also be happy and rewarding, and she knew that there would be much on the Coast to explore, to learn, to enjoy.

Six weeks later the Bryants were settled in their new home in Pascagoula, and Kathy was slowly beginning to make uncomfortable adjustments to her new surroundings. At first, it seemed to Mrs. Bryant that her worst fears were going to be realized. Kathy was too quiet, suddenly becoming self-conscious and afraid as she had never been before. And she hated her new school.

"I don't like anything about it," she said one day, after only two weeks at the attractive elementary school set among the tall Mississippi pines and oaks.

"Give it time, dear," her mother counseled.

"I hate it here!" Kathy said, stamping to her room, where she lay on her bed--so angry that she could hardly eat two peanut butter sandwiches and four cookies and a glass of milk.

Kathy's parents worried about her. She had always been so cheerful, so self-confident. And now she seemed to be unhappy, not herself at all.

For several weeks the pattern continued. And then, one day it was as if a miracle had occurred.

When Kathy came home, she was excited and smiling, almost it seemed to her mother for the first time since they had left Chicago. She was carrying two large books with colorful covers--and she hardly had time to eat an apple and make a quick sandwich before she was in her room and beginning to read and make notes.

For a while, Mrs. Bryant stifled her curiosity, but she could not help wondering what had happened; finally she went into Kathy's room and questioned her gently.

"What are you doing, dear?" she asked. "School work?"

"No, Mother," Kathy said, half-listening, continuing to read and draw small sketches and make more notes.

"But something happened, didn't it? You seem different--oh, I don't mean that. You seem happy. You're like you used to be."

"It's the fish, Mother," Kathy said, still only half paying attention.

"The fish, dear?" Mrs. Bryant's puzzled expression spoke more than the words.

"Yes."

"Well, what about the fish? Why on earth would fish make you happy?"

"It's the aquarium, Mother."

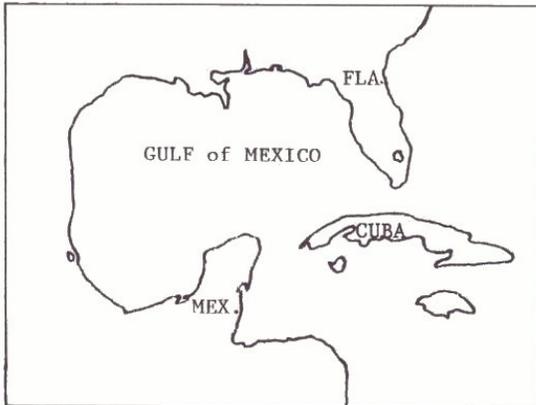
"What aquarium? Kathy, stop for just a moment and talk to me. What are we talking about?"

"We're talking about the new 150-gallon aquarium our class is getting, Mother. The PTA purchased it--and we're going to take care of it. And we're going to decide which fish to put into it--and take care of them; we're going to learn about the fish on the Mississippi Coast. The class elected me to write the first report for the PTA--and it's wonderful, Mother," she said, so excited that she could not stop her voice from rising. "You'll never guess what kinds of fish are in these waters. And the way they live--what it takes to raise them--the way the young are born. I can't wait to learn all about it. Mrs. Stackley said we could all contribute--but they especially want me to do the first report for the class and the PTA members because I'm new and I can look at things in a whole new way--at least, that's what Mrs. Stackley said. 'Bring the viewpoint of a new observer to the whole program,' were her very words, Mother. And it's wonderful and everybody wants to help. It's the fish, Mother," she said happily.

That was the beginning of Kathy's love for Pascagoula and her new school and the Mississippi Coast--and by the time the year was over, a person would have thought she had never lived anywhere else.

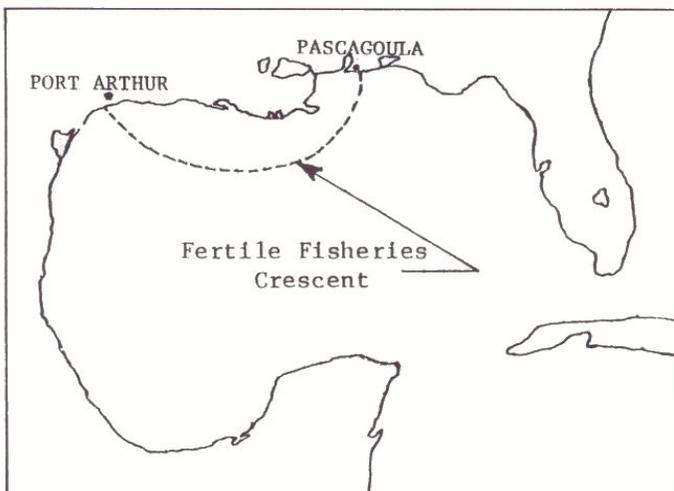
And all because of the fish!

For Kathy, the first few days of her research were times of real discovery. She visited libraries and talked with people and visited the J.L. Scott Marine Education Center in Biloxi and visited the aquarium at the high school and talked with the marine biology teachers. Her father even went with her one afternoon to some of the piers and talked with the fishermen with her. And much of what she learned she wrote down in her journal that would become the basis for her report to the class and the PTA. It would also be typed by Mrs. Stackley and placed in the school library for other students to read, complete with line drawings and sketches contributed by others in the class.



Kathy's first notes began with some simple facts about life in the Mississippi Sound.

The marine environment of Mississippi is part of what has been named "the Fertile Fisheries Crescent" by Dr. Gordon Gunter, a noted marine biologist of the Coast. This area extends from Port Arthur, Texas, to Pascagoula, Mississippi, and is one of the most productive areas on earth. The Gulf of Mexico and the Mississippi Sound are part of this crescent.



The Mississippi Sound lies between the state's southern coast and the Gulf of Mexico. It is separated from the Gulf of Mexico by four barrier islands, named Petit Bois, Horn, Ship, and Cat. In the Sound are two nearshore islands, Deer and Round.

Mississippi's marine life is abundant--not only in the waters of the Sound but also in the wetlands and tidal marsh and on the islands themselves.

The reason for the extensive marine life in the Mississippi Sound is that the Sound is a habitat area called an estuary. This means that fresh and salt water mix in the area

and the water is not as salty as that of the Gulf of Mexico. Many rivers and lakes, bayous, and bays influence the waters of the Sound, including the great Mississippi River, the Pearl River, and the Pascagoula River. Along with the fresh water come top soils rich in minerals necessary for small organisms called plankton to survive. The plankton is the food source for many marine animals.



Much of the marine life in the Sound can tolerate waters of wide ranges of salinity; however, those animals that remain in the Gulf have what is called a narrow or limited salinity tolerance. For the marine animals which **can** tolerate a wide salinity and can migrate into the Mississippi Sound, their food is abundant, and protection is increased by the low salinity water. Many enemies that would eat these animals are kept out in high salinity regions because of their narrow salinity range.

All of these facts contribute to the development of the Fertile Fisheries Crescent and to the presence of what Kathy discovered were the many vertebrates of the region. That was a new term to her, and she had to look up its meaning.

The name "vertebrates" is part of the classification scheme, or system that allows scientists to study all life in an organized, logical manner. The answer to how vertebrates are grouped among the animals of the world and to what makes an animal a vertebrate was in one of the science books Mrs. Stackley gave Kathy for her initial research.

The vertebrates, Kathy discovered, are animals having backbones or spinal columns, which can be hard like bone or made of softer material called cartilage. The skeletons of most vertebrates are hardened by minerals like calcium. Man, dogs, fishes, snakes, raccoons, and frogs are examples of vertebrates.

After she had gone that far, Kathy gave her report a new name. It was called "Marine Life of the Mississippi Coast: The Vertebrates," by Kathy Bryant. She made a cover for it one night after supper, and she was so excited by it that she could hardly eat.

Soon Kathy learned that the vertebrates of the Mississippi Coast environment are made up not only of fishes--but of reptiles, like snakes, turtles, lizards, and alligators; birds, like sea gulls, terns, herons, ospreys, and pelicans; mammals, like dolphins, otters, nutria, raccoons, and man himself; cartilaginous fishes, like sharks, rays, and skates; bony fishes, like croakers, mullets, eels, and tunas; and amphibians, like salamanders, frogs, and newts.

The fish are divided into groups called "families." Families, to the scientist, are groups of animals or plants that have in common certain traits or characteristics that indicate similarities. An example of a similarity would be the swimming crabs, such as the blue crabs, which have the last pair of legs flattened to aid in swimming. Other crabs that have similar legs are placed in the same "family." Another example would be the three types of shrimp caught in the Mississippi Sound: white, pink, and brown shrimp. Although there are several differences among them, they are in most respects similar and are therefore placed in the same group or family. It did not take long before Kathy was using the term herself, talking expertly of this family and that family.

One thing she decided very early in her research--a decision she made after a long talk with Mrs. Stackley.

"There's no way I can report on **all** the vertebrates," she said, holding her notebook for Mrs. Stackley to see. "If I try to do that, I'll be eighteen before I get finished." To Kathy, that seemed an enormous age, and Mrs. Stackley smiled her agreement.

"I have a suggestion for you," she said.

"I hope so," Kathy said wearily. "I'm afraid I've taken on too big a project."

"Why don't you call your report 'An Introduction to Some Interesting Vertebrates of the Mississippi Coast'? In that way, you won't suggest by the title that you're going to cover everything. After all, there are thousands of vertebrates, and this is going to be an introduction, not a complete survey of the whole group."

"Sounds good to me," Kathy said quickly, relieved that there would be some way of handling what had begun to seem like an overwhelming job. "That's exactly what I'll do."

From that point on, her research moved rapidly. Although all of the vertebrates she read about seemed almost equally fascinating, she was able to choose those that were her favorites. Slowly her journal assumed a kind of order, and she was able to arrange her ideas so that she was comfortable with them.

From time to time, she made entries and sketches and long notes, and when she was ready at last, she would make final entries in the large book that became known to all the Bryants as "Kathy's Journal." The entries were her very own--and she hoped that they were not "too technical" for the other students to understand.

In her introduction, Kathy included some comments about the wetlands so that the other students would understand the importance of these tidal and marsh areas to marine life of the Coast. She discovered that over ninety percent of our seafood relies on these wetlands for survival sometime during their lives. Many fish move in from the deep, salty Gulf of Mexico, live in the wetlands areas a while, then move back to deep water again. Some fish are born in the wetlands or estuaries like the Mississippi Sound; some fish move here after birth. Kathy wanted the students to understand that without the wetlands--the Mississippi Sound, marsh grass, and the bays--we would not have the variety and quantity of seafood we have.

Her journal began with some of the most interesting families, and she thought that the other students would also find them interesting.

