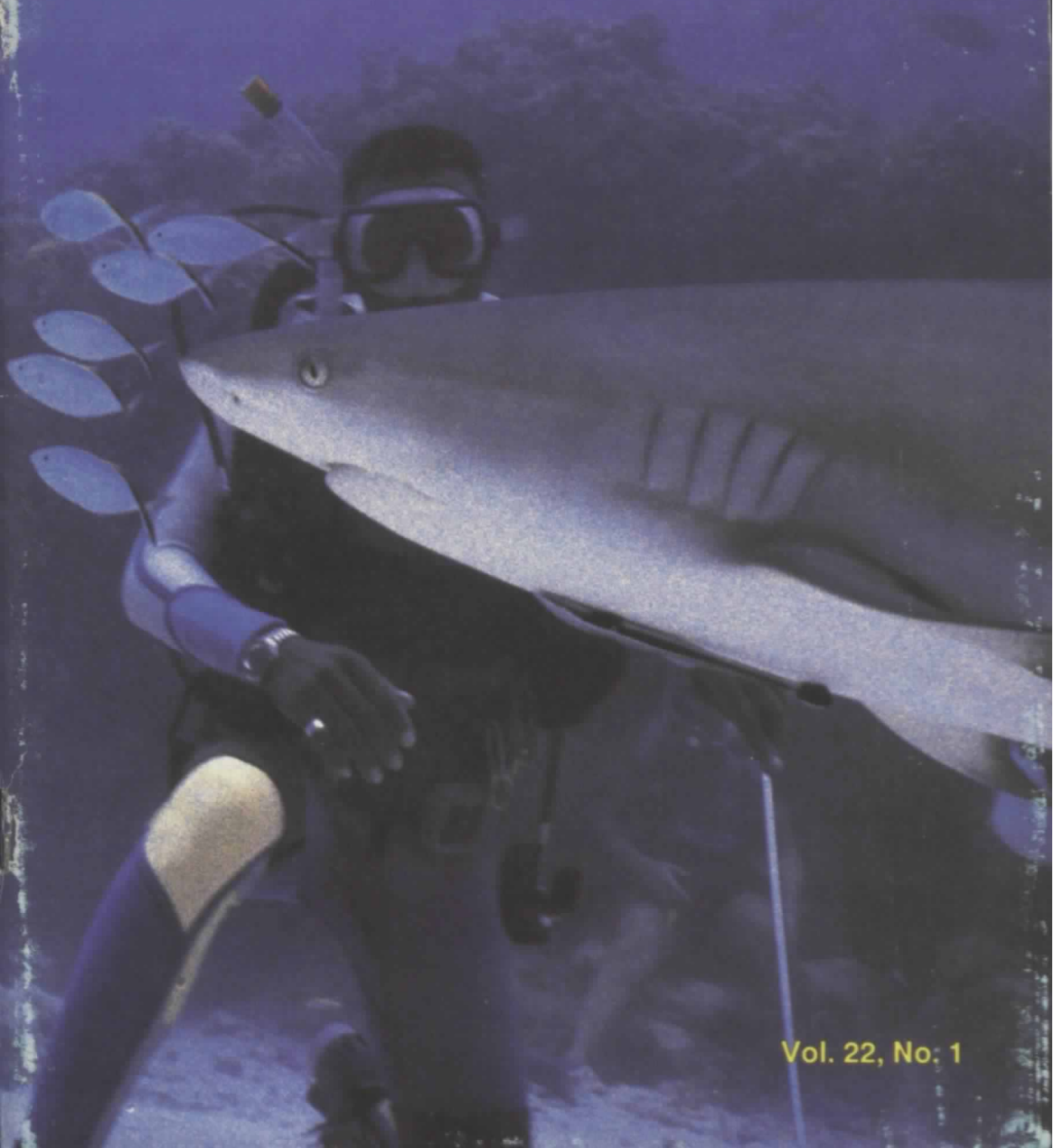
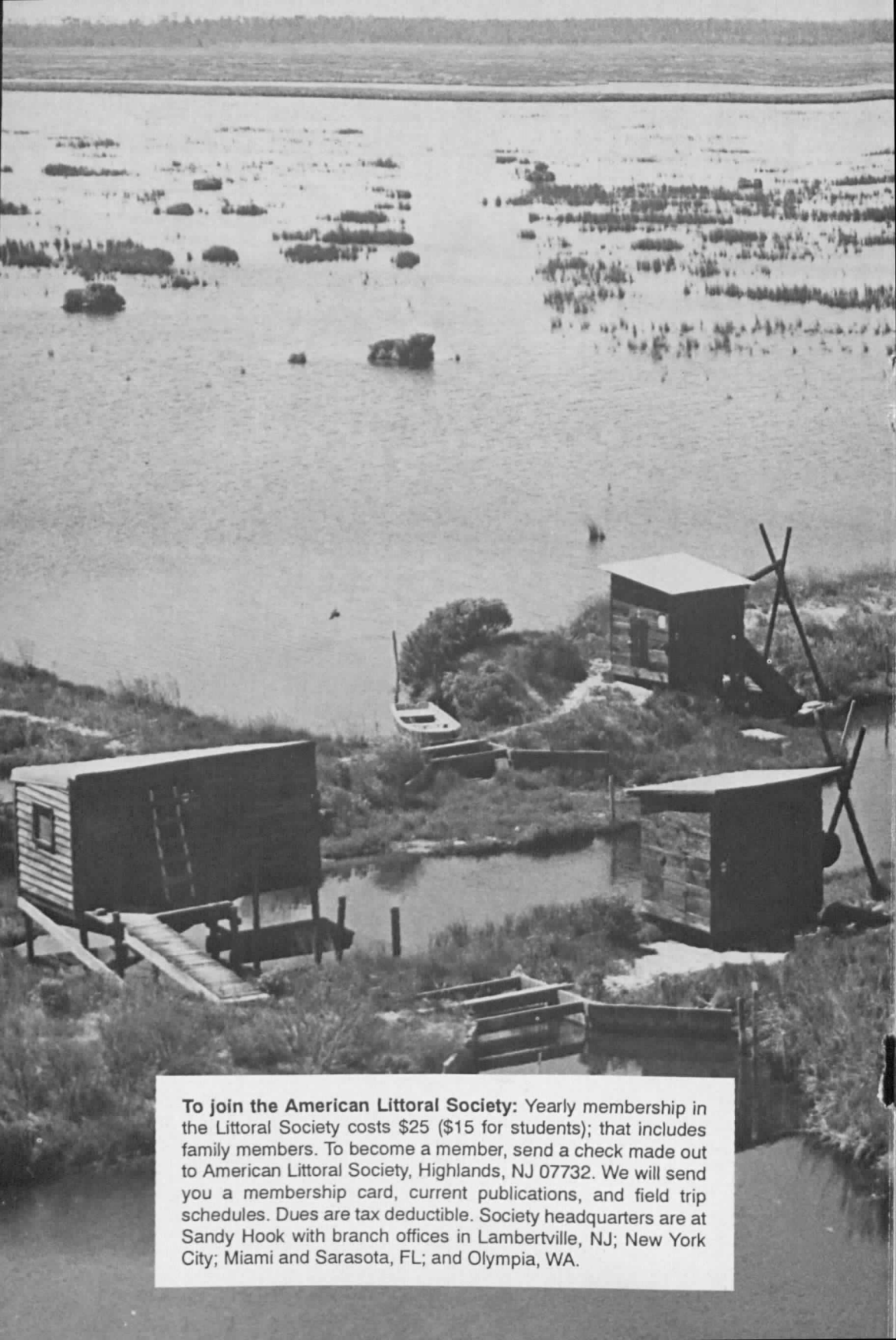


underwater naturalist



Vol. 22, No: 1



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To the editor

Exception Noted

...The article in Vol. 21, No. 2 titled "How to Catch Fish on Film," is very disturbing. I object to it for several reasons. First it recommends killing fish merely to photograph them. That is similar to killing sharks for their fins or killing buffaloes for their tongues or killing song birds for fun. Then, after the fish is killed, the article advises to use a poison on it that will contaminate the environment.

Photographs of live fish can be taken underwater by divers. Excellent underwater cameras are available, and there are plenty of divers now.

This article seems to lead people in the wrong direction by encouraging them to kill fish and add poison to the environment for the sake of a photograph.

Rachel Bosch
Warren, NJ

Impressed

...When I found the UNDERWATER NATURALIST, I was impressed regarding the pictures and contents. I would like to join the American Littoral Society. I am a graduate student at University of Hawaii. I am interested in ecological marine algae. Please allow me to join your society.

Shin, Hyun-Woung
Honolulu, HI

Wrong Bird

...I enjoyed your special edition about coastal birds, but any fool would know that the bird captioned "Black-legged kittiwake" on page 55 is, in reality, a Laughing gull in winter plumage. Picture aside, the piece on gulls was especially interesting.

Paul Dunne
Hull, MA

... "Recognizing different species (of gulls) can be difficult," as Dave Grant points out in his article "About Gulls" (UNDERWATER NATURALIST 21, [3-4]: 56, 1993). This is illustrated by the misidentification of the gull in the photograph on page 55 of that article. The bird in question is not a Black-legged kittiwake, but an adult Laughing gull in winter plumage.

Peter W. Post
New York, NY

Enough Horseshore Crabs?

...I read your coastal bird issue and immediately hid myself down to Reeds Beach on Delaware Bay to see the red knots eating horseshoe crab eggs. Two things struck me. First, I saw two men on the beach collecting female crabs as they climbed onto the beach. They said they used them for bait. Second, there were hundreds of gulls also eating crab eggs. It makes you wonder if there are enough eggs left to sustain the red knot migrants.

Mimi Chance
Philadelphia, PA

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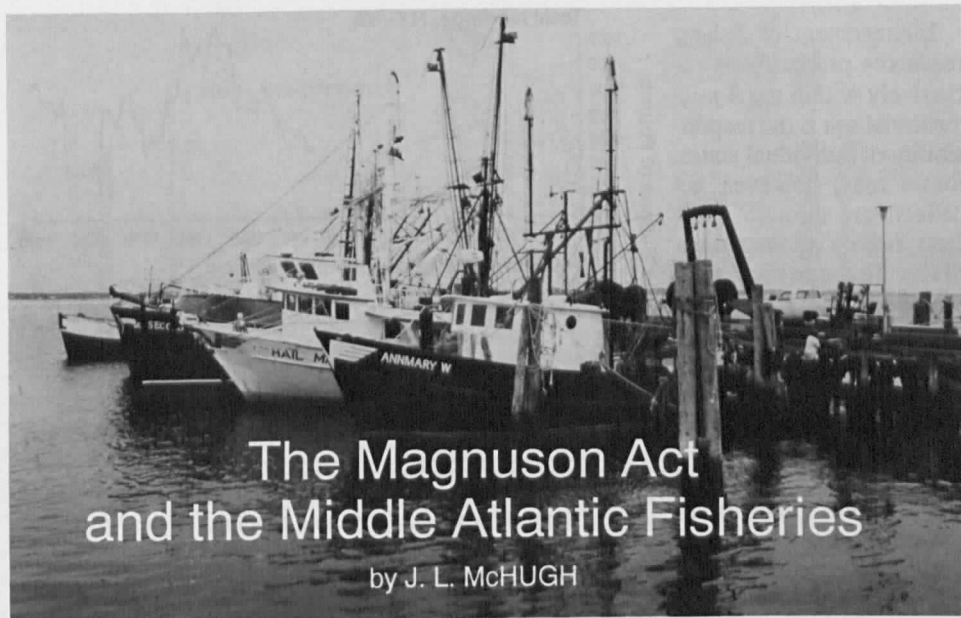
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The Magnuson Act and the Middle Atlantic Fisheries

by J. L. McHUGH

In 1976 the United States Congress passed a law described as one of the most important pieces of legislation enacted by the 94th Congress. This was Public Law 94-265, the Fishery Conservation and Management Act (FCMA), which prohibited foreign fishing within 197 miles of the existing 3-mile limit off U.S. coasts. The Act did allow some fishing by foreigners for certain underutilized species provided that an agreement was signed first. In 1980 the Act was renamed the Magnuson Fishery Conservation and Management Act (MFCMA) in honor of its principal committee member, now retired Senator Warren G. Magnuson of the State of Washington.

United States fishermen welcomed the Act. They firmly believed that foreigners fishing off our coasts, in addition to their own catch, were seriously overharvesting many species. What they did not recognize was that their own fishing ef-

forts should not increase. They quickly built new vessels, improved existing ones, brought in more fishermen, and substantially increased their own catches.

The FCMA created eight Regional Fishery Management Councils. The Mid-Atlantic Fishery Management Council (MAFMC) has authority over New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia fisheries.

The principal functions of MAFMC are to prepare fishery management plans for the approval of the Secretary of Commerce; to conduct public hearings on development of these plans; and to prepare comments on applications for permission to conduct foreign fishing.

The 23-member Council includes six state fishery management officials, six obligatory and six at-large members recommended by the governors of each state, and the Regional Director of the National Marine Fisheries Service. Non-voting members include the Regional Director of the U.S. Fish and Wildlife Service, members nominated by the U.S. Coast Guard and the State Department, and the Director of the Atlantic States Marine Fisheries Commission.

McHugh trained at the Scripps Institution of Oceanography, directed the Virginia Fisheries Laboratory, and was chief of the National Marine Fisheries Service's Division of Biological Research. He has been at the State University of New York at Stony Brook since 1970.

Management of fishery resources primarily or exclusively within the 3-mile territorial sea is the responsibility of individual states. States may, however, act collectively through interstate fishery management plans for species that migrate across state boundaries.

For any fishery that takes place primarily in the extended fishery zone (within 200 miles of the coast), state or interstate fishery management plans must not contradict nor interfere with federal fishery management plans for these same species found within the territorial sea. State fishery management plans that do interfere with a federal plan risk exemption of their authority to manage that species in the territorial sea.

Many important fishery resources migrate along the coasts, and therefore would fall under the jurisdiction of more than one state. For some time three existing Marine Fishery Commissions (the Atlantic States Marine Fisheries Commission, and commissions representing the Gulf of Mexico States and the Pacific Coast States) have tried to coordinate state laws on fisheries with varying success.

Total landings of all marine fisheries were first reported and published for 1880, but a number of species were not recorded separately in that year. So the figures begin, for the most part, in 1887. Up to 1946, surveys were not conducted in every year, and where data are missing, points

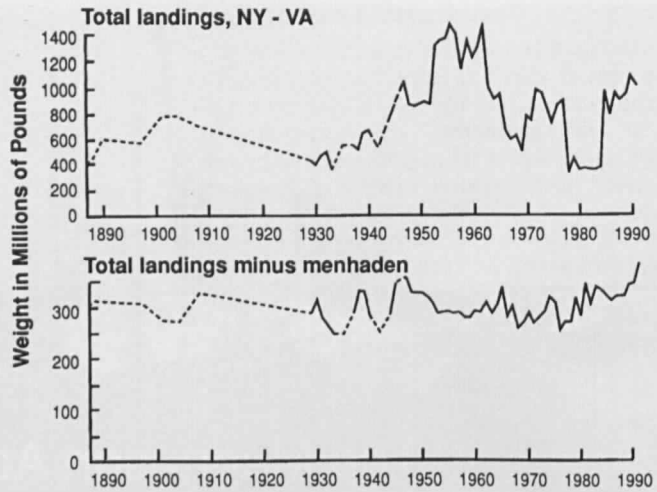


Figure 1 shows total landings, and landings of food fishes and shellfishes only, illustrating the great difference. The lower panel might lead one to believe that landings of food fishes and shellfishes in the Mid-Atlantic region have held up very well. In fact landings in 1991 were somewhat greater than in 1887. But this is far from the truth when groups of species that peaked in successive decades are examined.

on the graphs included in this article are joined with broken lines.

Total landings in the Mid-Atlantic region were so dominated by industrial fishes and shellfishes (mostly menhaden — up to 80 percent in some years, but much smaller amounts in others) that total landings do not have much meaning, except to provide an estimate of industrial landings, although somewhat higher than just industrial landings alone.

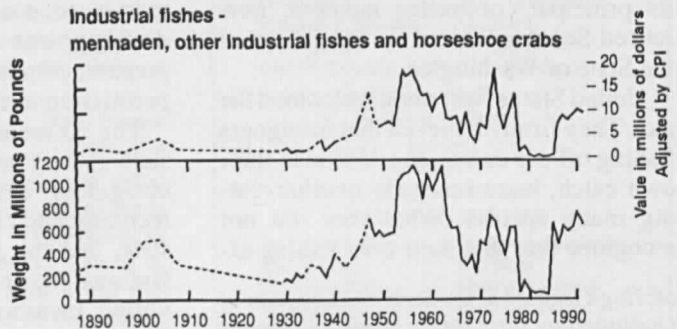
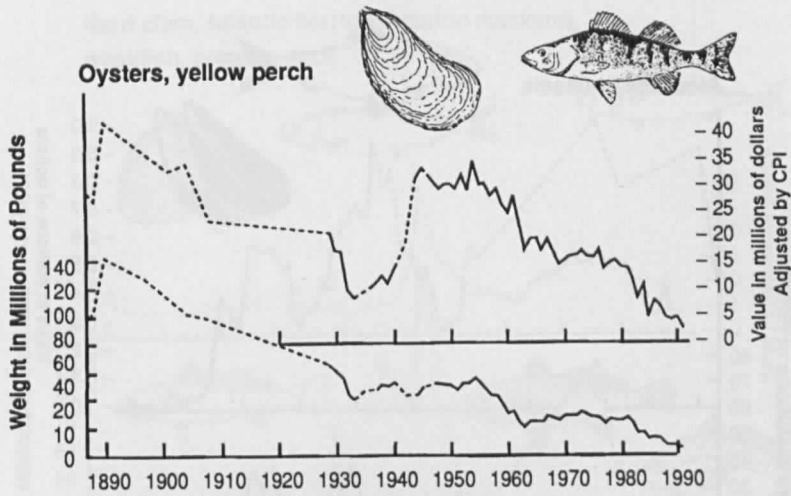
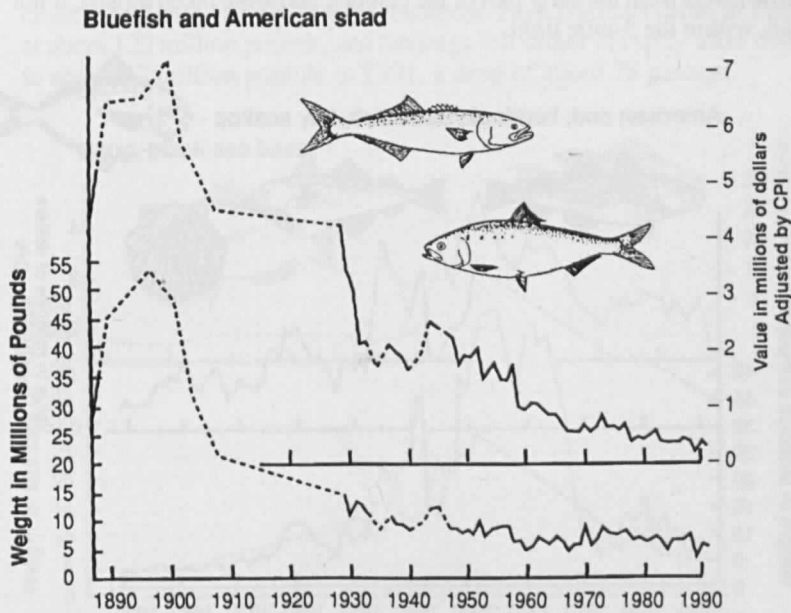


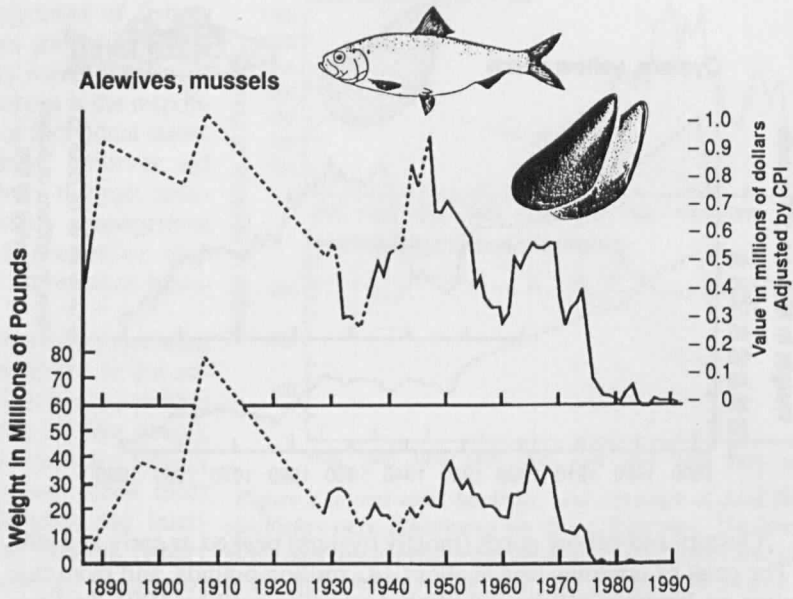
Figure 2 shows the similarity between the upper panel in Figure 1 and landings of industrial species only. The only great difference is that figure 2 is about 200 million pounds lower.



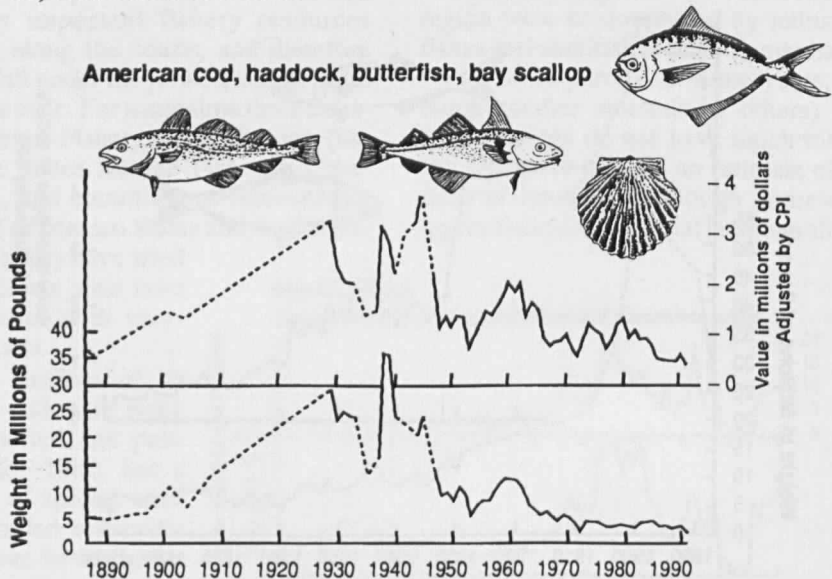
Oysters and yellow perch (mostly oysters) peaked as early as 1890. The peak of landings was at about 142 million pounds, and from that time on landings fell irregularly but steadily, until by 1991 landings were only about 2 million pounds, a decline of over 98 percent.



Landings of bluefish and American shad peaked in 1897 at about 54 million pounds. By 1991 landings had declined to about 5 million pounds, a decline of about 91 percent. Bluefish are an important recreational fish also, so the total decline in landings is probably even greater, but not known exactly.

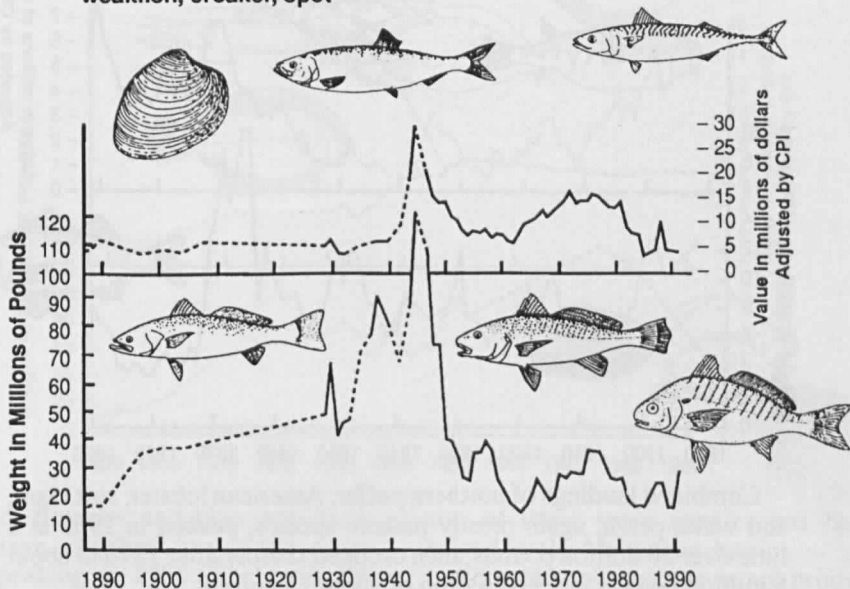


Alewives and mussels peaked in 1908 at about 70 million pounds, then fell rather irregularly, to a low of about one million pounds in 1991, a drop of about 88 percent. Thus, the first six food species all dropped to very low levels from the early part of the century, and were taken mostly, if not all, within the 3-mile limit.



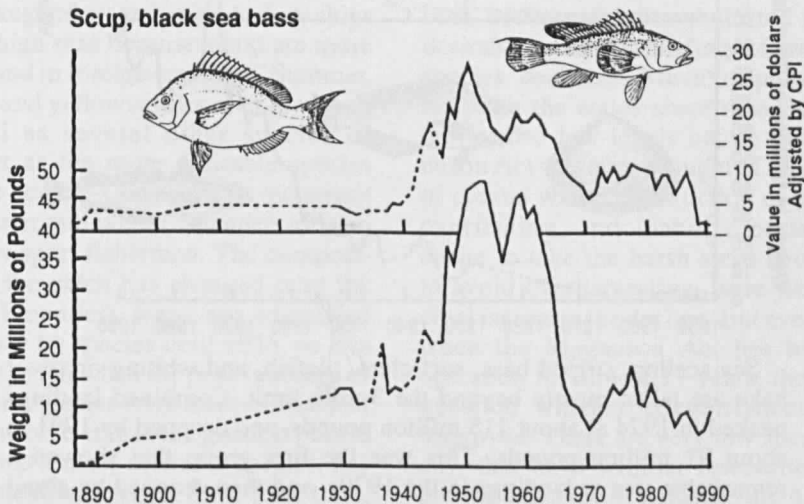
The first group taken mostly, but not all, in waters outside the 3-mile limit includes American cod, haddock, yellowtail flounder, and bay scallop. They peaked in 1938 at about 35 million pounds and declined by 1991 to only about one million pounds, a drop of about 97 percent.

Hard clam, Atlantic herring, Atlantic mackerel, weakfish, croaker, spot



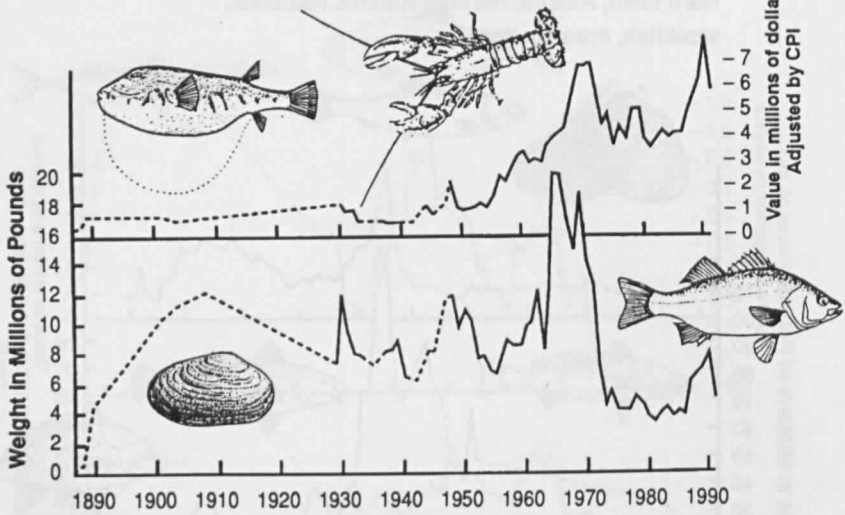
The next group, considerably larger in numbers of species, includes hard clam, Atlantic herring, Atlantic mackerel, weakfish or gray sea trout, croaker and spot, mostly inshore resources. Peak landings came in 1945 at about 120 million pounds, and landings fell rather abruptly after that, to about 37 million pounds in 1991, a drop of about 78 percent.

Scup, black sea bass



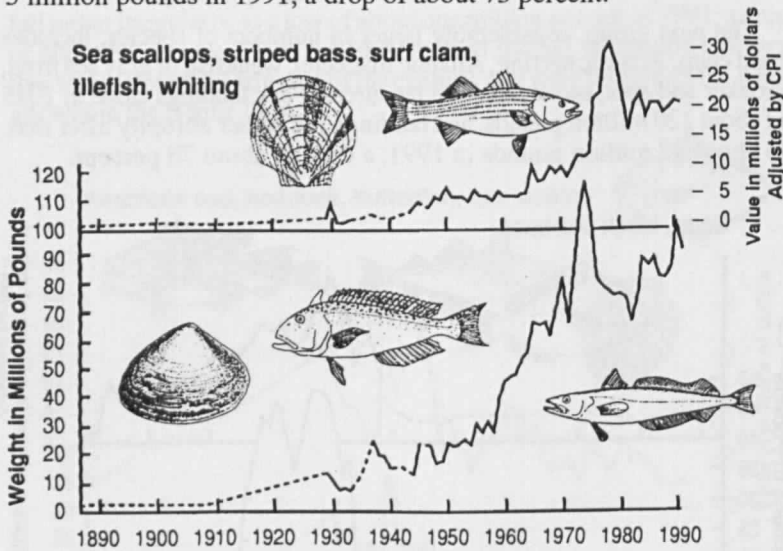
Reported combined landings of scup and black sea bass peaked at about 49 million pounds in 1954, stayed fairly high until 1964, then dropped sharply and somewhat irregularly to reach about 9.5 million pounds in 1991, a drop of about 80 percent.

Northern puffer, lobster, soft clam, white perch

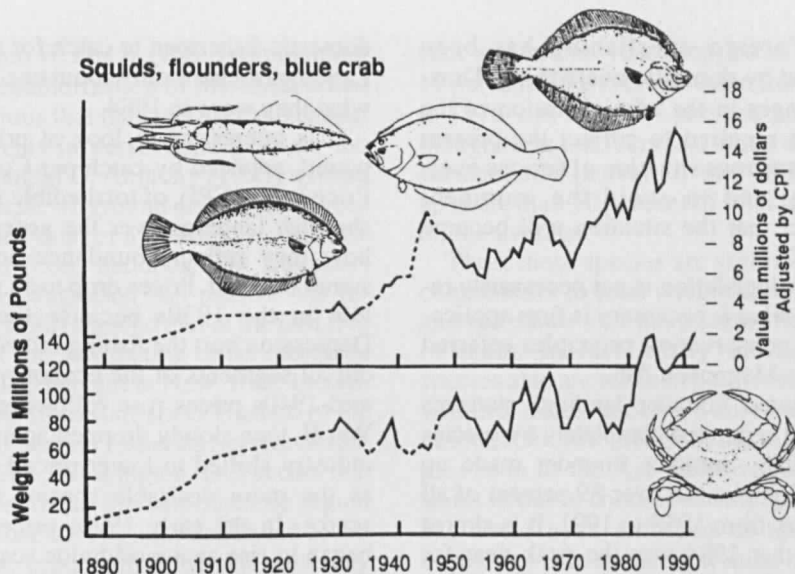


Combined landings of northern puffer, American lobster, soft clam, and white perch, again mostly inshore species, peaked in 1965 at a little over 20 million pounds, then dropped sharply after 1970 to about 5 million pounds in 1991, a drop of about 75 percent.

Sea scallops, striped bass, surf clam, tilefish, whiting



Sea scallop, striped bass, surf clam, tilefish, and whiting or silver hake are taken mostly beyond the 3-mile limit. Combined landings peaked in 1974 at about 115 million pounds, and dropped by 1991 to about 91 million pounds. This was the first group that showed a remarkable rise in landings in the 1970s, and then dropped by about 20 million pounds by 1991. All species have declined somewhat, except whiting, and the rise in landings of that species since 1977 has been about 18 percent. Unless fishing efforts can be reduced, however, that recovery probably will not last. Four of the five species now are in varying stages of overfishing.



Squid, flounder and blue crab landings, have climbed irregularly since 1887, peaking in 1991. The catch has increased from about eight million pounds in 1887 to about 142 million pounds in 1991, an increase of about 1800 percent. Each species has to be considered separately, however. Squid are taken by domestic fishermen, but considerable quantities are sold, by special arrangement, to foreign factory ships on the high seas because squid are more in demand in foreign countries. Summer, winter, and yellowtail flounder are taken as well as several other species of flounder as the more desirable species become scarce. Considerable quantities of summer and winter flounder are also taken by sport fishermen. The composition of the catch has changed over the years. Flounders were not identified separately by species until 1958, so it is difficult to tell when the peak landings of individual species were made before that year. The blue crab is the greatest puzzle of all. It is a most desirable species, has been fished with vigor for a long time, and has had no more meaningful management than any other species. Although it fluctuates widely in landings from time to time, it is still trending upward. So there is a real question whether

any of these three species has been helped by the Magnuson Act.

Altogether, the picture is not promising. We have reviewed landings of over 33 major species in the Mid-Atlantic region, and find that resource after resource in the area reaches a peak in landings, then declines to very low levels. The reason total landings of edible fish and shellfish have remained up has been because fishermen shifted to less desirable species as landings of preferred species declined. Much responsibility lies with the states since many species dropped to low levels before the Magnuson Act was even thought of. Pollution of coastal waters, destruction of habitat, overfishing, and inability or lack of desire to take the harsh steps necessary to avoid overharvesting, were the principal factors in the decline. But even now, when the Magnuson Act has been in operation for almost 17 years, there is a question whether circumstances have improved. There are very few species, if any, that have without reservation improved under the Magnuson Act. As John P. Wise of the Center for Marine Conservation (1991) has said: "It is obvious that the prime objective of the Magnuson Act, to eliminate overfishing of marine living resources off the U.S. coast, has not been

met. Foreign overfishing has been replaced by domestic overfishing. Drastic changes in the administration of the Act are required to correct the present near-disastrous situation of serious overfishing, and to avoid the imminent prospect that the situation will become worse."

"New legislation is not necessarily required; what is necessary is firm application of conservation principles referred to in the Magnuson Act."

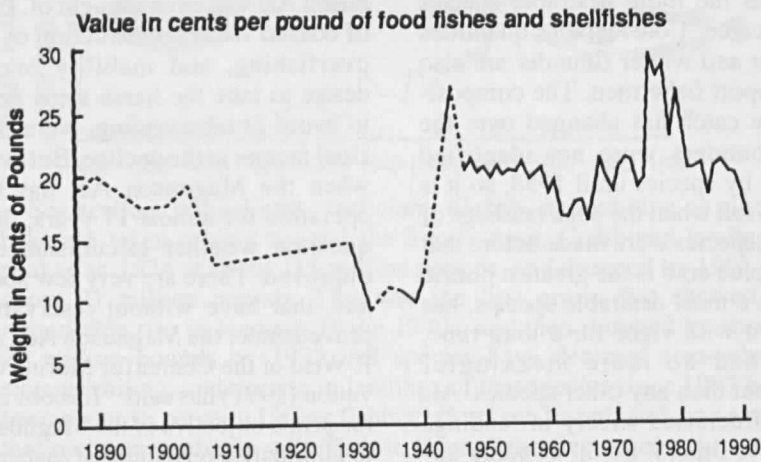
As noted flounder landings statistics were not separated completely by species until 1958. Summer flounder made up from 32 percent to over 89 percent of all flounders from 1958 to 1991. It is almost certain that 1984 was the peak year for summer flounder, when over 19 million pounds were landed. The second most important species was yellowtail flounder, and the third was winter flounder. These three, from 1958 on, made up about 94 to 97 percent of all flounder landings. There were at least six other flounder species, but they made up only a small portion of total flounder landings.

Why is it that flounder, which were very desirable commercial and also recreational species, peaked so late? Because they were also important to foreign fishermen, and when foreign fishing ceased, there were many more for

domestic fishermen to catch for a while. Landings are now only about one-third of what they were in 1984.