ENTRIES FROM KATHY'S JOURNAL

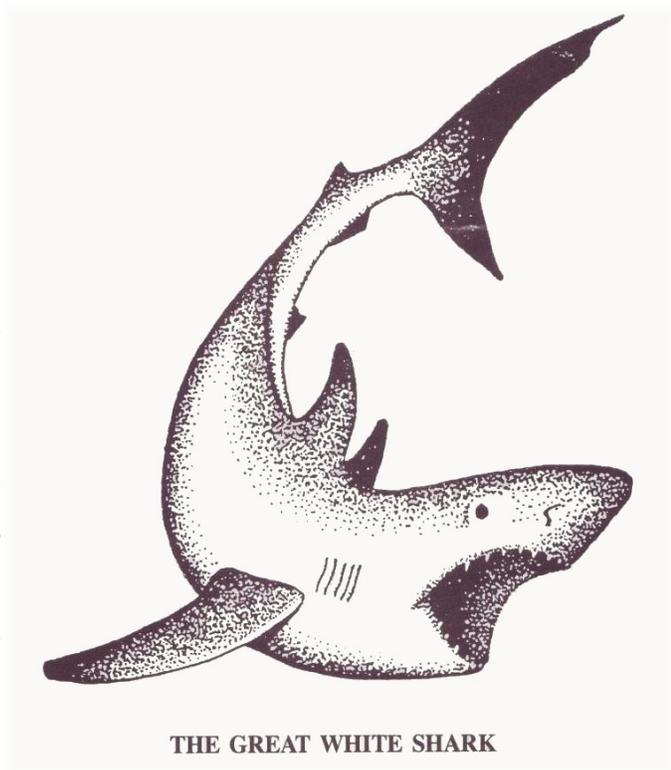
Shark, ray, and skate families

Sharks, rays, and skates are in a group of animals which have a skeleton made up of cartilage instead of bone. These animals don't have true bony skeletons.

Sharks are among the largest living vertebrates. They have small scales, fins, and ventral mouth ("ventral" means on the "belly side" of an animal).

Like other fish, sharks have a two-chambered heart and have red blood cells. The shark has a unique intestine which looks like an enclosed spiral staircase. This special design slows down the passage of food through the intestines, giving the animal more time to absorb food.

In our waters, you can easily find the Blacktip Shark. This shark grows to eight feet long. Its top (dorsal) fin has a black tip--hence its name.

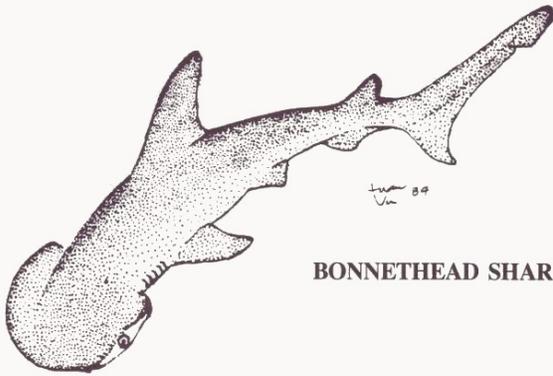


THE GREAT WHITE SHARK



HAMMERHEAD SHARK

Two other interesting sharks are the hammerhead and the bonnethead sharks; it is sometimes difficult to tell the difference between them. They both have similar looking odd-shaped heads. In fact, their common names are derived from their head shapes. The hammerhead has eyes located on the outer edges of its flattened extensions of its head. The bonnethead has a more rounded shape to its head.

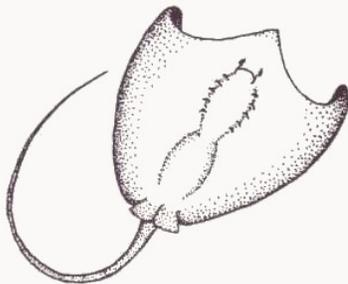


BONNETHEAD SHARK

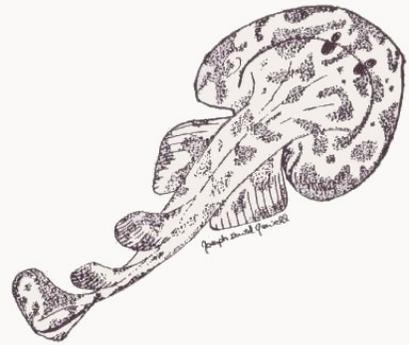
Although sharks have a bad reputation for attacking people, there are few reported cases of such attacks in this area. The few cases that have been reported can be attributed to accidental causes rather than to attacks by the sharks. These animals are edible--and, if prepared and cooked properly--they taste great.

The rays are also cartilaginous animals. One interesting ray is the torpedo ray, which produces its own electricity. Although the electric current is not strong enough to kill a person, it is severe enough to give a strong jolt.

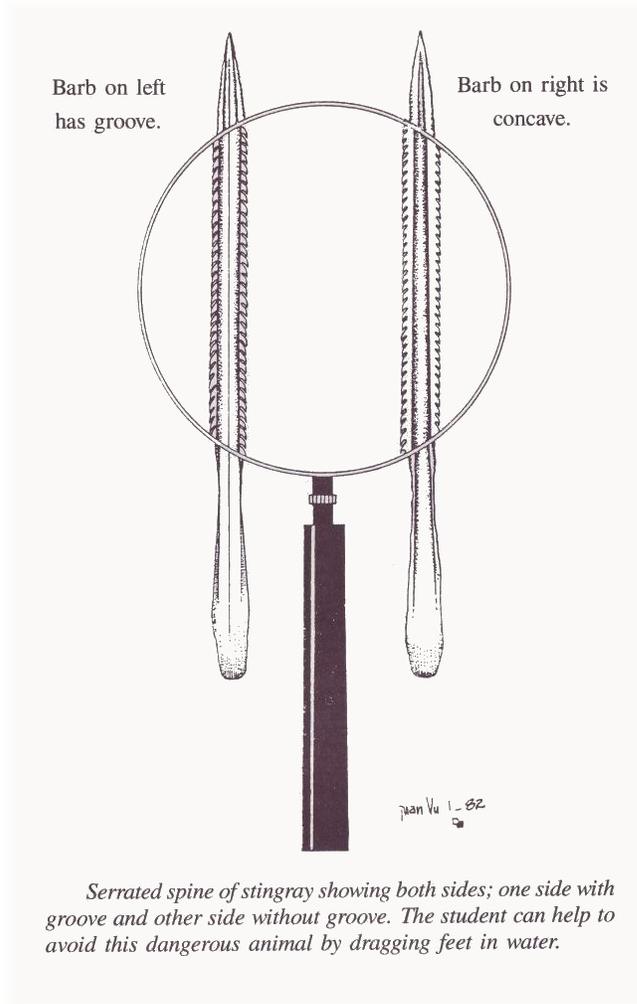
Another type of ray is the stingray, which is easily found in the Mississippi Sound. This ray lives on the bottom, as does the torpedo ray. It has a long, whip-like tail with a barb that is used for defense. The barb, or spine, located partway down the tail, is sharp and (like a kitchen knife) has serrated side projections which are dangerous. The skin covering the base of the barb has toxic cells that can cause pain and infection. If a barb sticks into an animal and then is pulled out the same way it entered, the flesh will be torn and the end of some of the serrated spines could be left in the victim. A doctor should be consulted immediately if someone is stuck with a stingray barb. To lessen the pain and infection, doctors often recommend



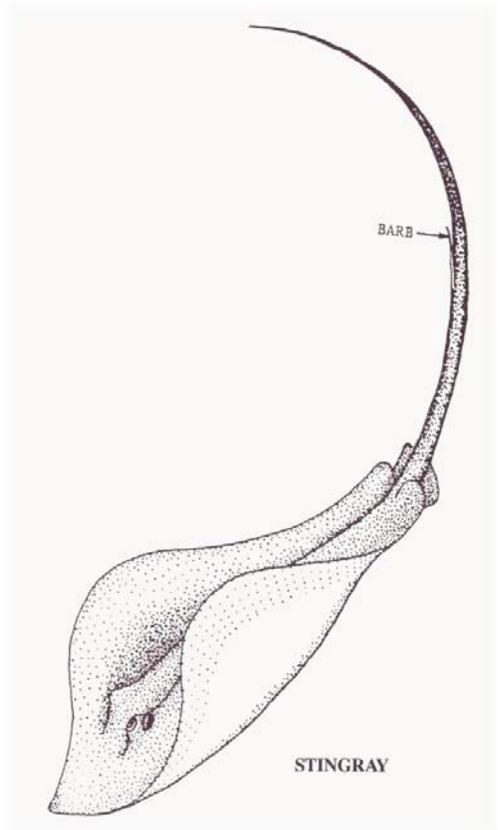
UNDERSIDE OF A STINGRAY



TORPEDO RAY



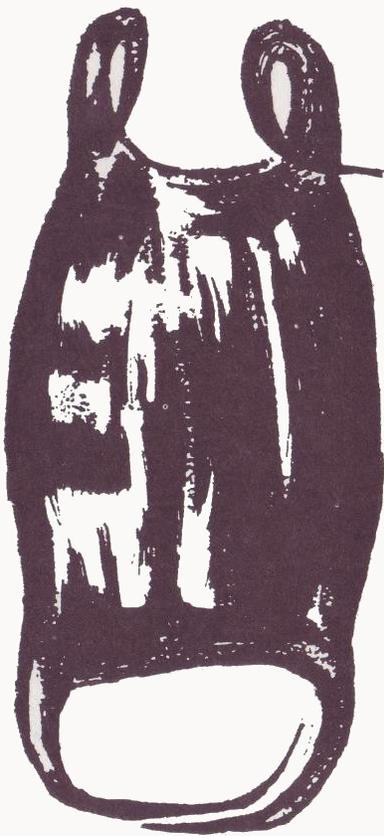
immersing the wound in hot water for about ninety minutes to deactivate or destroy the toxin. Knowledgeable people also point out that a person should try to avoid stepping on stingrays by sliding or shuffling their feet along the bottom when wading.



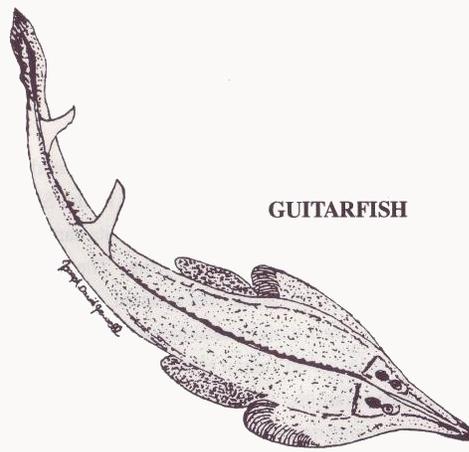
Besides stingrays, there are also manta rays in the Mississippi Sound. Manta rays are different from stingrays, but are similar in shape. Some are over twenty feet wide. They don't have barbs in their tails. They feed on crustaceans and other sea life and can be seen at times jumping out of the water. Manta rays are not dangerous, and they like to stay on the surface, unlike stingrays.