It is interesting to look at prices per pound, adjusted by catch per Consumer Price Index(CPI), of total edible fish and shellfish landings over the years to see how they reflect abundance and consumer demand. Prices drop to an all-time low in the 1930s because the Great Depression hurt the fishing industry as it did all segments of the economy. In the mid-1940s prices rose following World War II, then slowly dropped again as the industry shifted to lower-priced species as the more desirable species became scarce. In the early 1970s prices again began to rise as a worldwide scarcity of fish and shellfish coupled with a growing worldwide human population forced prices up. This upward trend peaked in 1978, with an all-time high of about 29 cents per pound, then fell to a low of about 18 cents per pound, as even less desirable species were landed to meet demand.

At the time of writing the National Marine Fisheries Service data on the number of fishing vessels and fishermen from 1977 to 1991 had not been received. Therefore it is not known exactly how the fishing effort has increased in the last 15 years.



William W. Fox Jr. (1989) commenting on the reauthorization of MFCMA stated it is obvious that fishing effort and capital investments in vessels and gear are too high. Vaughn C. Anthony (1993) writing on the state of ground fishing resources confirmed this for a smaller area in New England (cod, haddock and flounder) after the Magnuson Act passed. My research (1992) showed that in the first five years of the Act fishing effort increased almost 100 percent in New York. Incomplete data from Barbara O'Bannon of the National Marine Fisheries Service Statistical Office, Washington, DC, shows that fishing effort in the Mid-Atlantic region (New York to Virginia) continued to increase at least until 1981 and probably remained at these levels through 1987. Thus, we can safely say that fishing effort in the Mid-Atlantic region has increased about 100 percent from 1977 on.

At least 16 species, many of them major — menhaden, oysters, bluefish, American shad, alewives, weakfish, hard clam, striped bass, soft clam, horseshoe crabs, yellow perch, mussels, bay scallops, white perch, northern puffer or swellfish, and fish used for bait, or animal food — have been taken mostly or entirely within the 3-mile limit. Thus, they were entirely subject to state or interstate jurisdiction. These species once formed the major part of landings in the Mid-Atlantic region, and long before the Magnuson Act was even thought of, they declined substantially. These species reached their peak in 1956 at 1,256 million pounds, dropped to a low of 83 million pounds, when menhaden fishing with purse seine ceased; formed as much as 93 percent of total landings in the region; and never dropped below 60 percent. From 1977 on their highest value was just over 76 per-

cent and in one year dropped as low as 19 percent. The average value from 1887 to 1976 was about 77 percent, and even though their numbers and value dropped substantially thereafter, they still made up more than 50 percent of total landings on the average.

Thus, these species are still important contributors to total weight of landings, and the states still have control of most of them. In fact, many of the other species also are taken in part from waters within 3-miles, hence are only indirectly subject to the Magnuson Act. The provision of the Act which requires the states to act in concert with federal laws has never been enforced. If the Magnuson Act is to succeed, it must be. This provision is apt to be forcefully rejected by at least some states, and a bitter battle is bound to ensue. This issue alone may be the greatest obstacle to success of the Act, although not by any means the only one. The Magnuson Act has not protected fish and shellfish so far, and it will take very drastic action to correct the situation.

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This paper is Contribution 912 of the Marine Services Research Center of the State University of New York, Stony Brook, NY 11794-5000.

Eye Got Rhythm

by DAVID K. BULLOCH

If you have ever flown across four or more time zones in one hop, you surely have experienced that out-of-kilter feeling known as jet lag. It sets in within hours after your arrival and can last for several days until the internal timekeeper that regulates a number of your bodily functions is back on track.

The behavioral effects of this mysterious clock can be seen in a number of shore animals. The fiddler crab lies low in its burrow during high tide. Only when the tide recedes does it emerge to feed, attract a mate, and make threatening gestures at rivals — all in a burst of frantic activity. As the flood tide returns, the fiddler retreats to its den and quietly awaits the next ebb.

If you take the fiddler crab from its shoreline home and put it in a small dark box where there is no change in tides, no day or night, no change in stimulus whatever, the crab will continue its periods of tidal influenced passivity and activity with uncanny precision. During what used to be low tide in its former locale, it will scamper about the box and during high tide it will remain still. The crab can keep this up for the duration of its captivity. No one knows exactly how.

These kinds of rhythms can be twice daily, daily, monthly, or yearly, tied either to a lunar or solar cycle. Collectively they are known as circadian rhythms; although, strictly speaking, circadian refers to a daily or near daily cycle ("circa" meaning "about" and "diem" meaning "day").

The Bermuda fireworm, for example, times its yearly reproductive orgies to a series of geophysical clocks. A distant cousin of the Pacific palolo worm, this

A past president of the Society and a frequent contributor to this bulletin, Bulloch's latest book, THE WHALE-WATCHER'S HANDBOOK, was published by Lyons & Burford in 1993.

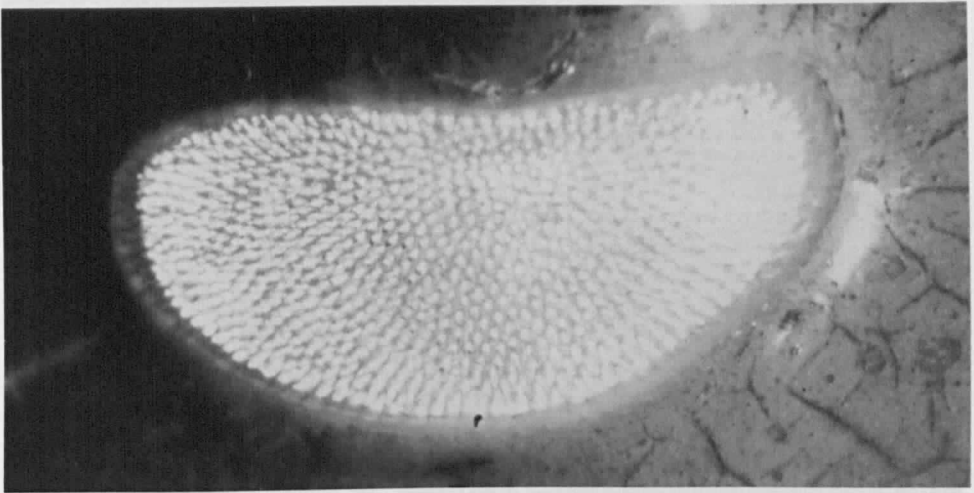
polychaete breeds during the full moons of early to mid-summer and at an exact interval after sunset irrespective of whether the moon has risen or not. The females, who normally live cryptically buried in the gravelly bottoms of shallow flats, swim to the surface and release their eggs in greenish bioluminescent clouds. The males, glowing in bright white luminescent bursts, streak into these clouds and eject sperm. The whole spectacle lasts but three minutes on average. The swarming peaks on the third night after a full moon at exactly 56 minutes past sunset.

Seasonal breeding and hibernation are examples of annual cycles, and they take hold without external cues. Golden-mantled ground squirrels, isolated from birth and kept in constant darkness at 37° F. will go through consistent periods of hibernation for their entire life span with no hints of seasonal changes from the outside world.

These rhythmic clocks can be reset by external cues, either by a change in tidal cycle or light. A fiddler crab transposed to new surroundings will quickly adapt to the new tide schedule. A human, transported from New York to Hong Kong will be adjust to the day-night shift within a week.

In vertebrates the seat of light-dark biological responses is the pineal gland. Situated between the two hemispheres of the brain and activated by signals from the optic nerve and retina (and in some animals, from its own photoreceptor), this miniscule snippet of tissue controls everything from the size changes in the pigment cells of fish skin to the menstrual cycle in humans.

For many years scientists thought the eye was only a sender of signals, telling the brain what's going on visually within its view. That venerable mariner, *Limulus*, the



The eye lens of a horseshoe crab in a shedded shell. Each structure was once part of a single light receptor. Photo by D. Bulloch

horseshoe crab, however, has shown us there is more to the eye than meets it.

Limulus possesses a pair of primitive lateral eyes (and a number of other light receptors that are not as obvious) which have been models for neurophysiologists for over 50 years. The eye consists of a mere 1000 light receptor clusters, called ommatidia, that are the largest of any known animal. If you pick up the shedded shell of a young horseshoe crab and look at both the outer and inner side of the lateral eye, you will see the outlines of the ommatidia in the eye cluster — convex on the outer surface (the lens), tapering in, wedgelike, to a point where a single nerve fiber emerged and joined in a bundle with the nerve fibers from the other ommatidia to carry their messages to the brain.

The eye of the horseshoe crab is easy to remove. A single nerve fiber can be separated out from the bundle and hooked up to a recording device. Thus the response of a single nerve fiber emanating from a single light receptor can be easily studied. Fortunately the horseshoe crab can withstand the trauma and will regenerate a new eye during its next shedding.

In 1977, Robert Barlow and his stu-

dents at Syracuse University decided to measure the eyes activity while leaving the optic nerve still connected to the brain. They found to their astonishment that the eye changed its sensitivity from day to night in a daily cycle and that this change was controlled by the brain.

The world of the horseshoe crab is nearly as bright at night as it is during the day because the brain directs the eye to increase its sensitivity up to a million-fold at night. Furthermore, this directing is the result of an internal clock. If you keep a crab in total darkness the sensitivity of the eye oscillates every 12 hours or so, depending on the length of the day it was placed in the dark.

In *Limulus*, the clock lies in the forward part of the brain. Not all the nerve fibers in the optic bundle that leads from the eye to the brain carry signals in that direction. A dozen or so send signals in the other direction, from the brain to the eye. As these nerves reach the retina they branch out and form connections with the cells of each ommatidium, commanding the ommatidia to increase their sensitivity.

This internal clock uses a 24-hour period. A light receptor in the tail of the crab helps keep the clock set to the



The smaller male recognizes the female by shape. Once found he clings on to her until she is ready to shed her eggs. Photo by R. Harrison.

changing length of day as do two small eyes on top of the crab. However, if you keep the crab in the dark the clock will continue to run on its last setting for well up to a year which is as long as anyone has measured it.

Studies by Kaplan and associates turned up other curious facts. The cells of the eyes fire off electrical discharges when struck by light. A certain number also spontaneously discharge at random creating a background "noise" which is superimposed against the discharges caused by light. Usually when sensitivity is increased in both biological and electronic systems, background noise increases disproportionately higher, but Kaplan found just the reverse. As the crab's eye becomes more sensitive to light, the background noise subsides. However, there is a tradeoff. Since the light signal takes longer to transmit, the eye's response time to changes in light level is reduced, essentially reducing its temporal resolution. Spatial resolution also decreases because each ommatid-

ium has an aperture that acts like an iris, and at night it's wide open. Thus outlines of objects and their relative movement are less distinct to the horseshoe crab at night than during daylight hours.

The horseshoe crab feeds by burrowing beneath the sand looking for clams and worms, so what exactly does a horseshoe crab use its vision for? Each spring the crab leaves deeper water and migrates to shallow water and protected beaches along our eastern seaboard with mating in mind. Thousands throng to certain beaches (Reed's Beach in New Jersey, for example) while many other beaches host only a few dozen mating pairs. This shorebound migration peaks during the nighttime high tides of late Spring full or new moons.

The smaller male seeks out a female, clings to her, and is literally dragged everywhere she goes until she is ready to lay her eggs. She digs a hollow in the sand at the high-water mark of the beach and deposits scores of tiny green eggs. The male releases his sperm into the

water above them and detaches from the female. She then covers the eggs up with sand.

In the 1980's Barlow and his associates showed in field studies that the male horseshoe crab could visually detect the silhouette of a female horseshoe crab (they used a black cement casting as the target) if it passed within three feet or so of the female. Beyond this distance the odds of the male making the right move diminished appreciably, dwindling to random chance at six feet. If the male horseshoe crabs were blindfolded they never approached either a live female or a cement casting directly.

Further field work using a video camera with an image intensifier suspended over shallow water at night showed the male's ability to find a female is almost as efficient as it is during daylight. The average sighting distance during the day was about two and a half feet and at night, about one and

a half. A human using SCUBA in the same waters could spot the target from 11 feet on average during the day and six feet at night compared to *Limulus* who reacted to the target from about three feet during the day and about two feet at night. The human eye has much better resolving power than *Limulus* but, that aside, what is surprising is that *Limulus* sees just about as well at night as it does during the day.

All this is attributable to the eye's remarkable circadian response to the brain's instructions; that is to say, its eye got rhythm. Who could ask for anything more?

* * *

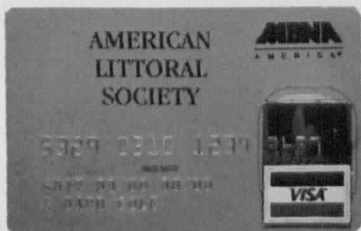
NOTE: For a more complete explanation about how these and other experiments were carried out and how the eye is altered by the signals from the brain, look up "What the Brain Tells the Eye" by Robert Barlow, *Scientific American*, April 1990.

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Confusing Carcharhinids — THE FINAL CHAPTER?

by SAMUEL H. GRUBER

It's over now. Stanley Meltzoff and I have settled our wager and the identity of the vast majority of sharks, at Shark Reef, Stella Maris has been confirmed. This final chapter was truly an adventure — both scientific and personal.

As you may recall, if you read the two preceding articles (UNDERWATER NATURALIST 17(4):14-20 and 20(3):28-30), Meltzoff, a founding member of ALS, having the eye of an artist and the inquisitiveness of a naturalist, was struck by the similarity of many carcharhinid (requiem) sharks and the difficulty of making positive identifications underwater. After diving with a group of sharks at Shark Reef, Stella Maris, Meltzoff resolved to determine the exact identity of these sharks, — which had variously been identified as bull sharks, *Carcharhinus leucas*; blacktips, *C. limbatus*; reef sharks, *C. perezi* and sharpnose sharks, *Rhizoprionodon porosus*. So, he hired a guide, caught one and made an identification. Meltzoff used a standard taxonomic text and concluded that his shark was a blacktip. And, he published his findings in UNDERWATER NATURALIST (op. cit.) stating flatly that for years the shark biologists (me included) erroneously identified these sharks as Caribbean reef sharks.

When the Meltzoff article titled "Confusing Caribbean Carcharhinids" appeared, several of my colleagues asked me to respond because, for one thing, the very photographs illustrating his article were diagnostic and clear examples of reef sharks. But it wasn't until three years

Professor of marine biology and fisheries at the University of Miami's Rosenstiel School of Marine and Atmospheric Science, Gruber edited DISCOVERING SHARKS which was published by the Society in 1990.

later that my friend and research associate, Don Nelson, again brought the 1988 article to my attention. After considerable discussion over a delicious Mexican dinner, I reluctantly agreed to respond to Meltzoff's article. On the flight back to Miami from Los Angeles, I wrote a long, detailed and stern indictment of the article proffering my ideas on exactly where Meltzoff had gone wrong. But upon re-reading the text a week later, it seemed pompous, pedantic, and vindictive...definitely not a fun article. So I completely rewrote it, and in a somewhat tongue-in-cheek way, challenged Meltzoff to a public wager that we travel to Stella Maris, again catch one of these sharks, and together identify it — finally putting to rest the question of its identity. If it were a blacktip, Meltzoff would win a two-week all expenses paid stay at the Bimini Biological Field Station and we would expose him to sharks of several types each and every day. On the other hand, if it were a Caribbean reef shark, he would have to execute an original painting of a lemon shark, *Negaprion brevirostris*, a species I have been studying for over 30 years. UNDERWATER NATURALIST published the wager, along with a retort from Meltzoff (UNDERWATER NATURALIST 20(3):28-30). The upshot was that Meltzoff accepted my challenge and was enthusiastic to set the record straight.

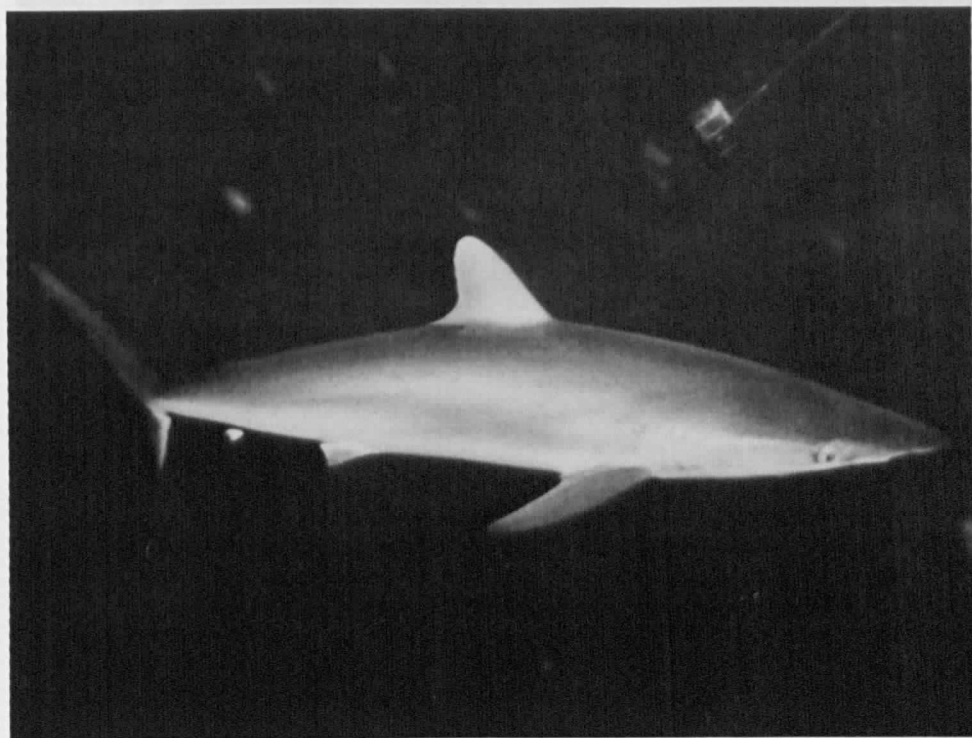
Now the adventure began. First, we had to decide upon a rapid, non-invasive and harmless way to identify these sharks. We both agreed that the existence of a low but distinct ridge of skin running fore-and-aft in the midline between the two dorsal (back) fins would immediately and completely separate out "our" shark from the two main contenders —

the blacktip and bull shark — which both have smooth backs. We further agreed that if our shark possessed such a ridge it almost certainly would be a Caribbean reef shark. True, there were other tropical Atlantic shark species with an interdorsal ridge but these were either oceanic species such as the silky shark, *Carcharhinus falciformis* or uncommon species found in moderately deep water such as the big nose shark, *Carcharhinus altima*. Thus, we merely had to go to Shark Reef, catch one of these sharks, run our hand along its back, feel for the presence or absence of a ridge and release it — unharmed. Merely.

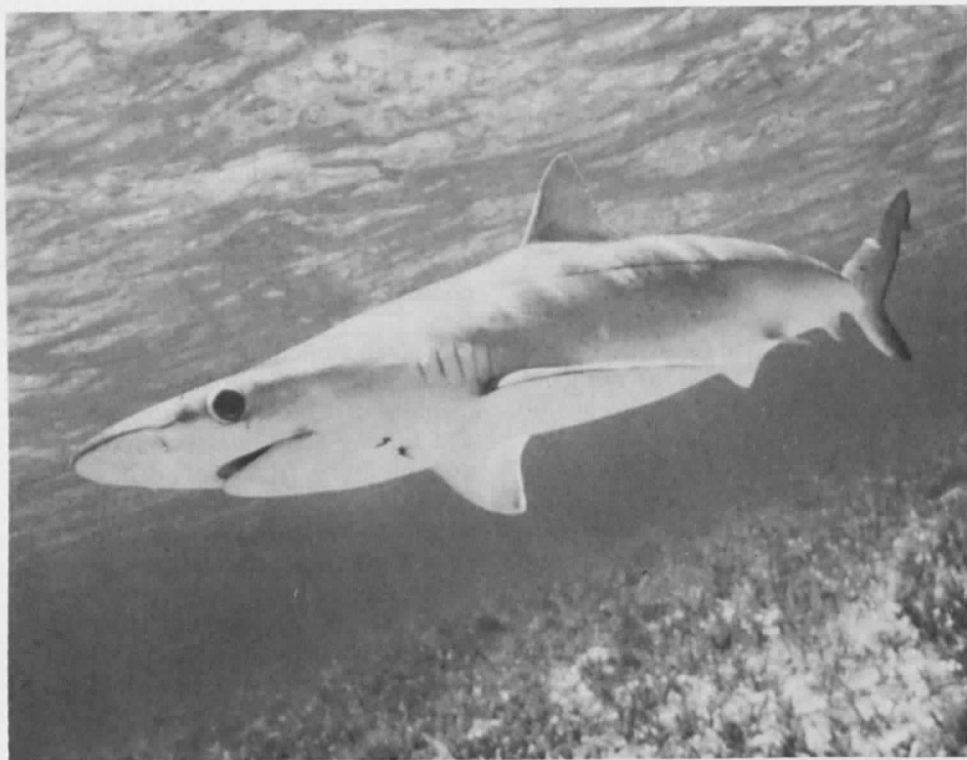
There was another factor. I felt that it was imperative to somehow connect our amusing little wager to the larger, more serious question of conservation of sharks and the obscene over-exploitation taking place today (see UNDERWATER NATURALIST 19(4) and 20(1):115-121). To me, public awareness is the key to

stopping this senseless and wasteful slaughter. I felt that our public wager might just pique the interest of a film maker and provide the multiple objectives of covering the considerable expense of our expedition; convincing the owners of Stella Maris to allow us to catch and identify one of “their” sharks; and, at the same time, further raise public consciousness on the conservation question.

Heaven smiled on us. My friend and producer, Bill Macdonald, formerly a member of Cousteau’s *Calypso* diving and filming team, was now producing documentary films for Bill Burrud Productions. Macdonald and I had worked together with Nelson on an unrelated shark film in the summer of 1991. At that time Macdonald was putting together some preliminary ideas for a major film on the plight of sharks for the Discovery Cable Channel. I told Macdonald about our little wager and he



Silky shark. Photo by D. Perrine.



Sharpnose shark. Photo by D. Perrine.

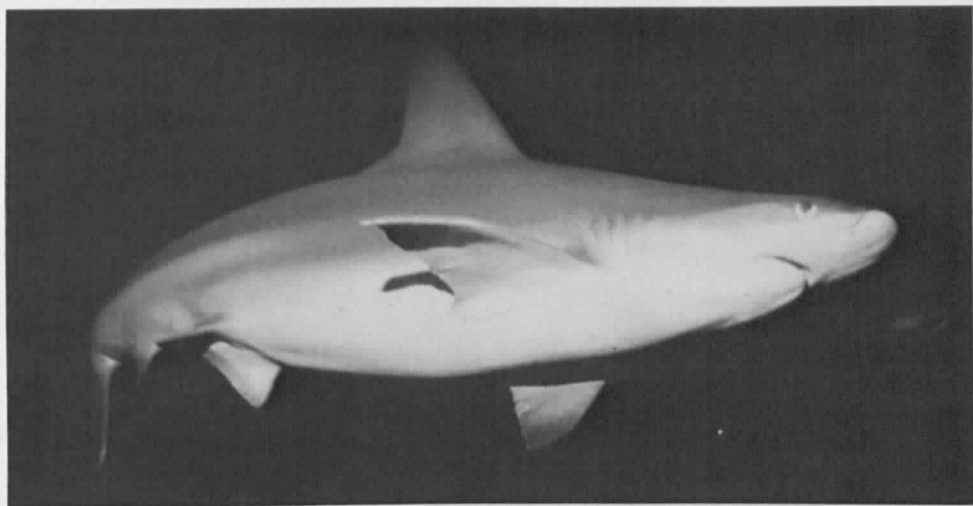
thought it would fit nicely in film. But, would the Discovery Channel actually come through with a contract and funding?

At this point in late 1991, I had never actually spoken with Stanley Meltzoff. I casually knew his daughter, Sarah Meltzoff, who is a faculty colleague of mine at University of Miami, but I had never met the man. What was he like? Would he agree to the film? Would he be willing to fit his plans into a tight filming schedule? Thus began a series of phone calls which resulted in a clear set of minimum requirements for the expedition. But everything depended on the Discovery Channel.

The word came through in February, 1992. The film was on and they definitely wanted to shoot The Stella Maris story. Now all eyes turned toward the owners of the Stella Maris resort, Joerge Friese and Peter Kuska, expatriate Germans, and presently full-fledged Bahamians.

These are truly incredible people. An entire novel couldn't do them justice. Suffice it to say that over a period of 30 years they have built a paradise from scratch, and they along with their wives Monika and Gaby and their colleagues Gerd and Eberhard — do it all, from meeting guests at the dusty airport, to repairing vehicles, to taking dinner orders. But what would Friese and Kuska think about our plans? Would they support the expedition? Would they actually allow us to catch one of their valuable sharks? Would they even want the publicity?

The first news was not encouraging. Friese related to me that several years prior a film group had come down with so-called experts and assured them that it would be OK to catch their sharks. Needless to say, most of the Stella Maris sharks were killed and it was more than a year before a new group of sharks could be recruited and trained. So, Friese and Kuska were not enthusiastic about



Sandbar shark. Photo by D. Perrine.

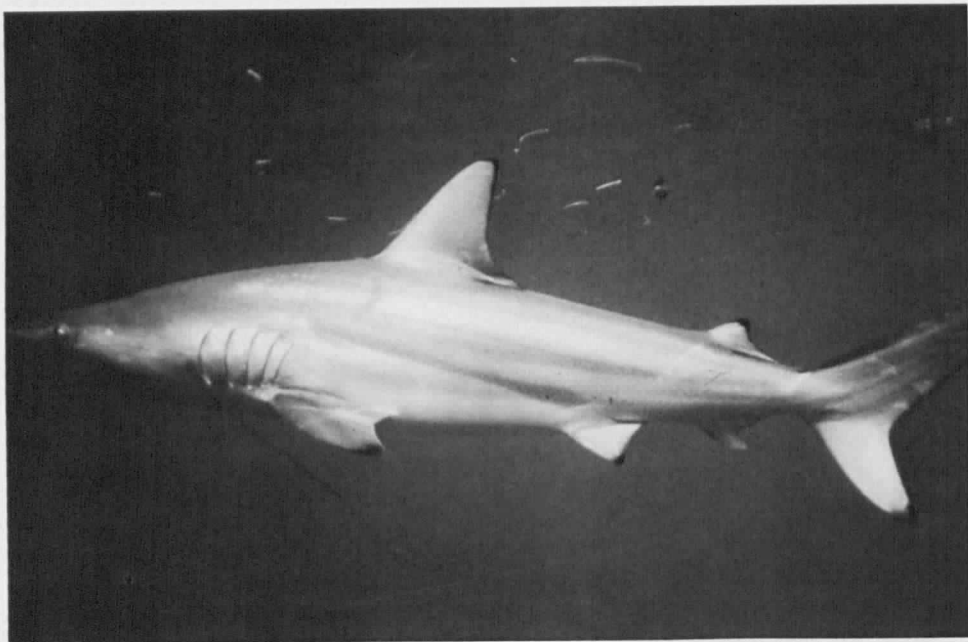
anyone disturbing their unique dive, no less catching one of their star sharks. However, Macdonald gave them a try. He pointed out the benefits of the film and eventually won them over. Yes, they would support the expedition. But, the question of actually catching one of their sharks remained. How would we do it? Could I guarantee that the shark would live? How would this affect the other sharks?

I proposed three possible methods of capture including netting and lassoing,

but the only practical way was handling with hook and bait. I was confident these were reef sharks from the dozens of photographs at Shark Reef, and I knew that while reef sharks were delicate, they could be handled. They quickly die if left to struggle on a bottom set line, but they are hardy enough to stand capture and transport, and several specimens are doing extremely well in captivity at Coral World in Nassau. So I felt that if we could hook one, "horse" it to the boat, and tie it alongside, it could be tagged,



Bull shark. Photo by D. Perrine.



Blacktip shark. Photo by S. Gruber.

measured, identified, and released in less than five minutes. I was indeed convinced that the shark would survive especially if it didn't swallow the bait. On the other hand, I wasn't at all certain that the other sharks wouldn't get frightened and flee. But we had a go.

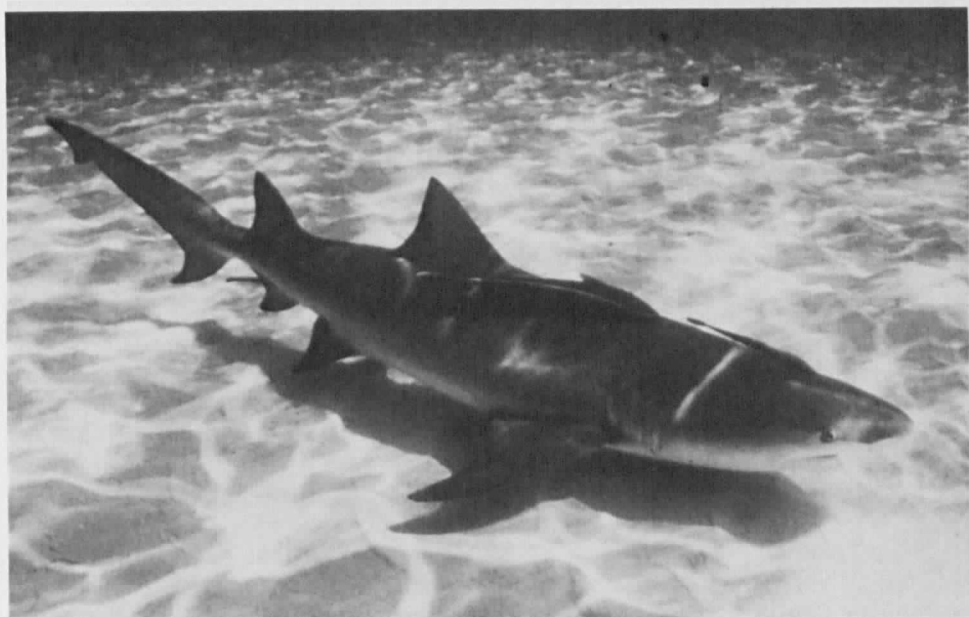
With high hopes, we all assembled in Miami on April 25. Our party of four consisted of Macdonald and Karl Deeds (Macdonald's camera assistant), Stan Meltzoff, and me. We boarded our Bahamas Air Jet at Miami with boxes and boxes of overweight camera gear — about one hour late but made our connection to Long Island with minutes to spare.

At Stella Maris, every meal is a European-style gourmet's delight. Over fresh grouper that evening, we discussed tomorrow's shark dive with Messers. Friese and Kuska. Everything, they assured us, would be handled. And it was.

The next morning was overcast with a moderate wind. There was some discussion as to whether we would actually do the dive. Finally, the other 14 guest-divers arrived and we left in two boats for

the half-hour trip to Shark Reef. Anchors down, divers down, and bait in the water, 17 sleek, elegant sharks showed up on schedule. Macdonald was having a field day filming the feeding action and, of course, the divers were both frightened and thrilled to be that close to a pack of hungry, actively feeding sharks. I was most impressed with Stanley Meltzoff. He is a highly cultured, animated, and optimistic man. Never mind the pain in his knees and back. He whipped on his scuba gear, grabbed his camera and was first on the bottom. I felt small, fiddling with my hooks, lines, tagging, and measuring gear while he was on the bottom in the middle of the action.

The moment of truth arrived. After the 20-minute feeding bout, the guest divers returned to their dive boat and left us in an empty sea with rising wind and dark clouds. We set up to catch our specimen. The rig consisted of an 11/0 stainless steel hook with 8 feet of 7 x 7 stainless aircraft cable connected to 150 feet of 3/8 dacron line. Our dive master, Dalbert Smith, wanted to strike the shark when



Lemon shark. Photo by D. Perrine.

and if it took the bait. I gladly acquiesced (better he hurt it than me). We threw out small pieces of fish for chum and sure enough about half a dozen sharks rose on it. Now all doubts disappeared. I was sure we could catch one. The situation was so controlled that we were able to choose the individual — a five-foot specimen. I carefully baited the hook, laid out the line and Smith threw it to “our” shark. Without hesitation, it took the bait. Smith struck it immediately to keep the bait from being swallowed, and the strike was successful — too successful. The shark felt the hook and sped off. The line flew out through Smith’s hands and somehow coiled around his foot. Down he went, but he immediately regained his balance and dignity. As planned, he horsed the shark up to the gunwale. But, when it saw the boat, it took the whole 150 feet of line out again. This time, I screamed to go easy — let the shark run when it wants to. After several such runs, the five-footer gave up. In no time at all, we tailroped it, tied it alongside, and I poked a NMFS dart tag into its flank just below its dorsal fin. Then stopped, drew some

calming breaths and remembered why we captured the shark. Together, Meltzoff and I reached over, steadied the shark by grabbing its fins, and felt the back. The interdorsal ridge was there. It was fine, subtle but unquestionably there. With grace and humility, Meltzoff conceded. These were indeed Caribbean reef sharks.

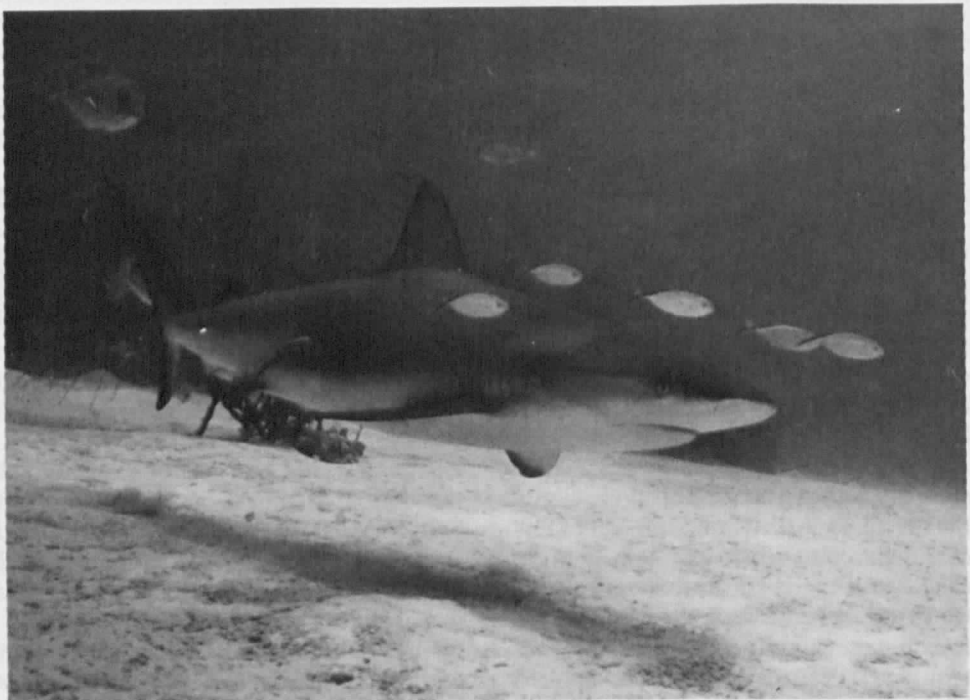
Now our concern turned to how the rest of the sharks took to having one of their mates captured. Would they vacate Shark Reef? Would they cease feeding out of fear? Macdonald resolved to do as much filming as possible. He noted that at sea, you never can tell. We all wanted to go back to the hotel but he insisted — wisely — that we do another dive. Twenty minutes later our group was back on the bottom with yet another bucket of bait. We literally held our breath as we scanned for sharks. We didn’t wait long. Nine Caribbean reef sharks came lazily in and as they picked up the scent, quickly homed in on the bucket. They fed without hesitation. However, our tagged five-foot specimen was nowhere in sight. After about an hour of filming, we pulled

anchor and headed in. Meltzoff pointed out the spot where he caught the shark in 1987 that led him to write the original article. It was perfect blacktip habitat, a shallow, clear and sandy flat. Later in the room, he showed me a photograph of the 1987 shark. It was indeed a blacktip. His error was in his assumption that this one species inhabited the overall area. Most of the locals called the sharks at Shark Reef blacktips also and so, on this evidence, he was convinced he was correct.