Most skates are kite-shaped animals, flattened from top to bottom, that live mostly on sandy bottoms. Skates eat crustaceans primarily. They are often caught in shrimp trawls. In Mississippi, skates are not as common as stingrays or sharks.

The skates lay their eggs in cases such as the one above. These cases float in the water until the skate eggs hatch.

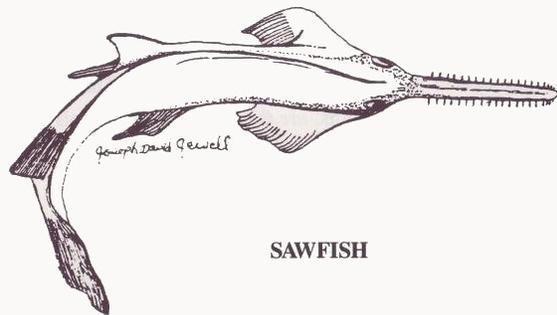


EGG CASE OF A SKATE



GUITARFISH

The guitarfish and the sawfish are also relatives of the sharks, rays and skates.



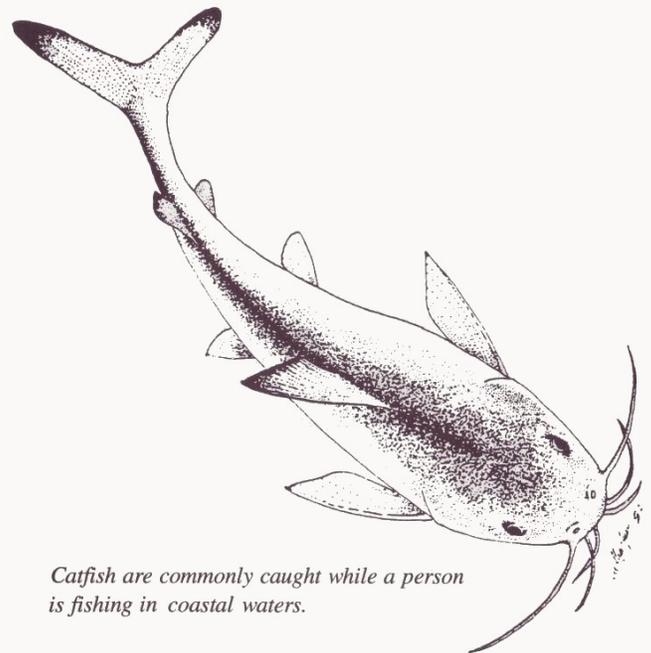
SAWFISH

There are many species of sharks, rays, and skates in the Mississippi Sound and the Gulf of Mexico, and people who study the vertebrates find these animals among the most interesting forms of marine life.

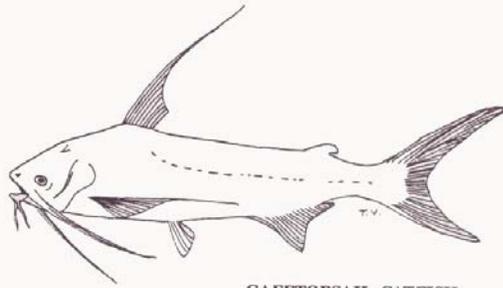
Catfish family

In the catfish family, the gafftopsail and the sea or hardhead catfish represent the two most common catfish in the Sound, bays, and harbors. The gafftopsail catfish received its name from its long dorsal (top) fin and pectoral (side) fins. The breeding habits of these two types of catfish are unusual, because the males carry the eggs in their mouths until they develop into small baby catfish. The male catfish cannot eat during this period and he must constantly aerate the developing young by keeping a supply of water over the eggs.

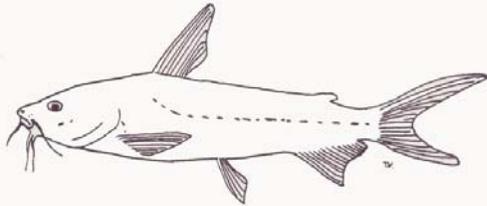
Dead hardhead or sea catfish are very common on the beaches of coastal Mississippi. You should be able to find a catfish skull in these areas.



Catfish are commonly caught while a person is fishing in coastal waters.



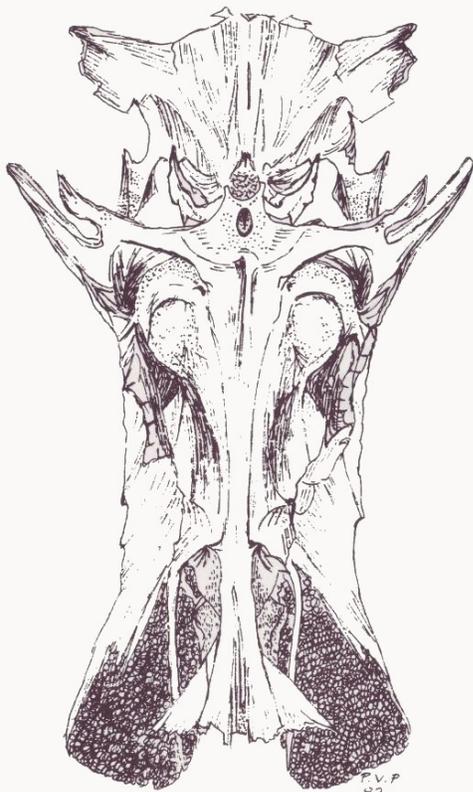
GAFFTOPSAIL CATFISH



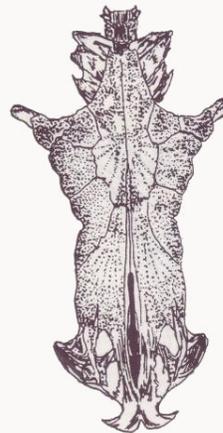
HARDHEAD CATFISH

An interesting legend about this catfish concerns its bony skull that resembles a crucifix with Christ on the cross. One side of the skull (the bottom part) represents Christ on the cross; the other side (the top) represents a Roman shield. One area represents a sword, and the two structures, one on each side of the head, which rattle when shaken, represent the dice which were used to gamble for the clothes of Christ. These rattling structures, called otoliths, are found in the skull of all fishes. The otoliths help a fish to detect gravity (for balance) and to detect vibrations and sounds.

Catfish have whisker-like things called barbels around their mouths. The gafftopsail has four barbels, and the hardhead has six barbels. The barbels are



According to the legend—this side of skull of the catfish that represents Christ on the Cross.



Legend has it that this side of the catfish skull represents the Roman shield.



Otoliths, the balancing structures in the skull of the catfish. According to the legend, these represent the dice which were used to gamble for the clothes of Christ.

sensitive feelers, which are used for tasting food items. Catfish have one spinous fin on top, closest to the head, called the dorsal fin. (This fin can stick in your hand or foot if you are not careful.) The

word "spinous" means "with spines." The dorsal fin located closer to the tail is not spinous. This back fin is composed of soft tissue and called the adipose fin. Catfish also have a spine in each side (pectoral) fin. These fins are also very sharp and can stick into your skin.

Eel families

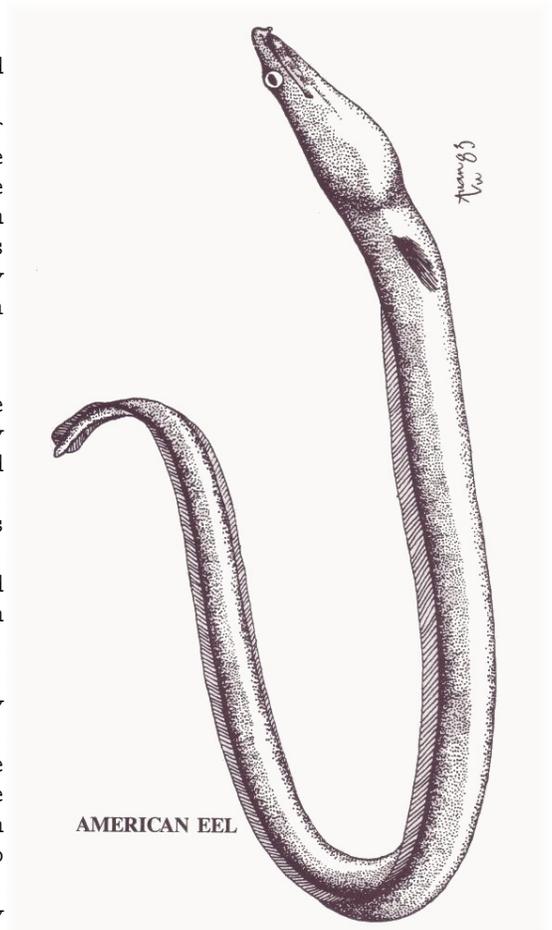
Although some people may not regard the eel as a fish, it definitely is one. Eels have fins and gill openings and may or may not have scales, depending on the species. If scales are present, they are tiny and embedded in the skin. They have an elongated or snake-like shape, which makes some people afraid of them. Eels are very good to eat, but most people in this area do not eat them.

The American eel is common in the Mississippi Sound, and its biology is very interesting. This eel comes into the Sound when very young and enters fresh water, where it lives until maturity. The females grow to be much larger than the males. After reaching maturity, the eels find their way out of the Sound, migrating to an area south of Bermuda in the Sargasso Sea. Here the female lays a few million eggs. After spawning, the adult eels probably die, but scientists don't know for sure. When the eggs hatch, they do not resemble the adult eel. The young larvae are completely transparent and are flattened in shape. These larval forms are carried to Mississippi's waters by currents, winds, and tides. Upon entering the Sound, they find their way to the brackish bays and fresh water. During this time, they change (transform) from a larva into a juvenile and have the snake-like shape of an adult eel. They become colored with black pigmentation. In brackish and fresh water, the eels feed and grow until they become mature and, as other eels have done before them, they migrate to Bermuda to complete their life cycle. This fish is interesting because it lives in fresh and salt water.

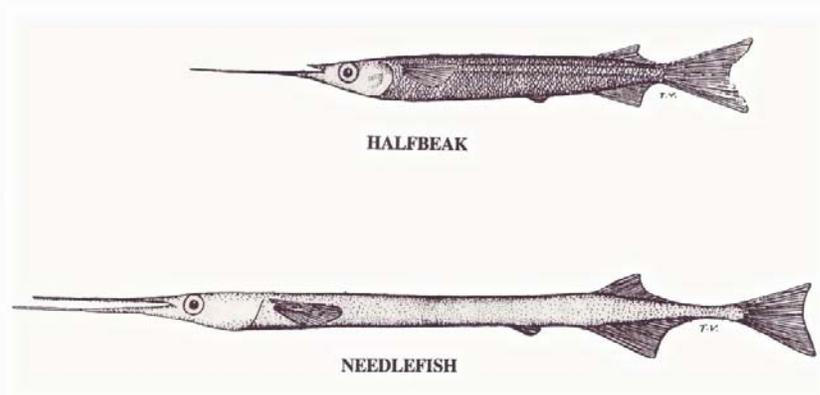
Moray eels are probably the best-known eels, but they are not actually found in the Sound. Many species of other eels do not live in the Sound, but they are rarely seen because they are active only at night or they live burrowed in the bottom.

Needlefish, Halfbeak, and Flyingfish families

The needlefish and halfbeaks are elongated fish with round, cigar-like bodies. The dorsal (top), anal (bottom), and pelvic (bottom, side) fins are located far back on the body, closer to the tail than in most fishes. The fins and tail region can be rapidly vibrated in the water, allowing these fish to skitter across the surface of the water.



One must observe carefully to differentiate between the needlefish and the halfbeak. The needlefish have long, sharp-toothed jaws with both of nearly equal length. In the halfbeak, the lower jaw is long and slender, but the upper jaw is short. Some species of needlefish and halfbeaks may be found close to the shoreline and even in fresh water rivers which feed coastal bays.

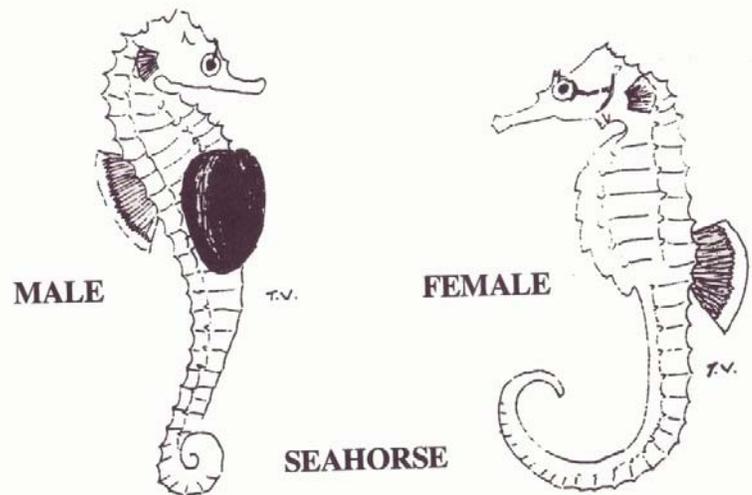


The flying-fish are usually found in the Gulf of Mexico, but at certain times of the year the young fish may be found in the Mississippi Sound and just south of the barrier islands. Flyingfish have

large pectoral fins and some also have enlarged pelvic fins. As their strong tail rapidly vibrates in the water, the wing-like side fins are spread outward, enabling the fish to glide upward and remain in the air until the momentum is exhausted. The fish then drops down into the water to build up more momentum. Some are able to glide for one-hundred feet or more.

Seahorse and Pipefish family

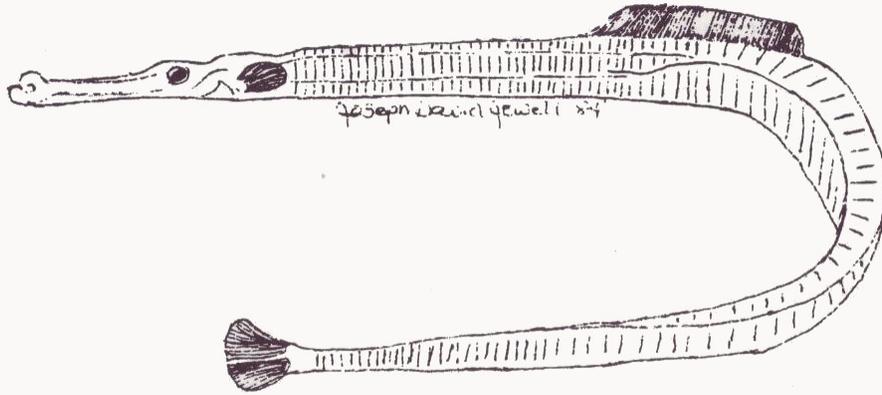
Some people incorrectly think that seahorses and pipefish are not fish--because of their odd-looking appearances--but they are. Small fins are present and all species have a snout with a small mouth at the end. By observing the size and shape of their mouths, one can readily see that their food would consist of small planktonic animals.



The body of seahorses and pipefish is covered with thick scales that are connected together. This gives them a hard body covering and helps protect them from getting eaten by predators.

Male seahorses and pipefish possess small pouches on their abdomens. This pouch is used to protect the eggs and the young as they develop. The females deposit their eggs in the pouches of the males. The eggs develop and hatch in the pouches, with the small seahorses or

pipefish emerging as tiny animals resembling the adults. Several hundred young can be expelled from the pouch of the male seahorse.



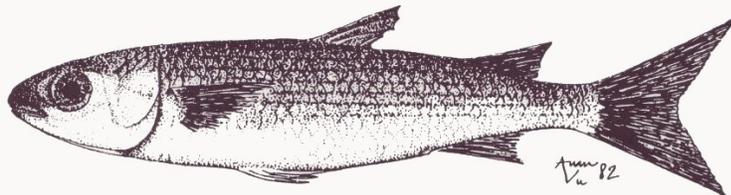
PIPEFISH

Like many other fishes, seahorses and pipefish have eyes that move independently of each other. If plankton is put into an aquarium, the seahorses and pipefish will immediately start moving their eyes and their heads to catch the small animals.

Pipefish and seahorses seldom grow over twelve inches. One species of seahorse is a dwarf, reaching a size of about two inches or smaller. A larger species reaches a size of approximately five to seven inches. Pipefish can grow longer, from four to twelve inches.

Mullet family

The mullet family contains several different species, but one species, the striped mullet, is found worldwide in warm coastal waters. The striped mullet is a very important source of food for many people. These fish have blunt noses, possess a gizzard, and are silvery in appearance. The striped mullet which can be found in the Mississippi Sound, in bays, marshes, and bayous, is locally called the "popeye mullet". They are often seen jumping repeatedly out of the water. Many young, beginner fishermen learn to throw a cast net to catch these fish. Fishermen can also be seen throwing their cast nets from the piers or while wading in the water.



THE MULLET, A FISH SOLD IN ALL SEAFOOD MARKETS AND KNOWN AS "BILOXI BACON"

Many fishermen have long referred to

the mullet as "Biloxi Bacon," because there are plenty of them and because they could be caught in quantities sufficient to feed fishermen's families in hard times.

Because mullet are abundant, they are important commercially. The commercial fishermen use gill nets and purse seines to catch them. Not only can these fish be seen in all of the fish markets along the Mississippi Coast; they are also shipped to inland areas.

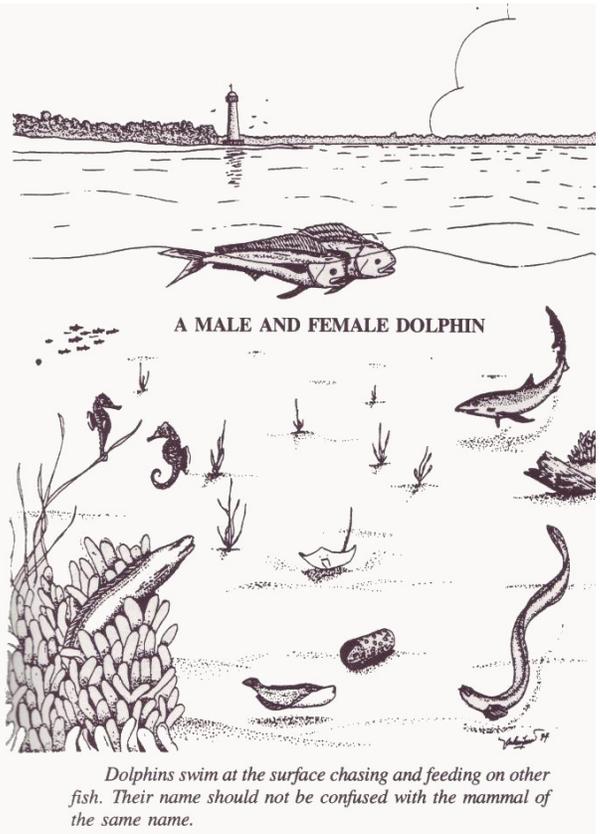
The mullets travel in large schools, with the young feeding on plankton and the adults feeding on large bits of vegetation. The striped mullet has a gizzard, like the stomach in other fishes, which assists in the digestion of food. In the plankton are organisms with hard body coverings that are resistant to digestion. The gizzard collects silt and mud, removing the coverings of the diatoms and other types of algae to obtain the food materials.

Fishermen prepare mullet to eat by removing the skin, head, and intestines. Some fishermen leave the skin but remove the scales. These fish may be fried, smoked, baked, broiled, or cooked in other ways.

Dolphin fish family

The dolphin family of fish, not to be confused with the dolphin mammals, has two species that occur in the Gulf of Mexico.

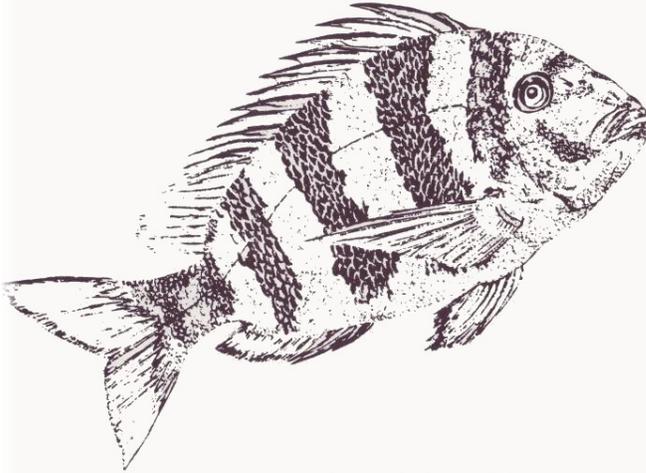
These fish are easily identified, with the male having a high, blunt-shaped head. Both male and female have a long continuous dorsal (top) fin and are beautifully colored when alive, with various shades of purple, blue, and silver. These fish grow to about five feet in length and weigh up to forty pounds. They are caught under buoys, around oil rigs, and in other areas in the Sound and the Gulf. Small dolphins about one inch long have been caught in nets around the barrier islands. They are considered by many people to be the best-tasting fish in the world.