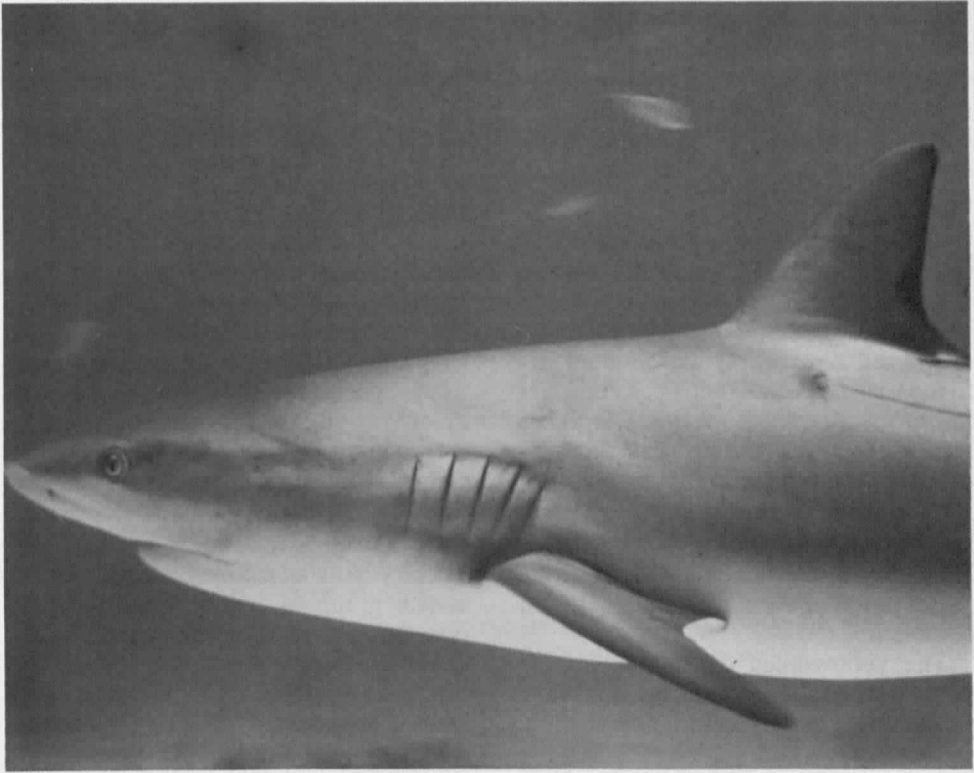
In addition the interdorsal ridge of *C. perezi* is so subtle compared to say a sand bar shark, *C. plumbeus*, that an underwater observer might easily overlook it as did Meltzoff. This is why Meltzoff captured his shark in the first place — namely, to confirm the presence or absence of an interdorsal ridge. When he found none, he rightly concluded that it was not a reef shark.

After many years of observing blacktips and reef sharks both underwater and on the dock, I have found several features

which divers can use to distinguish between the two species. First, as I suggested earlier these two closely related sharks occupy very different niches. Although it is certainly possible that the two could be seen together, as its name suggests, the Caribbean reef shark is mostly a creature of the reef. In contrast, the blacktip is often, but not exclusively, found over shallow sandy seagrass beds near shore. Physically however, they are very different in appearance. Just as a husky and German shepherd might look similar to some but very different to the experienced eye, so the blacktip and reef shark appear very different to me. Here are some of the more obvious differences: The snout of a blacktip is rather pointed while that of a reef shark is broadly rounded and flattened. Their markings are quite different. As its name suggests, the pectoral fins of a blacktip look as if they were dipped in a bottle of India ink. The delineation between the blacktip and the milky white underside of



Reef shark at Stella Maris. Photo by A. Nelson.



"Taggy," the tagged reef shark at Stella Maris. Photo by A. Nelson.

several of the fins is sharp and crisp. In contrast, the fin markings of the reef shark are dusky and grade from black at the tip to white at mid-fin. In addition, the body of the blacktip is marked with two quite obvious horizontal bars which are not evident in the reef shark. On the other hand, the trailing edge of the reef shark's tail is clearly marked with black from top to bottom. The tail of the blacktip is not.

There are other subtle differences such as fin placement and robustness of body, but all things being equal, I think of the blacktip as the more elegant of the two. In truth it is the overall appearance or "gestalt" that provides the best cues for identifying a shark. Thus experience, not knowledge alone, will always play a role in underwater observation and identification of such sharks.

For the remaining three days, we were blown out by the wind and weather, so no dive boats went to Shark Reef. If we

hadn't made it in on that last flight, the expedition and film would never have come off. Happily, we achieved all our objectives. I am awaiting word about our tagged shark. I predict she will be back.

In any case, our adventure can be seen on the Discovery Channel in 1993. So, if you want to see it as it actually happened, watch for it.

Postscript: In August, 1992, I received a letter from Friese. He wrote that our shark, which they named "Taggy," appeared only a few days after our departure and they have seen her more than 20 times since the first sighting. I will be most interested to see how long she remains in the Stella Maris feeding group.

Note: Dr. Gruber reported that on April 9, 1993 a longliner caught the entire Stella Maris shark population (including "Taggy"), cut off their fins, and dropped the still living sharks overboard.

The Caribbean Yellowtailed Damselfish

by CARLTON E. WYNTER Jr.

Caribbean reefs support a variety of marine life including many fish species which can only be found there. Because reefs are fragile systems that are easily destroyed by natural and human activities, such specialization can endanger the survival of these species. Ecologists around the world are studying the biology and ecology of common reef fish such as the Caribbean yellowtailed damselfish, *Microspathodon chrysurus*. Hopefully this research will lead to the preservation of coral reefs and their fish communities.

The yellowtailed damselfish is particularly useful for study because it is active during the day, common to shallow water reefs, and does not hide when approached by divers. Yet its complex biology and ecology are poorly understood.

Coral reefs are found around the world. They may cover miles, or be as small as a yard across. Reefs may extend out from shore, or form an offshore barrier creating a shallow lagoon. Small coral patches are common in such lagoons, and yellowtailed damselfish are typical residents of such patches in the Caribbean.

Stony corals form the reefs most familiar to divers and are created by colonial invertebrates which secrete protective limestone shells. Corals require clear, uncontaminated water, which makes them susceptible to damage from sediment, pollution, and toxic runoff from land. In the Caribbean shallow reefs often consist of staghorn, elkhorn, and brain corals. Broad sections of coral sup-

Wynter recently completed his doctoral work on reef fish community theories and the ecology of yellowtail damselfish at Princeton University.

port the algal growths that yellowtailed damselfish feed on.

Fish populations on coral reefs are diverse. A two-yard square coral patch may support over 30 different species. Some species are nocturnal, resting out of sight during the day and coming out to feed at night. Some are transient, moving from reef to reef, while other are fiercely territorial, defending a small patch of reef surface from other fish.

The yellowtail is a member of the damselfish group of fishes which is comprised of over 220 species worldwide. It grows to six inches in length and has the typical damselfish spade-like body. The adult is brown with small blue spots and a yellow tail. Unlike other Caribbean damselfishes, the yellowtail has easily moveable teeth and a notch in the plate covering the gills behind the eye. It spends much time swimming over the reef surface and will defend its feeding sites against other algae eating fish such as parrotfish. This pugnacious behavior makes it easy for divers to observe. My research, based on detailed observation of yellowtail feeding and gut examination, shows they are predominantly algae eaters.

Basic information about a species' biology such as diet, growth and development, competitors, and predators, is necessary to understand its requirements for survival. Lacking much of such information for coral reef fish makes conservation efforts difficult. Ecologists often compensate by generalizing observations to include related species. For example, some species of damselfish have been observed defending territories. Lacking other data, some researchers assume that territorial defense is typical of

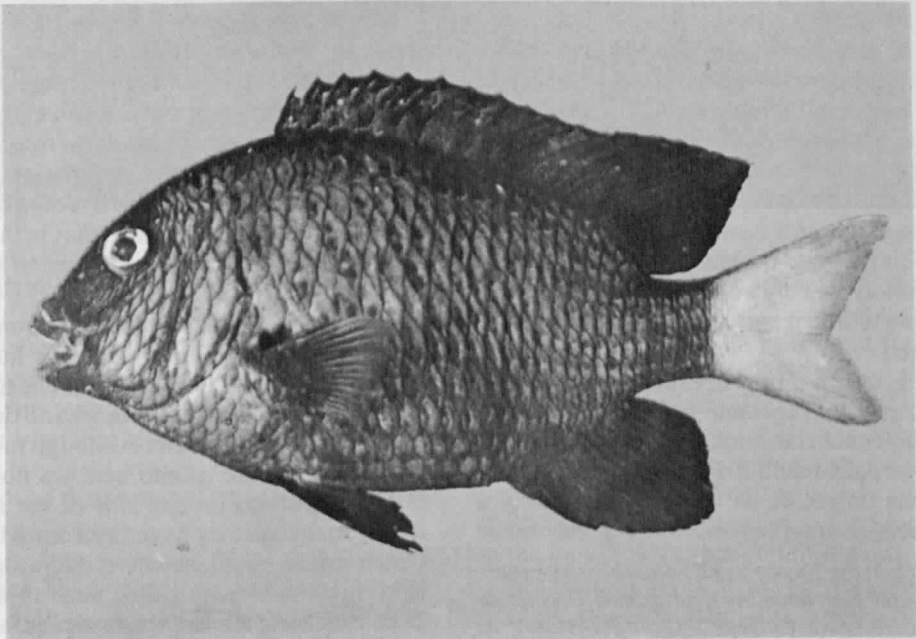
all damselfish. However, reef fish are complex organisms, and their behavior does differ from species to species, so such generalizations may lead to incorrect conclusions.

We do know that yellowtail reproduction is typical of damselfish in that it is cyclical and lunar cycles influence the egg hatching. The young go through a distinctive larval stage. Observers report that yellowtails spawn at dawn. Their adhesive eggs are laid on reef surfaces and are guarded by the males until hatched. The larvae, which do not look like the adults, rise into the open water. Ocean currents carry them for probably several weeks, although they may also have limited self movement. They subsequently settle onto coral reefs and transform from larval shapes into miniature replicas of the adults.

Larval dispersal of reef fish like the yellowtail allows for distribution of young over wide geographical areas, but such far ranging and uneven distribution makes estimating reef fish populations

difficult. Predicting the effects of destruction of local populations on the entire population of a particular reef fish is also difficult. It is possible that the larval distribution minimizes the effect of a local disturbance by bringing in recruits from healthy areas. We do not have enough data yet to be sure. Patterns of colonization are considered key to understanding whether reef fish can survive in a changing reef environment. Experiments continue on small coral patches where yellowtails are commonly found.

The public as well as ecologists should be concerned about species diversity. Most of the Earth's animal life is small, rarely seen, and little understood. But much remains to be learned about some of the most visible and beautiful life forms such as coral reef fish. Human activity like shoreline development can easily impact coral reefs and their fish populations. To conserve fish like the yellowtailed damselfish, we need to learn more about their habitat requirements.



Sandy Hook's Sea Beans

by DAVE GRANT

I once presented a peculiar beach find to my biology advisor in college, a zoologist, who I assumed knew everything there was to know — at least he had given his students ample reason to think that was the case. It looked to me like a seed, with a seam on its perimeter and a scar where it might have been attached to a stem. After scrutinizing it for a few moments and conferring with his office mate, the department botanist, he said, “I give up...animal, vegetable or mineral?,” presumably thinking I was trying to stump him.

Oftentimes the most enigmatic finds on the beach are simply everyday things that are out of place at the shoreline. My “find” had gray fur and black stripes — certainly animal-like features and not unlike a sea mouse, our most peculiar polychaete worm — but it also had a woody feel to it and in my naivete I guessed correctly that it must be a form of plant. Warily we opened it and found it was a seed case, solving part of the mystery and boosting my confidence as a budding biology student. However, it wasn't until years later when I first ate a mango in Florida that it finally dawned on me what it was that had washed up so long ago and how it had arrived there. Being a good beachcomber, I had stuffed it away in a drawer, and remarkably, was able to find it and confirm it was a mango seed.

I often find myself murmuring, “Animal, vegetable or mineral?” when I'm beachcombing, and invariably after I've researched it a bit, the most mysterious object of the day ends up being a seed or fragment of some plant. Since

Grant, the Society's chief naturalist, is a year-round beachcomber and directs Brookdale Community College's Ocean Institute at Sandy Hook, NJ. He took the photo and created the pencil sketches for this article.

most woody things float, at least for short periods, it's only logical that if they are washed into some water system that they should end up eventually stranding on the beach. Mango seeds remain buoyant for as long as three months, long enough to be carried by the Gulf Stream from the Florida Keys and Bahamas, where it grows, to Sandy Hook.

Plant materials wash up on our shores incidentally or as part of their life cycles. The incidental finds include seeds, nuts and pits from land plants of the flood plains and shorelines and from fruit that animals deposit and humans dispose of in the water. Walnuts, hickory nuts, acorns and samaras from maple trees are often found on beaches located near the river mouths where they washed out. Peach and cherry pits are also common, even on secluded beaches, and are in a sense another pollutant that people heap on the shore.

None of these local seeds or nuts appear to be tolerant enough of the saltwater to have much chance of sprouting after they wash up. However, certain other seeds and nuts, especially tropical ones, are adapted to survive over a year in the sea and still remain viable — a remarkable feat for creatures that in their growth stages are quite sensitive to the desiccating effects of salt.

They are able to do this because most are surrounded by an impervious husk and contain air sacs for flotation. The true “sea beans” are from the tropics and drift north on the Gulf Stream. Although most types rarely make it onto beaches north of Cape Hatteras on this side of the Atlantic, many species have been found in Great Britain and elsewhere in Europe. Here they have been called such things as confinement stones, worm stones, and kidney fat, reflecting the widespread belief that they had curative values.

Some were also considered to bring good luck and were fashioned into snuff boxes, teething rings, and even amulets to ward off the Evil Eye. It is said that Christopher Columbus was inspired to search for undiscovered lands to the west by these mysterious gifts from the sea. In fact, the best known of all the drift seeds and fruits (or disseminules) the sea heart (*Entada*), a seed from a West Indies vine, is called "*favas de Colom*" — the Columbus-bean, in the Azores.

guts of animals, mostly birds; and through human activities — mostly littering.

Drifting or aquavectant disseminules from the tropics found on our beaches over the years include coconuts, true sea beans, sea hearts, and mangos. The large number of Latin American immigrants around New York City, bodegas catering to their tastes, and the availability of a variety of tropical fruits in area supermarkets, may account for the increase in



As with anything found at the beach, drift seeds are interesting, fun to collect, and allow us to speculate like early mariners about currents that wash distant shores. Progeny of those plants that grow at the tenuous limits of the terrestrial environment represent the lunatic fringe of the plant world, ever attempting to expand their ranges away from the safety of the tropics.

A large variety of plant disseminules reach Sandy Hook by: drifting from the tropics in the Gulf Stream or down stream from our fresh water rivers and neighboring beaches; being carried in the

mango pits at the beach in the last few years. Whole coconuts are hard to miss when they wash up, and we do get them fairly frequently this far north, but fragments like the hacked-off end of the edible inner nut are often puzzling to beachcombers. The word coco is sometimes attributed to the Portuguese, meaning "monkey face." With artistic license it's possible to imagine eyes and a mouth in the dark holes at the end of the nut.

Sea beans and sea hearts are also great oceanic travelers from the tropics and may be more common here than we think. Because they are so buoyant, they

tend to be stranded at the highest storm tide drift lines and settle just where they are designed to — high on the drier parts of the beach away from the salt water (and beachcombers).

It is too cold for these tropical and subtropical plants to grow at our latitude, but worth a try at potting them up to sprout them as indoor plants if you find one on the beach. This would certainly be fortuitous for a seed that has survived a thousand mile voyage from the south. However, seeds of local freshwater plants that drift downstream to the sea are not as lucky because they cannot survive or sprout in salt water.

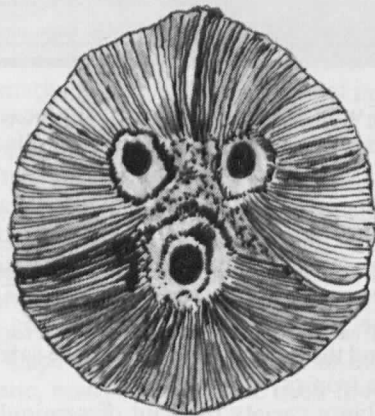
The water-nut, possibly the most puzzling freshwater plant that regularly strands here, is actually from a wetlands plant of European origins. Called a swimming water-nut, Jesuit's water-nut, Sanghara-nut, and by young beachcombers, a Devil's head; it is an edible Old World emigrant. Like many exotic plants it has become well established in America — probably with coaxing from humans — but not by drifting here. The water-nut (*Trapa natans*), grows in the freshwater portion of the Hudson River and elsewhere in the East, and thrives in ponds and slow-moving streams. It's a weird and durable trinket from the Jersey shore that regularly embarrasses beachcombers who mistake it for a shark or skate egg case, which it resembles in color and texture.

Other plant seeds that flow downriver to us are cast off by trees that grow close to the water. The most common are "buttonballs" from sycamores, those magnificent trees of swamps and city streets. The ripe ball is a soft, chestnut-colored mass of hairy seeds that is about an inch in diameter. Countless children toss them around schoolyards, but rarely recognize them on the beach. Sweet gum trees, another freshwater wetlands species of bottom lands and riversides, also drop seed "balls" that find their way to the ocean. These are about the size of the sycamore's buttonballs, but have a

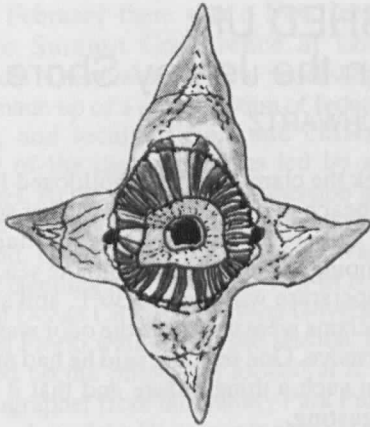
honeycombed appearance after a good pounding in the surf.

Acorns and hickory nuts are easy to identify once you realize they are not from a sea creature, but from trees that commonly hang over river banks. Walnuts, on the other hand, produce a large, dark corrugated nut that, whole or broken, can cause confusion when you find it anyplace else but under a tree. Often they are split open, revealing an owl-like face to further befuddle beachcombers.

Winged seeds from several tree species end up at the beach in great quantities, especially in the summer and fall. Maple and ailanthus samaras get a boost from the wind and oftentimes end up in rivers, where they drift down to the shore. Both trees are well established on barrier beaches even though they seem to be out of flying range for the seeds. Perhaps their seeds are tolerant of a short dip in salt water. Tulip trees also add flotsam and their "cones" which look a bit like miniature dried pineapples, are made up of scores of tightly packed winged seeds. Both the cones and the seeds are common on the beach. Stripped of the seeds, the cone's stem is about the size and shape of a candle from a birthday cake.



The "monkey" or "grinning face" at the base of a coconut.



Sandy Hook's sea bean, the water nut.