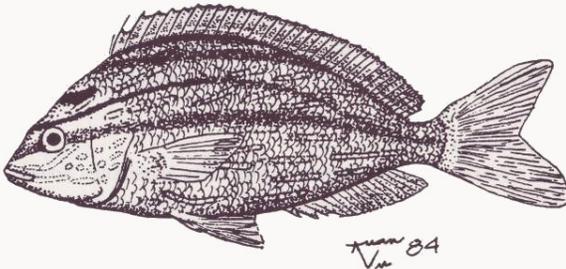
MALE DOLPHIN



Porgie family



**SHEEPSHEAD, AN EDIBLE FISH DEPENDENT
ON ESTUARINE ENVIRONMENTS**



PINFISH

The porgies have small mouths and strong jaw teeth. Some young porgies have dark cross bands which may or may not disappear with age. Most of these fish feed on crustaceans, mollusks, or vegetation.

The best-known porgies are the sheepshead and the pinfish.

The sheepshead is easily recognized by the small mouth with the strong jaw teeth adapted to picking and crushing crustaceans and mollusks. The teeth resemble the protruding teeth of sheep, hence the name sheepshead. These fish can also be identified by the seven vertical black bands across the body. Because of these dark bands or stripes, the young fisherman may sometimes mistake this fish for the black drum; however, one can readily distinguish

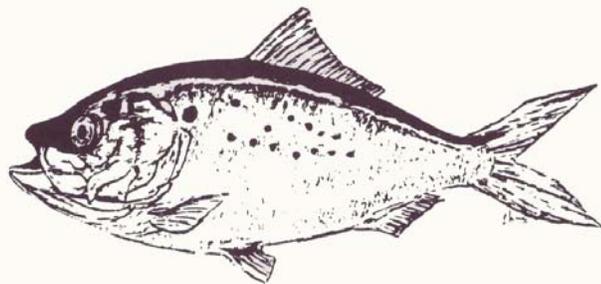
the sheepshead by its continuous single dorsal or top fin which differs markedly from the deeply-notched fin of the drum.

The pinfish is smaller than the sheepshead, reaching a length of about a foot and weighing less than a pound. The pinfish has a colorful appearance, with silver, yellow, blue, and other colors making it attractive. The dorsal fin has sharp spines along its length and can stick your hand when you try to hold it. This fin can be raised to protect the pinfish from predators. The pinfish gets its name from its sharp, pin-like spines.

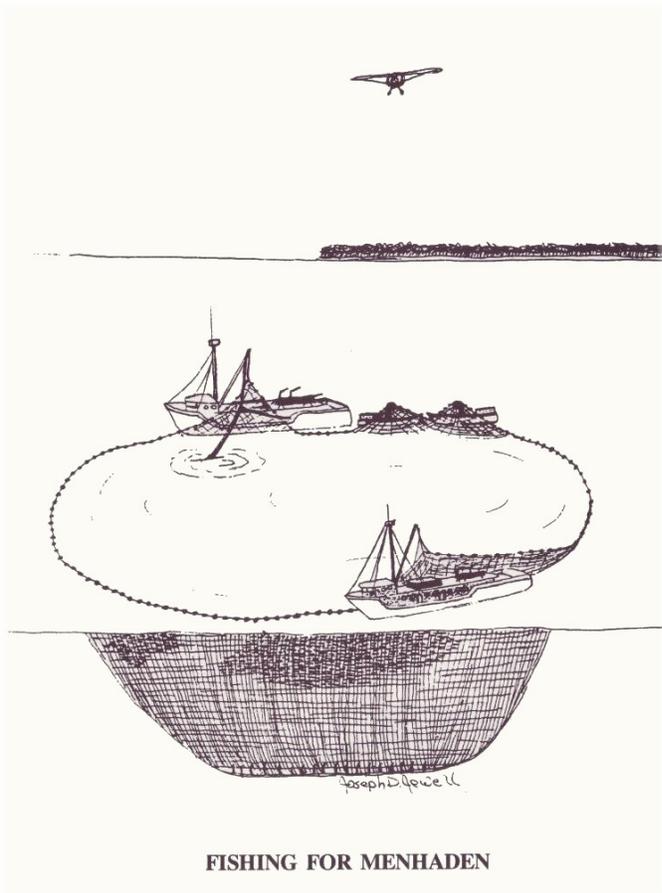
Menhaden family

Among the most important fish in the Mississippi Sound are the menhaden. They are found in large numbers in the Sound and in the Gulf of Mexico and are caught for commercial uses.

The silvery menhaden will grow up to eighteen



A SPECIES OF MENHADEN



FISHING FOR MENHADEN

inches long, averaging about eight to ten inches. They feed on plankton near the surface.

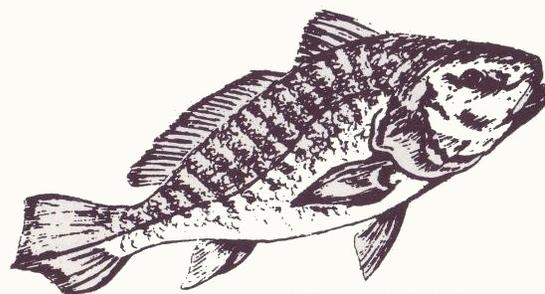
Traveling in enormous schools, the menhaden may be spotted from airplanes, which direct commercial fishermen to the right location for catching them. In the matter of total weight, they are caught in greater quantities than any other fish in the Mississippi Sound. The menhaden have many commercial uses. The solid parts of the fish are used for fish meal, particularly for chicken feed. The oil from the menhaden is used in chemical industries, cosmetics, perfumes, and paints.

Often the menhaden will travel in such phenomenal numbers that when they come into bays or bayous, many die because of insufficient oxygen in the water.

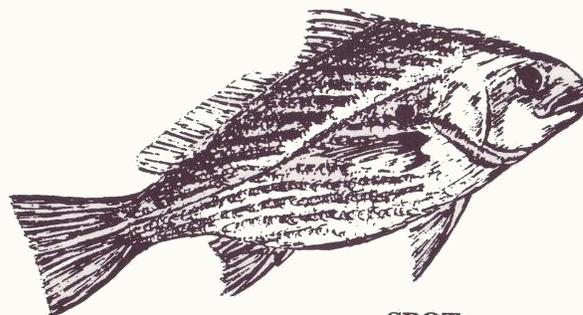
Drum family

The drum family is of considerable economic importance to the state of Mississippi. This family has many species (the greatest number of species in the Gulf, as a matter of fact) and varies in looks, feeding habits, and size. All members of this family have a lateral line (as do most fish) which extends all the way out to the end of the tail or caudal fin. The lateral line is the line on the sides of the fish which detects vibration in its environment--vibrations caused by pressure, sound, or currents. In some species, the air bladder is capable of producing a drumming or croaking sound; hence the name drum or croaker.

The Atlantic croaker is one of the most common fish in the Mississippi Sound. This fish reaches a length of a foot or more. Although the average mature croakers weigh a pound, some have been known to weigh four or five



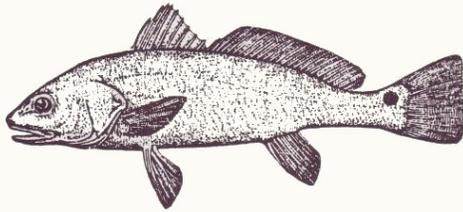
ATLANTIC CROAKER



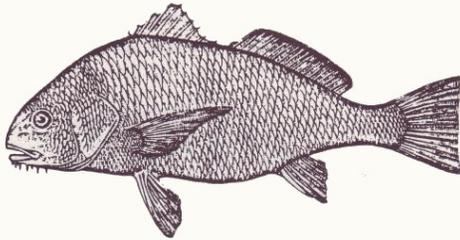
SPOT

pounds. Most young fishermen in this area have experienced catching these fish on their poles or rods and reels in the Mississippi coastal waters, since they are one of the most abundant species.

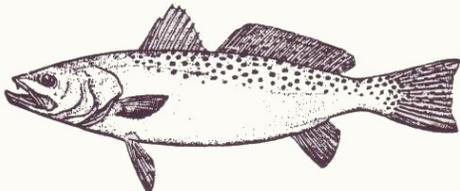
Another type of drum is the spot, which can be recognized by the large dark spots above the pectoral or side fins. These fish are larger than the Atlantic croaker, reaching a length of about two feet and weighing up to six pounds. Both the Atlantic croaker and the spot fish feed on other small fish, crustaceans, and mollusks. They are usually abundant in marsh grasses, around oyster beds, and in the bays and bayous, where their food supply is plentiful.



REDFISH



BLACK DRUM



SPECKLED TROUT

The speckled trout or seatrout is one of the best-known fish to Mississippi fishermen. This fish can easily be recognized by the dark spots on the upper portion of the body. These fish may reach a length of four feet and a weight of ten or more pounds. Speckled trout are sleek, fast-swimming, predator fish. They are great to eat.

The red and black drums are the largest of the croakers. The black drum may grow to three feet and weigh over one-hundred pounds; however, the average black drum's weight is around ten pounds. This fish feeds mainly on mollusks, small fish, and crustaceans. It is often found near oyster beds, since oysters are a favorite food of the black drum.

The red drum or red fish is a favorite of the sportsmen on the Coast. These fish are recognized by the black spot or spots at the base of the tail. The largest of these fish may weigh thirty or more pounds. The name refers to the colorful red appearance of the fish.

Other members of this family are the southern kingfish (ground mullet) and weakfish (white trout). The ground mullet is a bottom feeder and can easily be caught with fishing poles in shallow waters. White trout can also be easily caught in shallow waters, especially around submerged objects and bridges.

Triggerfish and Filefish family

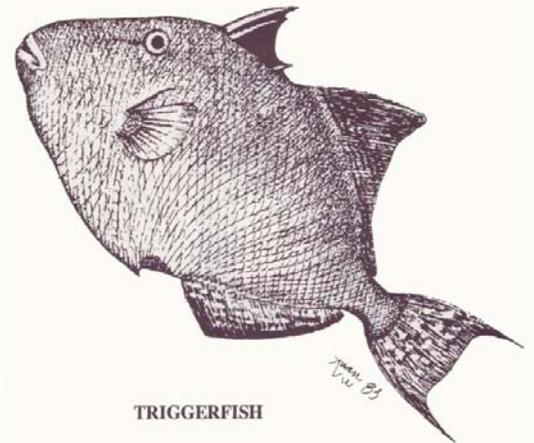
Triggerfish clearly illustrate why they were given that name. This fish has three dorsal spines. The first of these three, the tallest, can be locked in an upright position by the second spine. This causes

the first to stand erect and it cannot be pushed downward. This upright spine helps protect the fish from predators that try to swallow it. The interlocking arrangement of the first spine can be released by pushing down on the third spine, just like a trigger releasing the hammer of a gun. Triggerfish are usually found in the Mississippi Sound around piers, rocky piling, and grass beds and under floating objects.