True pine cones are common on the beach too. Equally abundant are the spiny cones of the native pitch pine, which grows on some barrier islands, and Japanese black and Scotch pines — ornamentals that are planted frequently at the shore because they can tolerate the salt spray.

Birds bring “avivectant” seeds to the barrier beaches as they digest the fruit in their guts. In fact most of the plants on Sandy Hook are fruit-bearing and birds distribute their seeds. Robins and cedar waxwings, fruit-eaters in the winter, don't all fly south during the colder months. Many head for the coast and sometimes they are the most abundant winter land bird here. As a result, it is not unusual to find pits of cherries, beach plums, holly, shadbush, and cedar at the beach. Tree swallows rely on bayberries when the insects are gone, allowing them to dally along the coast during the fall migration. Some even overwinter in the mid-Atlantic. By December the shrubs are stripped and the beaches here are littered with the spent seeds that thousands of swallows have passed through their digestive tracts. These often accumulate at the storm tidemark with the seeds of other common beach

plants like sea rocket, beach grass and cocklebur, all temperate, salt-tolerant plants that, like their rugged tropical cousins, have seeds that can drift and survive. In fact, sea rocket is so durable, it is said to be the first higher plant that colonized the volcanic island of Surtsey in Iceland.

Finally, this brings us to materials that humans are responsible for. Unfortunately this is not a new phenomenon, since we've tossed our trash into the water since Colonial times, and even the most conscientious of us dispose of our banana peels and peach pits in the sand or overboard. But it may not always be detrimental to the beach. There's speculation among some botanists that prickly pear cactus, an inland plant with fruit that is not utilized heavily by birds, got to some of our offshore islands with the help of native Americans who canoed out to them.

Other human trash includes the obvious, from peanuts, pistachios, and the pits of peaches, plums, apricots, and nectarines that are tossed from boats or left on beaches, to insidious and potentially harmful things like plastic. The little plastic packing peanuts, although not digestible, are eaten by a variety of sea creatures, especially birds, that mistake them for prey organisms.

Animal, vegetable or mineral...trash or treasure, all of it is interesting to collect; reminding us the ocean is always full of surprises — most of which end up on the beach.

SOURCES FOR IDENTIFICATION:

C.R. Gunn & J.V. Dennis (1976) *World Guide to Tropical Drift Seeds and Fruits*. Quadrangle/The New York Times Book Co.

H.B. Guppy (1917) *Plants, Seeds and Currents in the West Indies and the Azores*. Williams and Norgate, London.

J.P. Scurlock (1987) *Native Trees & Shrubs of the Florida Keys*. Laurel Press, Pittsburgh.



ALL WASHED UP: Clam Strandings on the Jersey Shore

by ED SCHWARTZ

On the morning of January 4, 1992, at Seaside Heights, NJ, the ocean was wild and furious, as I had never seen it before. Huge waves successively thundered and broke on the beach. Keeping a safe distance away, I tried to get some pictures but the camera lens kept getting wet. An impressive event and sight but unfortunately no pictures.

The next night my wife, Pearl, and I watched NJ Network News. There were reports of the destruction the storm had caused along the Jersey coast. One seg-

week the clams had been bulldozed from the beach into tall piles and farther south we observed two front-end loaders dumping the clams back into the sea. Air temperature was around 36°F. and since the clams were still alive the odor was not offensive. One resident said he had never seen such a thing before and that it was disgusting.

We drove south to Longport. Cleanup had not started and the clams covered the beach for a long distance south. We continued on south to a street where some



ment showed millions of sea clams dislodged from the sea floor and flung across the beaches from Margate to Longport. That sparked my interest to take some photographs that would compensate for those I had missed during the furious wave action.

On Saturday January 11, we drove down to Margate for a look. During the *A Society member since its founding in 1961, Schwartz is a photographer who lives in Toms River, NJ.*

rocks jugged out into the water and there were fewer clams. To our north the beach was inundated with clams clicking and clacking with each wave. They formed swaths anywhere from 150 to 200 feet wide in an unbroken stretch north to Margate. I believed I was on to a new phenomenon. I made camera exposures — long shots, cross shots, slope and location shots. When the film was processed, the results were very good. I was sure I had a scoop.

In February there was a New Jersey Shore Summit Conference at Long Branch. There were several workshops, one made up of a cross section of federal, state, and local officials and citizens. Most of the discussion was led by engineers. At the round table discussion my prints of the stranded clams were passed around. One shot showed the high water line extending right up to the row of condos in Ocean City. At this point Governor James Florio walked into the session. He picked up the photo and looked at it. A photographer from the Asbury Park Press took a shot of the Governor looking at the picture which appeared on the front page of the paper the next day.

In March we attended a local Audubon meeting where Dave Grant gave a talk on the dynamic forces at work along the coast. I told him about the millions of clams on the beach at Longport which I believed had never happened before. I showed him my pictures. Dave said that

he had written a Field Note called "Mass Standings of Surf Clams" for UNDERWATER NATURALIST in 1985. So now I no longer had a scoop.

Being a longtime members of ALS I had all the publications saved and lo and behold in Volume 15, Number 3 (August 1985) was Dave's in depth description of his observation of "enormous numbers of clams washing ashore at the tip of Sandy Hook and reports of a similar stranding in 1984." However there were no pictures. So now I'm providing a January 1992 picture of sea clam strandings on the beaches in Longport.

EDITOR'S NOTE: Such strandings happen when clams set too close to the surf zone and are subjected to storm waves. Sometimes the clams are young (1-2 inches across). This observation was of 4-6 inch clams, less common. Clams that set in deeper water (they are found out to 120 feet) do not suffer this dead-on-the-beach fate.

GENERAL STORE

Here is a list of books the Littoral Society keeps in stock at discount prices, plus other items for sale. All prices listed include cost of postage.

BOOK SHELF

Discovering Sharks. Edited by Samuel H. Gruber, 23 chapters written by 27 scientists currently conducting research on the world's shark populations. Covers feeding habits, reproductive strategies, anatomical features, and sensory systems from deep-sea dwellers to coastal cruisers. \$10.

Natural Lives: Modern Times, by Bruce Stutz, chronicles the people, places, and natural history of the Delaware River from the Capes upstream to the East and West Branches. \$20.

AMERICAN LITTORAL SOCIETY BOOKS

By Lyons & Burford, Publishers

Seaside Reader, edited by D.W. Bennett. An anthology of the best of seaside writings. \$20.

Whale Watchers Handbook, by David K. Bulloch. A handy pocket guide to whales, dolphins, and porpoises of North America. \$12.

Marine Parks and Aquaria of the United States, by Anthony L. Pacheco and Susan E. Smith. A complete reference guide to 95 marine life displays from Maine to Honolulu including facilities, rates, hours, etc. \$10.

The Underwater Naturalist: A Layman's Guide to the Vibrant World Beneath the Sea, by David K. Bulloch. A natural history of the sea and what can be found from warm ocean coral reefs to the cold waters of Puget Sound and the Gulf of Maine. \$20 hardcover.

The American Littoral Society Handbook for the Marine Naturalist, by David K. Bulloch. Basic techniques, projects, and activities to guide amateur explorations on the beach and beyond. \$10.

Anglers' Guide to Sharks, by Jack Casey, a reprint of this classic brief on how to identify sharks. \$3.

A Field Guide to the Atlantic Seashore, by Kenneth Gosner. Peterson Series. Paperback \$12.

Field Guide to Saltwater Fishes of North America, by A.J. McClane. A non-technical guide with good illustrations and text, covering Maine to Florida. \$12.

OTHER ITEMS

Fish Tag Hats: baseball-style cap, royal blue and white sporting tagged striped bass and "American Littoral Society Fish Tagging Program." One size fits all \$7.

Crew Neck Sweatshirts and T-Shirts - A littoral design of a night heron, bass, shellfish. Sweats: 50/50, gray with black and teal ink. M, L, XL \$18.

T-Shirts: 100% cotton, gray with purple, red, or teal accent on neck and roll-up cuffs. Specify accent color when ordering. Medium, Large, X-large. \$15.

Littoral Society Logo: The new logo in blue and white. Jacket patch \$4; window decal \$1.

Fish Tag Kits: Regular kit of 10 tags, needle, instructions. \$5; tagger's jacket patch \$4.

For all items in this notice send a check made out to:

AMERICAN LITTORAL SOCIETY, SANDY HOOK, HIGHLANDS, N.J. 07732



A Parasite For Prionotus

by DAVE GRANT

Sea robins (*Prionotus*) are one of the best known, but least appreciated fishes of the Middle-Atlantic waters, even though they are often the first saltwater trophy most of us catch. Although they are considered bait-stealers and trash fishes, the much maligned sea robins are perhaps the most interesting and beautiful of all our local fishes. To catch one, simply go fluke fishing in the summer.

Two species are regularly found in our area during the warmer months, the northern or common sea robin (*Prionotus carolinus*) and the striped sea robin (*P. evolans*). In spite of the name, the striped is the more common in Sandy Hook Bay. Also it is the larger and more attractive of the two, displaying many shades of red and orange on its body and fins as well as dashes of turquoise around the fins.

Fishermen have been known to call the adult striped sea robins, "cock robins," mistaking them for the males of the species. The smaller less colorful cousins, the northern sea robins, are assumed to be the females.

Another nickname for the sea robin is "green eye," and it may have the most beautiful eyes of any fish. It has been described as an "opalescent gem set in a ring of gold." The color can vary from rich green to dark blue to black depending on the light that strikes it.

During the 60's, U.S. Fish and Wildlife yearly creel surveys showed individual Mid-Atlantic anglers caught between 16 and 68 sea robins each summer. Some fishermen will tell you they catch that many on one fluke fishing trip.

Sea robins are the only local fish that "walk." If you are lucky enough to witness their underwater antics, you'll discover that they use their unique, detached, finger-like fin rays to drag themselves across the bottom. They also

use these fins to burrow into the sediments so only their eyes and the tops of their heads are exposed, a tactic for avoiding predators, to ambush prey, or to wait out the tidal currents. The fins are used as well to agitate the bottom and help sense food in the area.

Sea robins are noisy fish which is why the early European settlers called them "gurnard," a word derived from the French word *grogner* which means to grunt, growl, or grumble. Sea robins do all three when they are hauled out of the water on the end of a hook, much to the delight of novice anglers.

All things considered life is probably not too tough for sea robins. They are edible but are not sought after commercially on a large scale, and they certainly aren't coveted by recreational fishermen. They are omnivorous, bite on any bait, and always seem to have bellyfuls of any thing they can fit in their substantial mouths, even unwary young sea robins. In fact examining their stomachs will provide an excellent sample of the fish diversity in the bay. Although they are the most abundant bottom fish and many are hooked every summer, most are released. Their bony heads and sharp spines probably deter lots of other creatures besides humans from eating them.

While carefully unhooking a large sea robin recently, I noticed curious, scale-like bumps on its head. At first I thought they were just another feature on the bony, heavily sutured skull, but when I touched one with forceps, it moved like an inch worm. I collected a few of these specimens and it wasn't long before I noticed that about eight out of ten sea robins I caught had them.

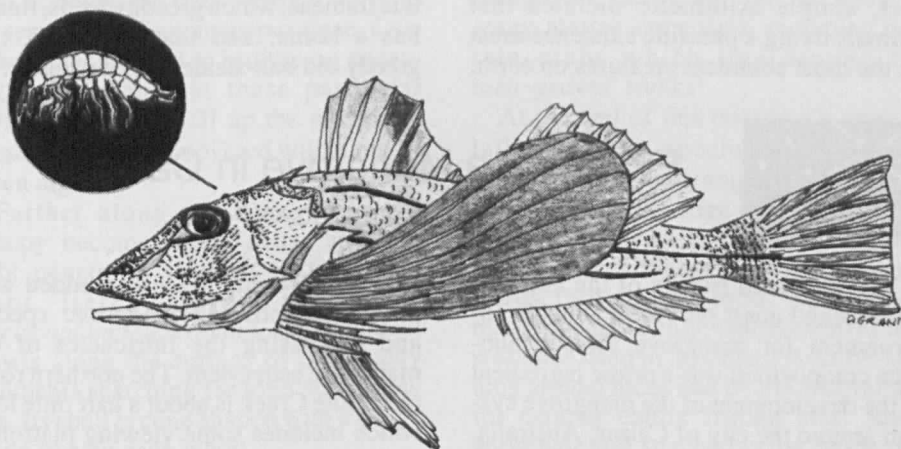
Most fish carry a half dozen or so and they congregate around the top of the head and between the sea robin's beautiful green eyes, above the area that is

covered if the fish is buried in the sediment. The sea robin's intricately textured head offers innumerable footholds for hitchhikers.

A magnifying lense revealed the bumps to be amphipods, small crustaceans with laterally compressed bodies. They are ubiquitous in the sea, estuaries, and fresh water, and there are even a few terrestrial species. The narrow shapes, antennae, and large eyes of these tiny hitchhikers readily identified them as amphipods. Determining which species

to science are found on slow-moving, slow-growing bottom sharks and bottom fish, many of them "ambush predators" of cold or deep waters, like the goosefish, sculpin, and flounder. These amphipods settle around their hosts' mouths, gills, pectoral fins, wounds, and anal vents and have specialized mouth parts, suggesting that they feed on uneaten food, mucous, skin tissue, and fish wastes.

Under the microscope the sea robin hitchhikers look a lot like other shrimp-like members of the group, but with large,



they might be and what they were doing on sea robins required a bit of study.

Most of the 600 or so species of amphipods are free-living on the bottom or in the water column. However, some live intimately as commensals or even parasites with a wide range of other creatures. Many of these arrangements are species-specific and amphipod hosts include kelp (where they are responsible for gall formation), sponges, jellyfish, anemones, tube-building worms and crustaceans, salps, tunicates, sea turtles, and even whales. So it's no surprise that several different groups of amphipods have become for parts of their lives, external parasites on fishes, which they cling to with specialized hook feet.

These parasite forms have not been studied extensively. Most that are known

dark red, multifaceted eyes. They also have sizable hooked appendages that allow them to cling tenaciously to their hosts. They are members of Lafystiidae ("to swallow greedily"), an amphipod family that was first identified in 1888 off Nova Scotia as parasitic on fishes.

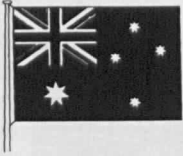
Determining the species of sea robin amphipods required expert opinion on a number of microscopic details of amphipod anatomy. They were eventually identified as male and female *Lafystius frameae* by Anne Frame, the Sandy Hook Marine Lab biologist who first recorded the species from samples taken from a New Jersey offshore sludge dumpsite in 1970. It was presumed at that time that they were parasitic, but the host fish was not known until now.

Sea robins are not noted in the scien-

tific literature as being particularly bothered by diseases or parasites. References seem to indicate that only internal parasites like nematodes, cestodes, and trematodes have been identified in them. This is likely related to the fact that since sea robins are not an important commercial species, no one has taken the time for a close look. We tend to forget that "every dog has a few fleas," especially in the sea, and often when examining the different possible lifestyles available to marine life — drifters, free swimmers, or bottom dwellers — the parasite is overlooked. In fact, simple arithmetic dictates that animals living a parasitic existence must be the most abundant creatures on earth.

So life may not be as carefree for the sea robin as it seems. And it's no surprise to me that they are bothered by these "fleas" and probably other inconveniences. Some day a budding ichthyologist in search of a project will make a career out of studying sea robins or their parasites and discover that they are as exciting as many of our larger, more thoroughly studied species.

For now, those of us who are friends or foes of the "cock" robin will be satisfied (for different reasons) with the knowledge that as of September 1992, *Lafystius frameae*, which greedily feeds, finally has a home, and that *Prionotus*, that greedy old bait-stealer, has a parasite.



Exploring a Mangrove in Cairns

by JAMES DUGGAN

The protected fringes of the northern Queensland coast provide a suitable environment for mangrove forests. Substrate composition was a prime ingredient in the development of the mangrove system around the city of Cairns, Australia. Here some 16 square miles of mangroves grow on a sand-ridge plain consisting of alluvial silt and clay. These sediments are the deposits of a flood plain created by the Musgrave River prior to the Pleistocene Age when volcanic activity diverted the river farther south. In recent times, the Barron River has deposited mud around Cairns, providing an ideal environment for mangrove growth. A mangrove area near Cairns International Airport was opened in 1988 complete with a boardwalk trail, jointly funded by the Cairns City Council, the Cairns Port Authority, and the Commonwealth.

The Jack Barnes Bicentennial Mangrove Boardwalk takes either a northern *Duggan lives in Queensland, Australia, and enjoys exploring and writing about its littoral zone.*

or southern route. Each is studded with plaques identifying mangrove species and discussing the intricacies of the mangrove ecosystem. The northern route to Middle Creek is about a half mile loop which includes some viewing platforms and a canopy tower. The southern route to Swamp Creek is under a half mile and ends at a tower which provides good views of Cairns City.

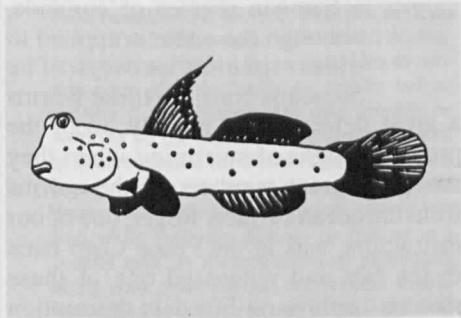
The sights, smells, sounds, and sensations of a mangrove must be experienced to be appreciated. A prerequisite for any mangrove walk is insect repellent since mosquitoes in this area do carry Ross River virus and at times, dengue fever.

At the beginning of the walk there is a salt flat devoid of mangrove flora, but full of samphire or *Sarcocornia quinqueflora*. This succulent plant, common in salt flats, thrives with little or no competition because of the high salt content of the soil. Samphire is edible either raw or cooked. In Europe similar species were used as a source for soda for soap and glass production.

At the entrance to the mangrove forest,

the first two dominant species are eucalypt (*Avicennia eucalyptifolia*) and yellow (*Ceriops tagal*). Both host several species of gastropod on their trunks, as far as six feet up. *Cassidula angulifera* is the least common. *Littorina scabra*, a periwinkle, is the next most common, and *Cerithidea anticipata*, a mud whelk that can withstand long periods of time out of the water, is the most common. All three of these herbivores are detritus feeders and are common to the northern mangrove swamp. The periwinkle is found on the lower trunks of the wood as well as below the trees where it browses on seaweed and microscopic algae. *Cassidula* species tend to browse on decaying vegetation, but these particular individuals were well up the mangrove trunks; their shells covered with a tint of green algae.

Farther along the boardwalk, the canopy becomes more dense and less light penetrates through to the forest floor. Here, a larger gastropod, *Telescopium telescopium*, a mud whelk, crawls along the surface of the muddy sediments searching for food during low tide. Its shell is cone shaped with a single white line on each whorl.



Small fish jump between pools of water as the tide ebbs. Closer observation reveals them to be mud skippers. *Periopthalmus koelreuteri*, the most common of the five species found in the swamp, is a drab, brown-grey fish, about six inches long. Its pectoral fins are muscular and have developed into limb-like ap-

pendages for creeping along the mud. It uses its tail to skip and leap across the mangrove swamp, and is most readily seen on an outgoing tide.

At this point along the walk, the dominant mangrove species has changed again. The trees commonly seen here have prominent stilt roots and are primarily of the *Rhizophora* species, the most common being the spider mangrove. Popping sounds made by crabs and mollusks can be heard as they go in and out of their burrows and shells in the mud. Leaves fall from the mangroves, decay, and are fed upon by many marine organisms, including certain crabs which live around the mangroves' trunks.

At the end of this boardwalk route, a tall mangrove species with a large canopy above, the orange mangrove, can be seen along the edge of the forest and swamp. This variety has many knobby protuberances or knee roots thrusting upwards through the mud. The orange mangrove has a high tannin content and was once used in Southeast Asia for tanning animal hides and by the Australians for tanning cotton fishing nets. Seeds germinate still attached to the parent tree and develop into seedlings without any dormant period in this species and Aborigines ate the hypocotyl (portion of the seedling between the stem and the root) after the tannin was removed.

The northern route boardwalk has similar flora and fauna, with a well exposed mud flat along one leg. Here, many fiddler crabs scurry around with their bright orange claws in full view, keeping their burrows cleared and protected from other crabs as the tide ebbs. The viewing platform on this route provides a good view of Middle Creek. Schools of mullet swim along the banks awaiting the flood tide to bring them in among the mangroves to feed.

Should a mangrove swamp be accessible in your area, I highly recommend a walk or paddle through it.



The Dance of the Luminescent Threadworms

by JOHN and PAT KINGMAN

While visiting South Water Cay, a remote Belizian island, we witnessed the mating courtship of the luminescent threadworm, *Odontosyllis enopin*. During the months of July and August, on the third and fourth night after the full moon and 1¼ hours after sunset, female luminescent threadworms initiate a swarming ritual with striking patterns and flashes similar to those of fireflies.

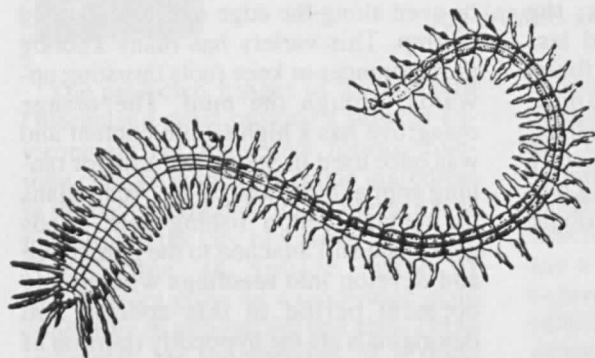
As part of a Save The Rainforest group, under the sponsorship of The Programme for Belize, twenty-two of us, ranging in age from high school seniors to a retired middle school teacher,

even brighter and undulating slivers of light. Males attracted to this display streaked through the water like Patriot Missiles. Males and females collided and burst into explosions like 4th of July fireworks. Sound effects were provided by the spectators on the dock with the enthusiasm of children totally engrossed in a natural wonder. The display lasted only 15 minutes.

Odontosyllis belongs to the phylum Annelida and the class Polychaeta. The female exhibits a phenomenon known as epitoky which is the formation of a reproductive individual. The female luminescent threadworm metamorphasizes into a swollen body bursting with gametes. To ensure fertilization, swarming in the male and female must coincide and take place over a very short period of time.

The most famous display of this type is exhibited by the so-called palolo worms which are a Samoan species of eunicids, although the name is applied to other species as well. The Samoans consider these worms a great delicacy and eagerly await the predicted night of swarming when they scoop up great numbers of the worms from the ocean surface. Roger, one of our instructors, was in the Peace Corp back in the 60s and witnessed one of these mating displays on Fiji. His description of the catch and subsequent feasting ritual of worms over a foot long stays in our minds.

We know that textbook facts and information are important, but experiencing natural phenomenon like the dance of the luminescent threadworms in Belize makes us better and more enthusiastic teachers.



crowded onto the dock right outside our housing station one evening to catch the action. The still waters began to flash from the depths with the green glow of luminescent creatures. The female worms were warming up. Eventually they rose to the surface and swarmed in tight circles for 10 to 20 seconds. As they spiraled around in the water they secreted a halo of luminescent mucus that surrounded them in an aura of brightly glowing green-white light about a foot wide. Within this ring the females glowed as

The Kingmans teach high school environmental science, oceanography, astronomy, and earth science in New Jersey.



Swimming with Snails

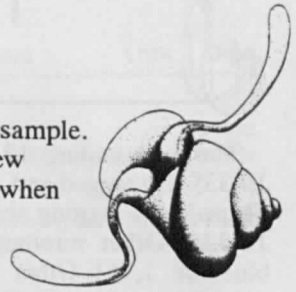
by PEGGY BOWEN

Last June my husband, Ed, and I were diving near Barnegat Bay in southern New Jersey. On the way down the anchor line we saw many naked sea butterflies near the wreck of the *Tracy* as well as lion's mane jellies. As we came up we found ourselves surrounded by swimming little black dots in between 10 to 45 feet of water. It felt as if we were swimming in coffee grounds.

On later examination, we found these dots were snails. Since we do a safety hang at 15 to 20 feet for five minutes, we know that thousands of these snails passed by. They clogged the plankton net in minutes. Unfortunately we could not

A member of the Society's Advisory Council and an avid diver, Bowen spends most of her summer weekends investigating the waters off the New Jersey coast.

bring home a live sample. I tried to "fix" a few of the dead snails when I got home, but they dissolved (?) in the formalin.



The shells had at least three whorls with the middle one the darkest. The animals seemed to be swimming using their feet. I thought these might be the shelled sea butterfly, but the soft tissues were wrong despite the swimming action seen on each side of the shell.

The ocean never fails to amaze me. We have something new every summer. I would have hated for this to be called dirty water — it was active water.

NOTE: The most likely candidate is young of the shelled sea butterflies. The shell of the planktonic Limacina is recognizably snail-like.

GUIDELINES FOR SUBMISSIONS

UNDERWATER NATURALIST is the Society's journal. Its pages are open to all members for articles, notes, pictures, observations, comments, compliments, or criticisms.

SUBJECT MATTER: We favor direct reporting. The best guidelines for articles are back issues of the journal. **Feature articles** run 1,500-3,500 words or four to 10 double-spaced, typed pages. It is a good idea to submit your plan for such an article before writing it as someone else may already be working on the topic. We are also interested in shorter pieces for **Field Notes** and **Coast Issues**, so we encourage reporting observations of interesting bits of natural history you find while walking, diving, or fishing in a coastal area. Is there something happening along your coastline that our readers should know about, such as red tide in the Carolinas, whale deaths in New England, or mangrove preservation in the south? You can also submit a number of short observations or notes on an area. The best guideline of all is to not submit an article unless you think our members will want to read it. **Letters to the Editor** expressing thoughts on the magazine and its contents are especially appreciated.

ART WORK: For illustrations, black and white prints are preferred, but clear, color

slides or color prints with good contrast, drawings, maps, and charts will also be considered. Tables are discouraged; this information can usually be handled in the text. For **Cover Art** work we want clear, sharp 35mm color slides or color prints, either horizontal or vertical, having to do with littoral subjects above or below the water. Horizontals can wrap around from front to back. Action is nice but not essential if the photo is interesting. (Note: We keep all accepted art work until it is published unless otherwise requested.)

HOW TO SUBMIT: Typed, double-spaced manuscripts, please — Latin names (not too many) underlined. We do not carry footnotes; incorporate sources in your article. We edit for clarity, favoring clear wording over specialized terminology. Strunk and White's *Elements of Style* is our guide. Send your work with a stamped, self-addressed envelope. We will acknowledge soon after.

We do not pay for articles or illustrations, but we do send five authors' copies when published.



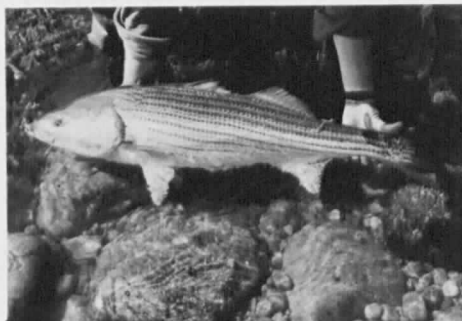
TAGGING REPORT

compiled by PAM CARLSEN

The year ending 12/31/92 produced 19,335 fish tagged and 1,331 recaptures. Striped bass tagging showed a record at 14,325. Other numbers: fluke 1,788; bluefish: 1,761. Other species included weakfish, tautog, red drum, and speckled sea trout. All inshore marine gamefish of 8" or longer may be tagged.

Safe release of fish is primary to the success of our program. In every case, the fish should be put carefully back in the water, never thrown. When it is noted that a fish, especially a striped bass, is exhausted, special care is needed. Whenever possible the fish should be put back in the water using two hands, one hand supporting the head the other gripping the tail. The fish should be moved back and forth to pass water over its gills, bringing in oxygen. As the fish revives, it will try to swim away let it. For more information, contact A.L.S.; we have copies of a "Fisherman" magazine article on striped bass release techniques and the "Sea Grant Released Fish Survival" guidelines.

On some bass tag cards, we have had reports of various unhealthy conditions. One was a bass covered with lumps and a whitish, gray slime; this is lymphocystis, a viral disease which rarely kills the fish, but reduces its desirability. Another was fin or tail rot with secondary ulcers. This is caused by a bacterial invasion of the fish and can lead to other diseases. Deformities such as pug-headedness or spinal curvature are generally believed to be a genetic problem or an abnormal embryonic development. Although these abnormalities can lead to poor mobility or eating problems, we note the tagging of a 24" humpback bass and its successful return one year later. The recapturer stated that the fish was healthy despite its handicap, but growth was non-existent.



John Mettler's 37 1/2" striped bass, a safe release.

The fall of '92 proved that fishermen are great observers of the natural scene. Rick Fink, Staten Island, called to tell of his encounter with a 4 1/2 foot harbor seal while fishing with friends in the wee hours of 11/3/92 at Sandy Hook. The seal appeared and swam around the fishermen, feeding, for 30 - 40 minutes. On Thanksgiving morning, Art Schweithelm reported a small harbor seal swimming around him for about five minutes at Crab Meadow Beach, Northport, NY. Paul McDonough, wrote of seeing two humpback whales feeding within casting distance off Beach Haven Park, NJ. In Cape May, NJ, Ray Szulczewski found that the stripers were feeding on baby lobsters 5" long, while Al D'Amato reported that Delaware Bay was loaded with 9 - 10" weakfish. Tony Evangelista fishing on the Hudson River at Englewood, reported great numbers of red hake (ling). All good signs for the future.

Neat return: 12" fluke tagged 8/3/91 by Steve Knapik at Pt. Lookout, NY recaptured 7/2/92 at 16" in a lobster trap off Block Island, RI.

Great swim: 30" bluefish tagged 5/23/92, 23 mi. E of Virginia Beach, VA by George Dulka was returned from Pt. Judith, RI on 7/25/92.

TAGGING RETURNS

Species		Place Tagged	Date	Recapturer	Location	Lnth	Date
Lgth	Tagger						
Atlantic Spadefish							
09	G Dulka	Offshr, Rudee Inlet, VA	08/02/92	N Clark	VA Beach, VA		08/03/92
12	G Dulka	Offshr, Rudee Inlet, VA	08/02/92	T Dulka	Offshr, Rudee Inlet, VA		08/19/92
Black Sea Bass							
09	T Wilkinson	Great South Bay, NY	08/25/92	A Sgueglia	Great South Bay, NY	10	08/30/92
08	A D'Amato	Cape May, NJ	09/03/92	B Antonio	Cape May, NJ		09/20/92
Bluefish							
28	H Millington Jr.	Provincetown, MA	10/11/91	C Brown	Offshr, Oregon Inlet, NC		03/20/92
20	W Anderson	Provincetown, MA	09/18/91	R Dayton	Little Egg Inlet, NJ	20	05/29/92
20	P Westcott	Charlestown, RI	09/06/91	J Esteban III	Calvert Cliff, MD	19	05/30/92
16	D Mann	Port Jefferson, NY	06/15/91	J Leggio	Great South Bay, NY	19	06/07/92
32	J Lutz	Avalon, NJ	05/30/92	S Franco	New Haven, CT		06/10/92
33	S Cunningham	Jones Inlet, NY	06/13/92	J Rogener	Moriches Inlet, NY	33	06/17/92
18	S Knapik	Jones Inlet, NY	06/09/92	R Pruyn	Atlantic Beach, NY	18	06/20/92
29	R Kyker	Stamford, CT	10/12/91	H Stroh	Plum Gut, NY	32	06/23/92
17	J Foti	Verrazano Bridge, NY	05/29/92	F Murphy	Sandy Hook Bay, NJ		06/25/92
29	R Kyker	Darien, CT	10/13/91	T Strelau	Little Gull Is., NY	30	06/26/92
20	R Meyer	Sandy Hook, NJ	06/28/92	J Bingle	Highlands, NJ	23	07/19/92
33	B Shillingford	Great Bay, NJ	05/03/92	H Post	Black Point, CT		07/24/92
22	S Klimek	Shrewsbury Rocks, NJ	06/07/92	E Hakam	Montauk Pt., NY	23	07/25/92
30	G Dulka	Offshr, Va Beach, VA	05/23/92	B Williamson	Pt. Judith, RI		07/25/92
22	S Klimek	Sandy Hook Chan., NJ	06/10/92	J Perkoski	Nantucket Sound, MA		07/30/92
30	R Kyker	Stamford, CT	09/22/91	R Moore	Norwalk Is., CT		08/01/92
29	S Klimek	Offshr, Sandy Hook, NJ	07/25/92	M Habel	Perth Amboy, NJ	31	08/05/92
32	J Lutz	Avalon, NJ	05/30/92	E Hayes	Stratford, CT		08/08/92
31	T Marburger	Shinnecock Inlet, NY	07/28/92	M Enne	Shinnecock Inlet, NY		08/11/92
35	S Klimek	Offshr, 17 fathoms, NJ	07/25/92	D Ambrico	Offshr, 17 fathoms, NJ		08/15/92
24	A Kazdin	Shinnecock Inlet, NY	08/02/92	G Palush	Offshr, Pt. Pleasant, NJ	24	08/23/92
12	B Salvaryn	Great Kills, NY	06/10/92	C Szeffler	Great Kills, NY	15	08/26/92
Fluke							
14	S Knapik	Jones Inlet, NY	07/28/91	M Brotherton III	Off Jones Inlet, NY	15	05/08/92
13	J White	Jones Inlet, NY	09/15/91	R Mott Jr.	Great South Bay, NY	15	05/15/92
14	S Knapik	Reynolds Chan., NY	05/21/92	R Dimin	Reynolds Chan., NY	14	05/24/92
13	S Carlsen	Atlantic Hlds., NJ	05/20/91	B Sinka	Perth Amboy, NJ	16	05/25/92
13	S Carlsen	Shark River, NJ	05/24/92	K Mann	Belmar, NJ	13	05/30/92
18	S Carlsen	Shark River, NJ	05/24/92	E Swazek	Shark R. Inlet, NJ	18	06/12/92
11	M Schavel	Gilgo Beach, NY	06/10/91	D DeGeorge	Gilgo Beach, NY	16	06/16/92
13	S Knapik	Pt. Lookout, NY	06/04/92	J Dotsey	Pt. Lookout, NY	14	06/17/92
16	S Klimek	Mud Buoy, Offshr, NJ	10/05/91	D Mell	Keansburg, NJ	16	06/25/92
14	M Frawley Jr.	Shinnecock Bay, NY	08/27/91	K Torelli	Provincetown, MA	15	06/26/92
11	S Wisnewski	Provincetown, MA	06/24/92	D Masse	Provincetown, MA	11	06/26/92
13	P Hahn	Sandy Hook, NJ	06/20/92	D Novosat	Sandy Hook, NJ	13	07/01/92
12	S Knapik	Merrick, NY	08/03/91	J Grant	Block Island, RI	16	07/02/92
11	S Wisnewski	Provincetown, MA	06/24/92	N Frey	Provincetown, MA	15	07/05/92
14	S Fries	Ambrose Chan., NY	09/13/91	L Larsen	Belford, NJ	17	07/09/92
12	T Witek	West Islip, NY	05/23/92	A Marchetta	Captree Inlet, NY	15	07/12/92
12	S Knapik	Pt. Lookout, NY	07/06/92	B Brown	Lido Beach, NY	12	07/12/92
11	D Newland	Rockaway Pt., NY	07/07/92	C Lanzon	Sheepshead Bay, NY	12	07/13/92
12	S Knapik	Pt. Lookout, NY	07/09/92	T Janis	Reynolds Chan., NY	13	07/13/92
13	S Carlsen	Deal, NJ	07/03/92	J Moore Jr.	Asbury Park, NJ	12	07/14/92
12	I Donatiello, Jr.	Lavallette, NJ	08/23/91	T Poole	Island Beach St. Pk., NJ	14	07/17/92
13	P Hahn	Sandy Hook, NJ	06/20/92	S Klimek	Sandy Hook, NJ		07/19/92
12	S Fries	Rockaway Inlet, NY	06/20/92	T Gucciardo	Marine Pky. Brdg., NY	12	07/22/92
12	S Fries	Coney Island, NY	06/27/92	A DuJat	Norton Point, NY	12	07/24/92