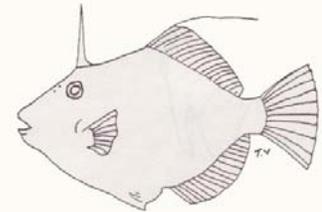
Filefish, relatives of the triggerfish, differ from the triggerfish by having one dorsal spine instead of three. These animals feed on organisms that are attached to floating or stationary objects and on organisms that grow on seaweed. Some species grow to one or two feet or longer, but most are smaller. Filefish may be found swimming among Sargassum seaweed or other plants, under floating objects, near rocky areas, under buoys, or in open water.

Sea Robin family

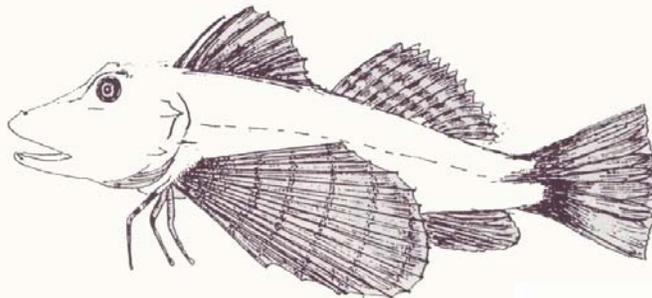
The family of sea robins represents some of the most interesting fish in the Mississippi Sound. They have large heads, big mouths, and large pectoral (side) fins. The sea robins' pectoral fins are different from those of other fish. Many fish have fins that are supported by rays. The rays of fins are rod-like structures made of cartilage, and they support the membranes of the fins. In the sea robins, three of these front rays are free or are separated from the pectoral fin. Since these rays are in front of the large pectoral fin, they enable the fish to walk on the bottom by sticking the rays in the sand, using them to walk. This enables the fish to stir up the bottom sand, uncovering worms, crabs, small fish, and other animals to feed on. The fish



TRIGGERFISH



FILEFISH

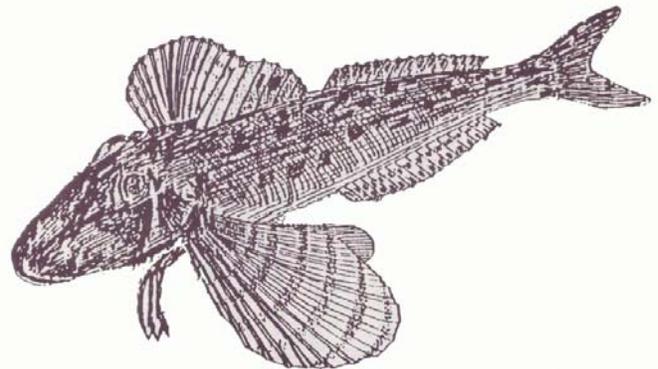


SEA ROBIN

is also a graceful swimmer, enabling it to feed on fish. More than one species of sea robin exists in the Sound.

Goby family

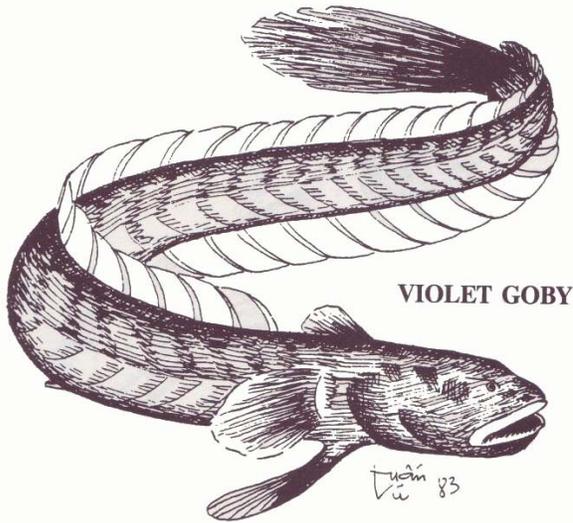
The goby family is made up of rather small fish, usually no bigger than ten inches long,



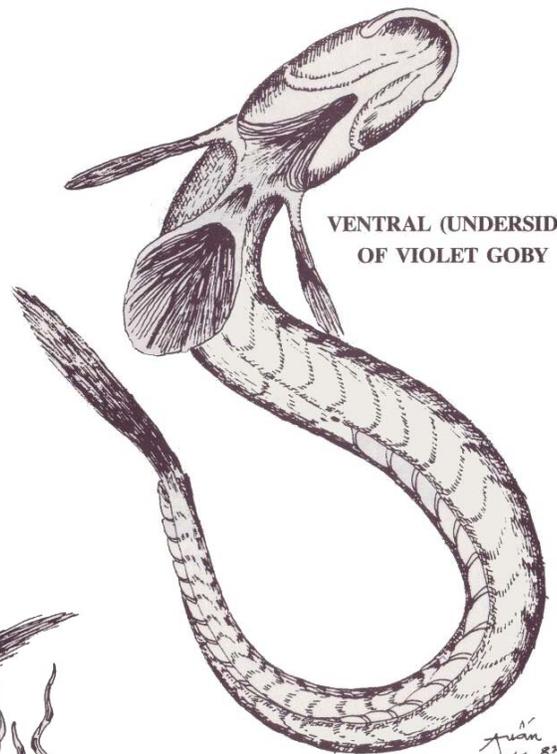
SEA ROBIN

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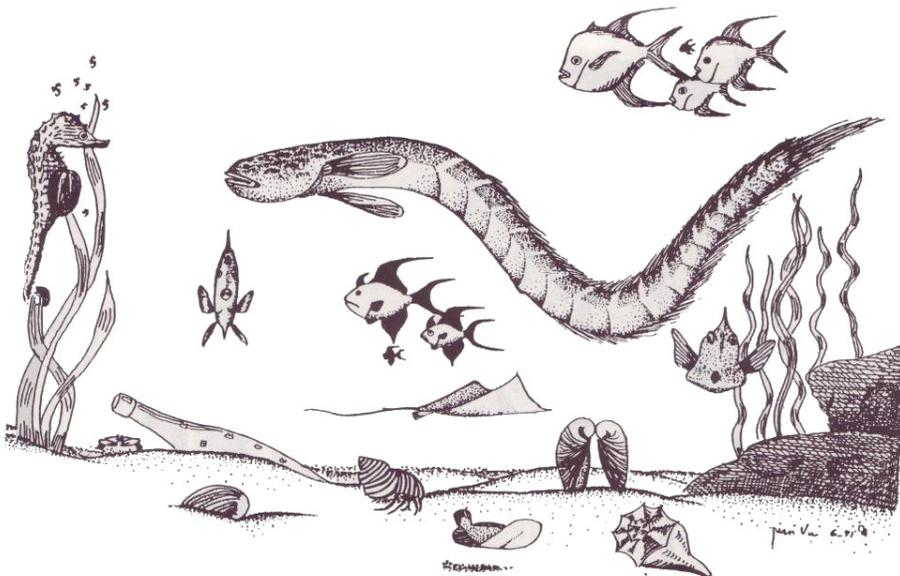
though violet gobies grow larger. Some gobies have scales and some do not. Their ventral (bottom) fins near the head region are close together, forming a suction disc. Most do not have lateral lines. This fish has a long continuous dorsal fin. The violet goby is an interesting fish because of its migration pattern. Violet gobies migrate in great numbers on the bottom, coming to live in bays and brackish waters. Upon reaching maturity, these fish migrate out on top of the water by the hundreds. It is difficult to keep them alive in an aquarium.



VIOLET GOBY



VENTRAL (UNDERSIDE)
OF VIOLET GOBY

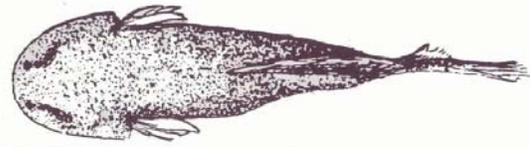


The VIOLET GOBY is a graceful swimmer.

Clingfish family

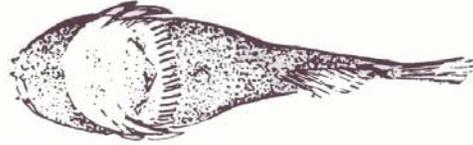
Clingfish are small, tadpole-shaped fish, reaching a length of about four inches. They are usually black, with large flat heads and slender bodies. Clingfish have a large suction disc on their ventral or bottom side formed by their pectoral and pelvic fins. These are sluggish fish, clinging or sticking to submerged objects, such as shells, pilings, and rocks. They feed on small crustaceans.

They are scaleless and are not caught on a fishing pole.

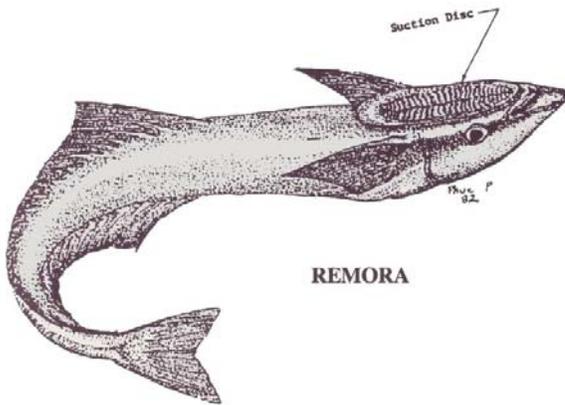


DORSAL VIEW

CLINGFISH



VENTRAL VIEW

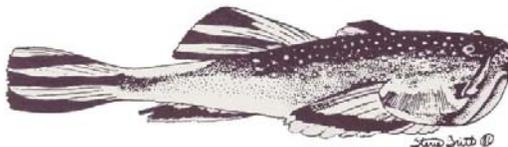


REMORA

Remora family

The remora family are the hitch-hikers of the Mississippi Sound and the Gulf of Mexico. Remora often hitch a ride on sharks as well as other large fish such as cobias (lemonfish).

The dorsal fin of this fish has become modified into a very strong suction disc capable of attaching and holding on to the body of large fishes. The remora goes where the action is! When a shark or large fish swims into a school of fish to feed, the remora can feed on the small bits of fish not eaten by the shark.



STARGAZER

Stargazer family

Stargazers have small eyes on top of their heads, and they have strange-looking mouths which open upward rather than

to the front of the fish, as is true of most fish. Fishermen in Mississippi call this fish the "bull dog fish," because of the shape and position of its mouth.

The family of electric stargazers represents a truly shocking fish! If someone sits on the fish or touches it near the head, he will be shocked. Although the electricity is not strong enough to kill a person, it will succeed in frightening him. This electric shock is used to stun fish which swim over the stargazer. Once stunned, the fish can be captured and eaten. The stargazer has electric organs situated

behind the eyes; it uses its agile tail to sweep sand back and forth, covering itself up to lie buried, with just its eyes and nostrils protruding so that it is hidden from view. The bottom, or pelvic, fins form a circular shape, as though producing a comfortable sitting cushion for it to rest on in the sand.

Toadfish family

In the toadfish family are two very unusual fish about which most fishermen know very little--the toadfish and the midshipman. These two fish can be caught by a person fishing from the piers, by pulling seines, and by dragging trawls. They can also be found in shallow water near oyster or shell reefs and around objects that have been submerged in water--such as old tires, rocks, and logs. The toadfish is called an "oyster cracker" or "oysterfish" by local fishermen, because it is found near oyster reefs and eats oysters and other animals. When the fisherman



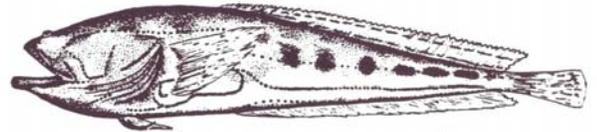
OYSTER FISH OR OYSTER CRACKER

catches one of these fish on his line, he is always eager to get rid of it as soon as possible. The toadfish and the midshipman are bottom dwellers and are somewhat sluggish in

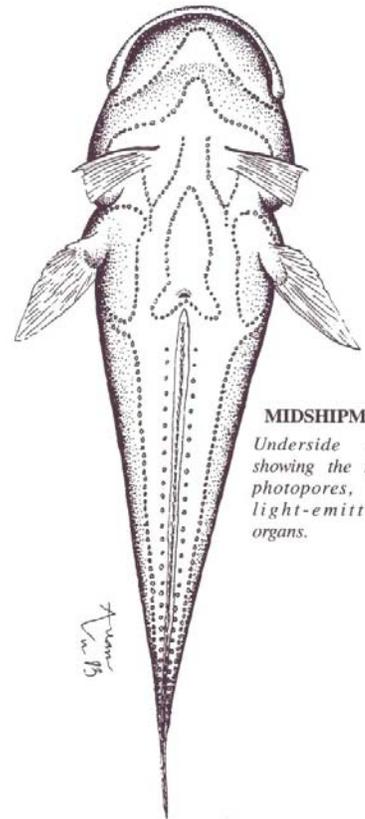
their habits. They feed on small fish, mollusks, and crustaceans.

The oysterfish must be given the award for being one of the ugliest fish in the Sound. This fish has a large head and a large mouth, with teeth that are strong. It will give a vicious bite and should be avoided and not handled. The oysterfish is colored in a mottled pattern, with spots, bars, and splotches in shades of brown, beige, and yellow. The fish has no scales. Its average length is around six to eight inches, although the toadfish may reach a length of a foot or more.

The midshipman is a fish that produces light. It is a beautiful gold color, with rows of photophores, which are small organs that emit light. The name "midshipman" refers to these rows of luminous spots which resemble the buttons on a naval midshipman's uniform. The photophores are also located on the sides of the fish and around



MIDSHIPMAN



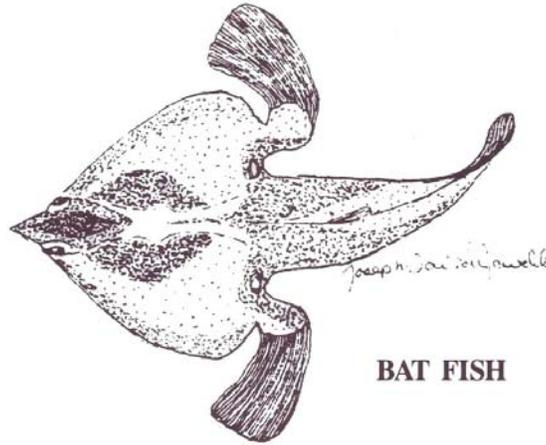
MIDSHIPMAN

Underside view showing the many photophores, the light-emitting organs.

its head. The midshipman is sometimes called the "singing fish," because it can produce sounds by vibrating its air bladder. The midshipman is usually caught in seines, rather than by hook and line, in shallow water.

Bat fish family

The bat fish family is peculiar in that the fish are flattened or depressed from the top to the bottom. The front of the fish has a pointed snout, and the pectoral (side) fins are located at the end of a bony joint. This is what gives the fish a bat-like appearance. It is found in deep water of high salinity.



BAT FISH

Kathy spent a great deal of time on the fish, trying to find out about their appearance, their habits, and their distinguishing characteristics. She also drew sketches of the ones she found most interesting.

Since the vertebrates also included amphibians, reptiles, birds, and mammals, she also decided to include brief introductions to these colorful animals of the Mississippi Coast in her report.

FROM KATHY'S JOURNAL

Amphibians

The word "amphibian" means "both" or "double" and "live." In other words, "double life." Members of the class *Amphibia* include toads, frogs, and salamanders.

Most amphibians are born in fresh water (aquatic) environments. Their eggs are laid in moist surroundings or are deposited directly into the water. The eggs hatch into larvae which also remain in the water for a period of time.

As the young develop into the adult stage, a change, or metamorphosis, occurs. After becoming adults, most amphibians move out onto land to complete the second stage of their lives.

The most familiar amphibian is the frog. Frogs lay eggs which develop into gill-bearing



SALAMANDER

tadpoles, which in turn develop into adult frogs with lungs.

Amphibians are not totally free from their water environment. Most must live in wet or damp areas to prevent drying out of their skins.

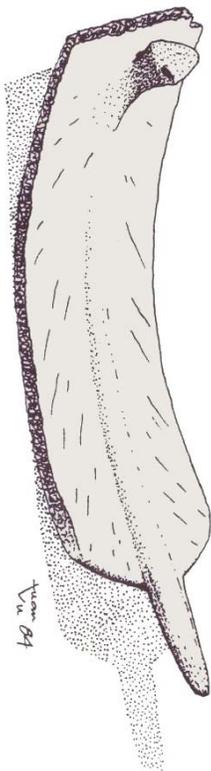
Most amphibians develop lungs in their adult stage and breathe air rather than water. They also absorb oxygen through their skins. The body temperature of amphibians varies with the outside surroundings. When the temperature is warm, amphibians become more active; when it gets cold, they are less active.

Since amphibians are restricted to fresh water and damp habitats, they are generally not found in the Mississippi Sound. After long, heavy rains, however, some of these--on rare occasions--may be found in the Mississippi Sound as a result of floating on logs or other objects which come from the rivers, bays, and bayous. When this occurs, they will be found on the surface of the water, where the salinity is very low. The congo eel, which is actually a large black salamander and not an eel at all, can sometimes be found in the Sound after heavy rains. Near the marshes of coastal Mississippi, frogs and toads can be found. Salamanders can be found in ditches and in other fresh water habitats.

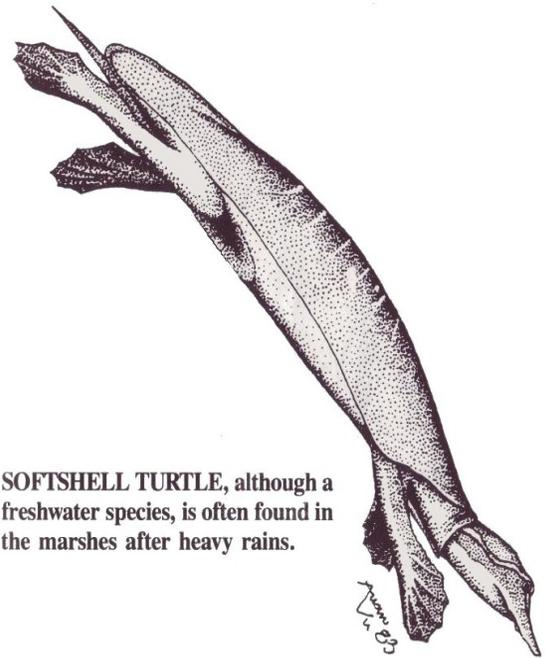
Reptiles

The word "reptile" is derived from the Latin word meaning "to creep." Reptiles are animals with scales and dry skins, and if legs are present, they usually have claws. This group includes snakes, turtles, lizards, alligators, and crocodiles. All of these animals have lungs and breathe air. Some are without appendages ("appendages" means arms or legs).

RIB BONE OF A TURTLE

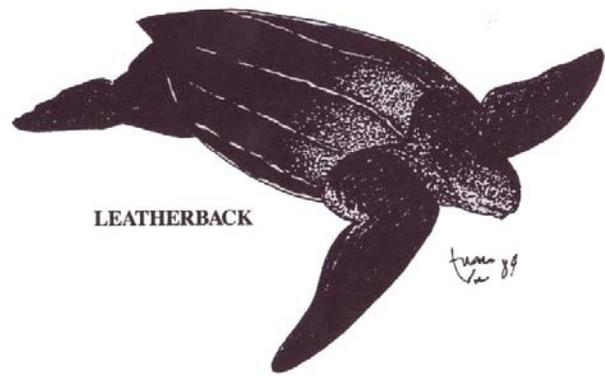


Reptiles can be found on the offshore islands, in bayous, and in marshy areas. In Mississippi coastal areas, cottonmouth moccasins can be found, together with such other poisonous snakes as copperheads and rattlesnakes. Alligators are found throughout the coastal marshes and can occasionally be seen in the island ponds. After heavy rains, they may venture into the waters of the Mississippi sound but return to their usual habitats when the salinity of the Sound returns to normal.



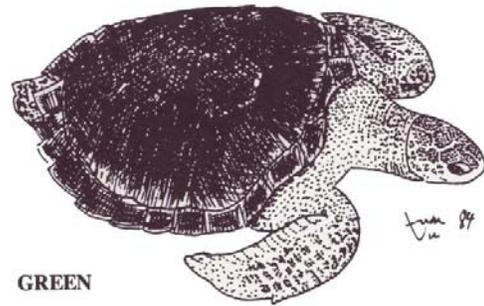
SOFTSHELL TURTLE, although a freshwater species, is often found in the marshes after heavy rains.

Alligators and marine turtles are protected by law. All of the sea turtles are very rare and are protected so that they do not become extinct. The sea turtles include the Atlantic Ridley, Loggerhead, Leatherback, Hawksbill, and Green Turtle. The Leatherback is the largest of all living sea turtles, with a record weight of over 1,500 pounds. The record weight of the Green Turtle is 650 pounds; the Hawksbill, 280 pounds; the Loggerhead, 500 pounds; and the Ridley, 110 pounds. Sea turtles can be seen swimming in the Mississippi Sound, though there are not as many as there once were.



LEATHERBACK

June 88



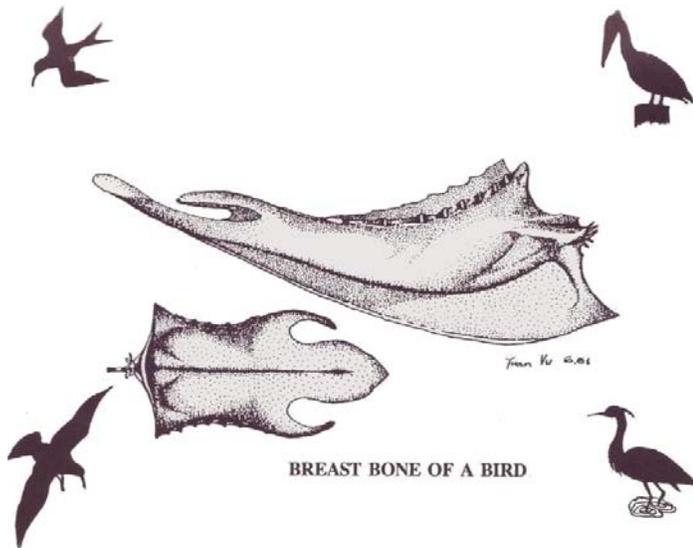
GREEN

June 88

Birds

Various species of birds add to the beauty of the Mississippi Sound and to the coastal area.

Birds have feathers, scales (on their legs only), and arms usually adapted for flying. Their legs are adapted for walking, swimming, feeding, and/or



BREAST BONE OF A BIRD

perching. Their bones are very light and hollow like chicken bones. Most birds have beaks and have a constant body temperature (warm-blooded). They have no teeth.

Seagulls, black skimmers, herons, loons, ibises, red-winged blackbirds, terns, egrets, and many other species of birds use the habitat of the barrier islands, the sand beach, and the wetlands of the Mississippi Coast in one way or another.

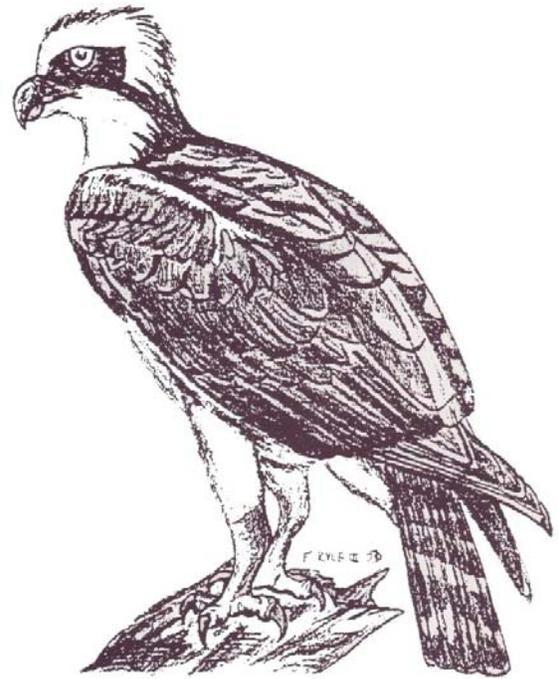


GREAT BLUE HERON

One of the most interesting birds in coastal Mississippi is the osprey. This bird is called a fish hawk by local fishermen and usually lives on the barrier islands.

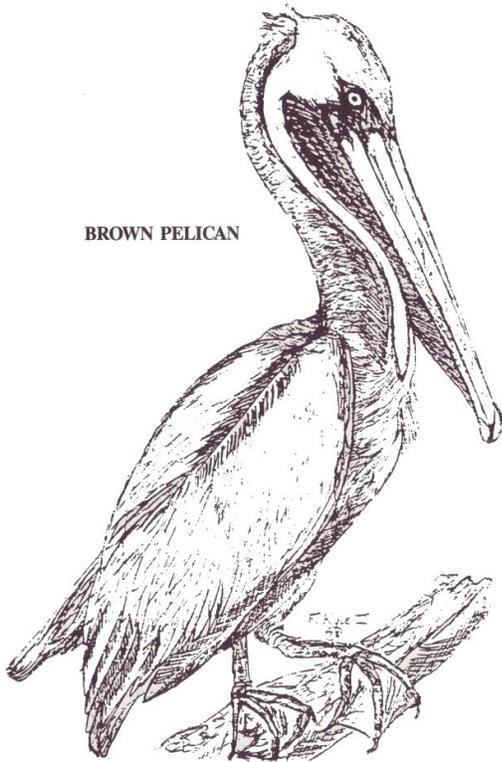
On the islands, the ospreys pair, mate, and build a large nest out of marsh grass, small limbs, other plant material, and sometimes even rope. These nests are approximately five feet in diameter and are built at the tops of pine trees. Usually the pine tree is dead, but sometimes a nest can be found in a live pine tree. These birds have wingspans of six feet or more. Both male and female will take turns sitting on the two to four eggs laid in the large nest. While one bird is sitting on the

eggs, the other will fly over the water to scoop up fish on its strong talons or toes. With their keen eyesight, they can easily spot swimming fish. Ospreys are often seen flying to their nests, grasping fish in their talons to take back to their young after the eggs have hatched.



OSPREY

BROWN PELICAN



Birds are among the most colorful creatures on the Mississippi Coast, and people on the beaches find it fascinating to watch the seagulls as they dip and soar over the water and the terns as they fly to their nests in protected areas on the beach. They are among the most fascinating of the vertebrates.

Mississippi's coast is also important to birds that migrate through the area. Birds stop here to feed and rest on their way to their summer or winter homes.

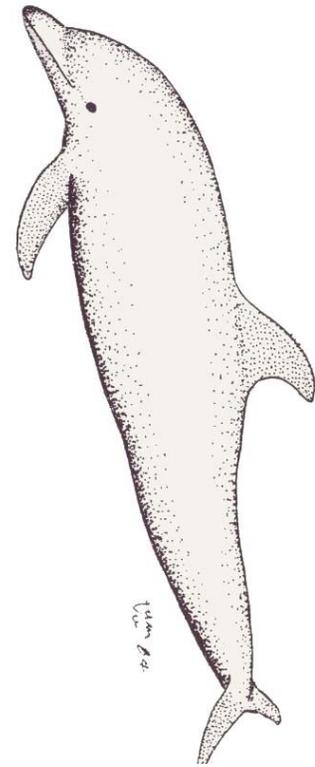
Mammals

Mammals are animals which produce milk to feed their young. They have hair, although the amount of hair may be scanty, as is true of the bottlenose dolphins. Mammals, like birds, are warm-blooded animals that maintain a nearly constant body temperature.

The bottlenose dolphin is the most common mammal found in the waters of the Mississippi Sound. Some people refer to this mammal as a porpoise; however, the dolphin is generally larger than a porpoise; its snout or front of the head is different. The smaller porpoise is not common to Mississippi's waters.

Mammals which can be found in or around marshy areas are nutria, raccoons, rabbits, rats, and others. In the fresh water rivers, creeks, and ponds may be found beavers, otters, muskrats, and other mammals.

The **BOTTLENOSE DOLPHIN** is Mississippi's state mammal.



The day finally came when Kathy's report was due.

Although she knew that there were many vertebrates she had not discussed, she was satisfied that she had produced a good introduction to the vertebrates--and that, after all, was what Mrs. Stackley had asked for.

Something quite unexpected happened on the day she was to make her report to the class and to the members of the PTA who had provided the aquarium. The president of the PTA had written a note to the television station, telling of the project and Kathy's part in it. And quicker than you could say WLOX, a call came from the station asking permission for a reporter and cameraman to tape the presentation. Kathy was only a little nervous--after all her work, she felt very confident--and the reporter was pleasant and friendly.

All in all, she told her parents later, it was just like giving any other report in class, though it wasn't often that you appeared on the six o'clock news. The short segment showed the attentive class, the pleased PTA members, and the very proud teacher as Kathy briefly introduced the vertebrates of the Mississippi Sound and gave her recommendations for the first inhabitants of the aquarium. Her mother and father gave her a hug when the news ended, both of them as proud as Kathy was--and even Tommy seemed pleased.

"My sister the TV star," he grumped, but he smiled when he said it.

And then a week later, another quite wonderful thing happened.

Mississippi ETV personnel had seen the interview on the Coast TV station and called the principal for permission to cover the story. The educational television station was doing a series on innovative work in Mississippi elementary schools--and Kathy's project would fit right in, they said.

Mrs. Stackley called Kathy's mother to tell her the news and ask whether it would be all right to accept the offer.

"I'm sure it will be, Mrs. Stackley," Mrs. Bryant said, her face lighting up. "Kathy will be so pleased, I know. I'll go upstairs now and tell her."

She knocked at Kathy's door before she went in. Kathy was still glowing over the warm reception of her report on the vertebrates, and she was so happy that she had forgotten to eat the grapes she had brought upstairs with her.

When her mother told her about Mrs. Stackley's call, Kathy could hardly believe it.

"State-wide TV?" she said. "They want to interview me? I can't believe it!"

"Just a regular old TV star," grumped Tommy, who had come to the door and overheard everything. "What next?"

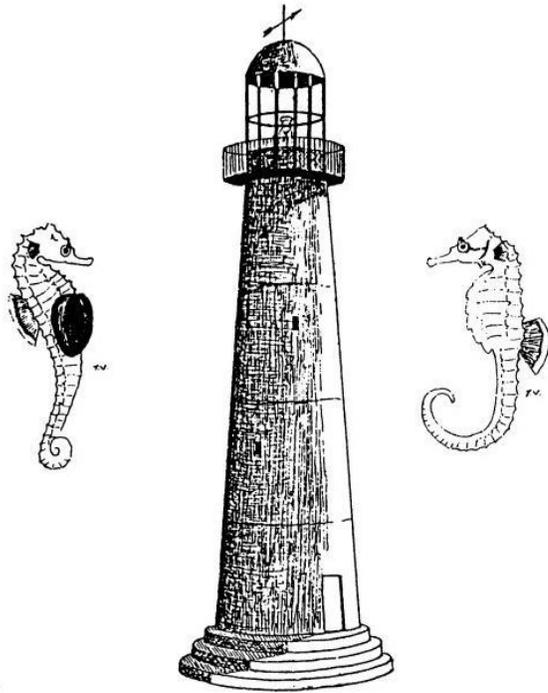
"I don't know," Kathy said happily. "Who would have thought that only a few months ago--when I didn't even want to come here in the first place--who would have thought what wonderful things could happen?"

"And all because of the fish," Tommy said, shaking his head.

"No, because of the vertebrates," Kathy corrected. "And now--state-wide TV. Then maybe Broadway. Or Hollywood. Who knows?" she said dreamily, reaching for a handful of grapes. "I think I'll need an agent." Tommy laughed with her.

Sometimes, he thought, Kathy was all right!





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