Species	Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
11	S Klimek		Sandy Hook, NJ	07/19/92	K Armbrister	Sandy Hook, NJ		07/25/92
10	S Carlsen		Atlantic Hlds., NJ	06/29/92	A Canuel	Atlantic Hlds., NJ	10	07/26/92
12	J Brittin		Delaware Bay, NJ	07/15/92	"Lady Chris"	Cape May Pt., NJ	12	07/28/92
13	S Knapik		Pt. Lookout, NY	07/09/92	A Froitzheim	Baldwin, NY		08/01/92
10	J Dymarczyk		Sandy Hook, NJ	07/11/92	P Zagajec	Sandy Hook, NJ	12	08/02/92
13	C Witek		West Islip, NY	05/24/92	D Algarin	Fire Island Inlet, NY	14	08/05/92
13	E Swain Jr.		Fire Island Inlet, NY	07/17/92	J Carroll	Fire Island Inlet, NY	13	08/05/92
14	K Leopold		Great South Bay, NY	07/19/92	A Stolinas	Fire Island, NY	14	08/06/92
13	E Swain Jr.		Fire Island Inlet, NY	07/26/92	I Cohen	Fire Island Inlet, NY	13	08/07/92
11	S Fries		Rockaway Inlet, NY	08/02/92	B Longstreet	Rockaway Inlet, NY	11	08/08/92
12	V Viola		Moriches Inlet, NY	07/15/92	M Symancyk	Moriches Bay, NY	12	08/10/92
11	M Palladini		Fire Island Inlet, NY	07/08/92	M Masia	Fire Island Inlet, NY	12	08/12/92
13	J Beard		Great South Bay, NY	06/06/91	R Barrett	Fire Island Inlet, NY	18	08/12/92
11	S Knapik		Pt. Lookout, NY	07/10/92	M Kraft	Reynolds Chan., NY		08/13/92
13	S Knapik		Pt. Lookout, NY	07/10/92	V Caulfield	Pt. Lookout, NY	14	08/15/92
12	D Obropta		Sandy Hook, NJ	08/05/92	R Bowitz	Sandy Hook Bay, NJ	14	08/15/92
12	R Anderson Jr.		Captree, NY	07/05/91	F Szybillo	Fire Island, NY	16	08/15/92
11	J Brady		Fire Island Inlet, NY	07/07/92	G Derenthal	Fire Island Inlet, NY	13	08/20/92
12	A Hagovsky		Chincoteague Inlet, VA	07/13/92	J Richburg	Chincoteague Inlet, VA		08/21/92
10	T Witek		Robert Moses Brdg., NY	05/17/92	R Bisking	Fire Island Inlet, NY	14	08/21/92
12	V Viola		Moriches, NY	07/25/92	C Krolick	Moriches Bay, NY	12	08/22/92
11	S Carlsen		Atlantic Hlds., NJ	06/29/92	R Klementovich	Sandy Hook, NJ	14	08/23/92
13	S Knapik		Pt. Lookout, NY	08/19/92	J Pash	Jones Inlet, NY		08/25/92
13	S Knapik		Pt. Lookout, NY	08/19/92	B Ginsburg	Long Beach, NY		08/25/92
10	A D'Amato		Offsh., Cape May, NJ	07/29/92	C Burke	Cape May Inlet, NJ		08/26/92
12	"Lady Chris"		Cape May Pt., NJ	07/28/92	E Shannon	Cape May, NJ	12	08/27/92
Grouper								
16	F Waltzinger		Bahia Honda Key, FL	02/11/92	B Veres	Bahia Honda Brdg., FL	17	05/10/92
19	J Dotsey		Islamorada, FL	03/01/92	C Upchurch	Islamorada, FL	18	06/04/92
Red Drum								
17	J Wright		Nokomis, FL	05/14/92	A Bothe	Nokomis, FL		07/16/92
18	G Fuss		Bald head Is., NC	07/04/92	G Fuss	Bald Head Is., NC	21	08/31/92
Snook								
24	J Wright		Venice, FL	11/27/91	B Naeve	Venice, FL	24	04/03/92
17	J Wright		Venice, FL	12/04/91	A Via Jr.	Venice, FL	17	04/18/92
31	G Siwek		Sebastian Inlet, FL	08/12/90	FL D.N.R.	Sebastian Inlet, FL		05/01/92
Spotted Seatrout								
13	H Kruse		Rappahannock R., VA	07/06/92	K Caudle	Stingray Pt., VA	13	07/16/92
Striped Bass								
24	K Sprankle		Outer Banks, NC	02/04/92	R Hartnet	Boston, MA	24	06/06/92
34	G Keenan		Shinnecock Inlet, NY	06/22/92	R Papp	Shinnecock Bay, NY		06/25/92
27	S Hentschel		Shinnecock, NY	07/25/89	P Martin	Montauk Pt., NY	33	07/08/92
33	B Shillingford		Cape May, NJ	11/07/91	M Oljey	Salem, MA		07/08/92
30	G Caputi		Island Beach St.Pk., NJ	11/15/90	W Livingston	Mamaroneck, NY	31	07/09/92
28	R Leja		Bridgeport, CT	06/27/90	E Wargo	Bridgeport, CT	32	07/10/92
31	R Grobarz		Sea Bright, NJ	06/24/92	S Tetorka	Sea Bright, NJ	31	07/10/92
23	T Rinaldi		Mulford Pt., NY	09/27/91	J Vukas	Orient Pt., NY		07/10/92
19	W Matuszak		Gilgo Beach, Ny	05/16/92	T Cartwright	Moriches Bay, NY	20	07/10/92
25	R Robertson		Cuttyhunk, MA	07/21/91	J Ritsi	Montauk Pt., NY	31	07/10/92
30	P Grippo		Tobay Beach, NY	10/19/91	A Melnick	Chatham, MA	31	07/10/92
22	T Nowell		Merrimack R., MA	06/11/89	J Shea	Salisbury, MA	32	07/10/92
30	G Karr		Island Beach St. Pk., NJ	05/22/92	J Izzo	Barnegat Inlet, NJ	30	07/11/92
17	J Herman Jr.		Stamford, CT	09/28/86	L Senecal	Stamford, CT	24	07/11/92
26	S Hentschel		Shinnecock Inlet, NY	06/27/89	E Hustedt	Orient Pt., NY	36	07/11/92
25	R Hartman		Eatons Neck, NY	11/02/89	K Jenkins	Scituate, MA	32	07/11/92

Species	Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
23	J Reiches		Davids Island, NY	06/15/90	B Siegel	Greenwich, CT		07/11/92
19	R Wellman		Horton's Pt., NY	11/22/91	C Goldberg	Reynolds Chan., NY	24	07/12/92
26	T Dziedzic		Nauset Beach, MA	11/12/91	A DeMarco	Green Island, NY	27	07/12/92
16	J Zaffuto		Democrat Pt., NY	04/19/91	R Wilkins	Plum Island Pt., MA	19	07/12/92
15	T Rinaldi		Mattituck, NY	07/26/91	D Foster	Wading River, NY	18	07/12/92
20	T Rinaldi		Horton's Pt., NY	07/01/91	J Vukas	Orient Pt., NY	20	07/12/92
15	J Sullivan Jr.		Merrimack R., MA	05/31/91	O Kutty	Galilee, RI		07/13/92
22	J Foti		Verrazano Bridge, NY	07/02/92	N Auritti	Verrazano Bridge, NY	22	07/13/92
29	M Russo		Moriches Inlet, NY	08/31/89	G Nigro	Sandy Hook, NJ	32	07/13/92
25	S Kellner		Horton's Pt., NY	07/27/90	J Lancelli	Mamaroneck, NY	29	07/14/92
28	M Ponticelli		Delaware River, NJ	07/02/92	R Mors	Trenton, NJ		07/14/92
34	M Ponticelli		Delaware River, NJ	07/10/92	R Mors	Trenton, NJ		07/14/92
35	P Grippo		Tobay Beach, NY	10/19/91	H Lynch Jr.	Newburyport, MA	35	07/14/92
34	H Millington		Trenton, NJ	06/19/92	R Mors	Trenton, NJ		07/14/92
10	K Morgan		East River, NY	12/30/90	J Nakouzi	Stratford, CT	14	07/14/92
28	M Ponticelli		Delaware River, NJ	07/02/92	R Mors	Trenton, NJ		07/14/92
20	J Karolides		Danvers, MA	06/14/91	A Kainamisis	Beverly, MA	26	07/15/92
27	S Penta		Boston, MA	06/19/92	M Rinaldi	Boston, MA	27	07/15/92
35	GS Gray		Charlestown, RI	10/28/90	J Bounds	Middletown, RI	38	07/15/92
33	D Kelly		Orient Pt., NY	06/15/92	E West	Niantic Bay, CT		07/15/92
31	A Anderson		Block Island, RI	11/03/91	A Guerriero	Cape Cod Canal, MA	35	07/15/92
19	M Romano		Kill Van Kull, NJ	07/13/92	D Dolan	Kill Van Kull, NJ	19	07/15/92
18	A LoCascio		Manhasset Bay, NY	10/13/91	M Tucker	Manhasset Bay, NY		07/16/92
37	G Sinclair Jr.		Sakonnet Pt., RI	08/18/91	D Cotisoridis	Sakonnet R., RI	39	07/16/92
32	R Ries		Cold Spring Harbor, NY	06/04/89	S Pietruska	Vineyard Sound, MA	36	07/16/92
20	F Stunkel		Darien, CT	06/17/92	F Stunkel	Darien, CT	20	07/16/92
17	J Kenny		Merrimack R., MA	06/13/90	R Wilkins	Plum Island Pt., MA	21	07/16/92
19	A LoCascio		Manhasset Bay, NY	10/13/91	A DeCresenzo	Moriches Inlet, NY	24	07/16/92
35	R Fink		Rockaway Pt., NY	05/24/92	R Fowler	Portsmouth, NH	34	07/17/92
23	D Walker		Long Branch, NJ	09/27/91	A Kalife	Martha's Vineyard, MA		07/17/92
29	D Kocher		Boston, MA	06/13/91	J Donlan	Boston, MA	32	07/17/92
22	T Rinaldi		Horton's Pt., NY	09/21/90	D Kelly	Orient Pt., NY	26	07/17/92
34	P Governale		Moriches Inlet, NY	07/07/92	S DeCresenzo	Moriches Inlet, NY		07/17/92
24	D Kelly		Orient Pt., NY	06/27/91	D Blais	Plum Island, NY	28	07/17/92
19	R Allardice		Beverly, MA	06/04/92	M Smith	St. George R., ME		07/17/92
27	P Orenzo		East River, NY	07/05/92	S Orenzo	East River, NY	27	07/17/92
24	T Lake		Chelsea, NY	04/09/92	J Giacco	Southampton, NY	28	07/18/92
33	B Billerman		Newburyport, MA	08/16/91	J DiGloria	Salisbury, MA	36	07/18/92
18	J Della Porta		Winthrop, MA	08/06/90	K Howland	Winthrop, MA	34	07/18/92
18	J Herman Jr.		Norwalk, CT	09/15/86	R Kyker	Norwalk, CT	27	07/18/92
29	B Billerman		Newburyport, MA	08/16/91	W Bamford	Merrimack R., MA	34	07/18/92
33	C Wendel		Martha's Vineyard, MA	05/22/92	B Perry	Falmouth, MA	34	07/18/92
30	R Canfield		Westport, CT	07/02/92	R Canfield	Westport, CT	30	07/19/92
35	A LoCascio		Manhasset Bay, NY	06/20/92	J Bollet	Sands Point, NY	36	07/19/92
30	F Tellefsen		Sandy Hook, NJ	11/26/91	F Coronato	West Bank Lt., NY	30	07/19/92
28	G Pharaoh Jr.		Amagansett, NY	10/22/90	J Brilliant	Boston, MA		07/19/92
34	B Billerman		Newburyport, MA	06/02/92	P Santini	Newburyport, MA		07/19/92
20	A LoCascio		Manhasset Bay, NY	06/07/92	L Meyran	Manhasset Bay, NY	20	07/20/92
33	F Stunkel		Darien, CT	07/06/92	W Brill	Noroton, CT	34	07/20/92
36	G Christman Jr.		Robinson's Hole, MA	10/10/91	A Belliveau	Quick's Hole, MA	37	07/20/92
19	T Rinaldi		Shinnecock, NY	11/21/90	B Balon	Cape Cod Canal, MA	28	07/20/92
18	G Epple		Charleston, RI	10/08/91	P Carpentier Jr.	Merrimack R., MA	20	07/20/92
24	J Mettler		Fishers Island, NY	09/27/91	B Claspell	Fishers Island, NY	25	07/21/92
30	D Kelly		Orient Pt., NY	11/04/91	J Mullen	Stamford, CT		07/21/92
22	J Dotsey		Long Beach, NY	05/19/89	J Conti	South Boston, MA	33	07/21/92
31	W Langworthy		W.L.I. Sound, NY	07/12/92	G Tivey	Port Chester, NY	33	07/21/92
26	A Anderson		Charlestown, RI	11/16/91	J Mead	Provincetown, MA	27	07/21/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
30	F Stunkel	Darien, CT	07/07/92	F Stunkel	Darien, CT	30	07/21/92
22	G Damato	Stratford, CT	10/15/88	W Beauder	Groton, CT	30	07/22/92
26	J Mello	Cuttyhunk Is., MA	07/17/92	J Russo	Cuttyhunk Is., MA		07/22/92
31	F Stunkel	Darien, CT	07/21/92	F Stunkel	Darien, CT	31	07/23/92
24	J Caputo	W.L.I. Sound, NY	09/25/90	S Vigilante	Throgs Neck Brdg., NY	26	07/23/92
18	S Fries	Lower NY Bay, NY	12/07/91	M Schardt	Pleasant Bay, MA	20	07/23/92
26	C Kaufmann	Plum Gut, NY	06/26/90	R Handfield	Fishers Island, NY	34	07/24/92
27	T Lynch	Stamford, CT	10/30/90	A Ginolfi	Stamford, CT	31	07/24/92
28	S Giaccone	Throg's Neck Brdg., NY	07/10/92	P Gasparre	Little Neck Bay, NY		07/24/92
24	P Krueger	Atlantic Bch. Brdg., NY	07/24/92	Unknown fisherman	Far Rockaway, NY		07/24/92
28	C Nelson	Darien, CT	06/20/91	R Canfield	Darien, CT	28	07/25/92
19	J Della Porta	Boston, MA	08/03/90	D DiMaio	Winthrop, MA	25	07/25/92
20	F Stunkel	Darien, CT	07/17/92	F Stunkel	Darien, CT	20	07/25/92
18	J Della Porta	Mystic River, CT	04/16/92	B Nowicki	Boston, MA		07/26/92
31	S Kellner	Montauk Pt., NY	10/31/90	J Peters	Georgetown, ME	34	07/26/92
16	D Kay	Taunton R., MA	08/06/90	P Hertz	Norwalk, CT		07/27/92
32	D Kelly	Orient Pt., NY	10/01/90	R Esposito	Rye, NY	35	07/27/92
16	D Beshara	Merrimack R., MA	07/10/92	L Jandris	Newburyport, MA	16	07/28/92
35	R Clark	Milford, CT	06/09/91	F Stoddard Jr.	Milford, CT	35	07/28/92
36	C Edwards	Fishers Is., NY	10/13/91	B DelFuoco	Winthrop, MA		07/28/92
23	K Black	Merrimack R., MA	06/29/91	R Turner	Newburyport, MA	26	07/28/92
20	R Leja	Bridgeport, CT	10/26/89	R Martin	Gloucester, MA	25	07/29/92
25	R Canfield	Westport, CT	06/26/92	M Lewis	Norwalk, CT	29	07/29/92
16	W Edwards	Stratford, CT	09/02/91	H Bergere	Stratford, CT	20	07/29/92
35	D Kelly	Orient Point, NY	07/29/91	A Ruchwa	Waterford, CT	37	07/29/92
30	J Sullivan	Newburyport, MA	07/05/91	H Lynch Jr.	Newburyport, MA	34	07/29/92
32	J Della Porta	Nahant, MA	08/31/91	K Muise	Nahant, MA	32	07/30/92
30	D Kelly	Orient Point, NY	09/17/91	J Grabowski	Plum Gut, NY		07/30/92
14	K Black	Danvers, MA	07/03/92	J Karolides	Danvers, MA	14	07/30/92
30	S Penta	Boston, MA	05/30/91	R Wildes	Wiscasset, ME	34	07/30/92
25	H Blazer	Avalon, NJ	12/13/90	M Kutt	Plum Island, MA	28	08/01/92
27	R Baumann	Mantoloking, NJ	11/18/90	M Smorto	Montauk Pt., NY	32	08/01/92
25	K Gleason	Darien, CT	08/08/90	J Melanson	Weymouth, N. S. Cda	34	08/01/92
23	S Kellner	Horton's Pt., NY	11/13/91	D Kostka	Bourne, MA	24	08/01/92
22	R Krueger	Atlantic Beach, NY	07/05/90	L Hoffman	Atlantic Beach, NY	32	08/01/92
35	G Ministeri	Cape Cod Bay, MA	08/22/91	T Perry	Cape Cod Canal, MA	38	08/01/92
23	D Kelly	Orient Point, NY	06/16/92	B Kopack	Orient Point, NY		08/01/92
20	S Gross	City Island, NY	10/14/91	R Covino	Highlands Brdg., NJ	20	08/01/92
35	D Kelly	Orient Point, NY	10/21/91	R Goodwin	Plum Gut, NY	37	08/01/92
26	J Della Porta	Boston, MA	01/03/90	A Rose	Boston, MA		08/01/92
22	D Kelly	Orient Point, NY	11/04/91	G Cable	Stratford, CT		08/02/92
29	J Foti	The Narrows, NY	06/28/92	L Greenberg	Rosebank, NY	31	08/02/92
28	C Ponte	Quick's Hole, MA	07/19/92	D Mann	Quick's Hole, MA		08/02/92
34	T Marburger	Shinnecock Inlet, NY	07/14/92	T Marburger	Shinnecock Inlet, NY	34	08/02/92
20	T Marburger	Northport, NY	04/14/92	D Clark	So. Dartmouth, MA	28	08/02/92
16	F Danylczuk	Port Jefferson, NY	07/02/92	E Etheridge III	Port Jefferson, NY		08/03/92
36	D Mann	Quick's Hole, MA	07/31/92	S Pietruska	Vineyard Sound, MA		08/03/92
22	J Karolides	Danvers, MA	06/29/91	D Ramsdell	Salem, MA	25	08/03/92
27	F Stunkel	Darien, CT	06/29/92	F Stunkel	Darien, CT	27	08/04/92
35	B Hastings	Moriches Inlet, NY	07/10/92	D Varney	Moriches Inlet, NY	36	08/04/92
28	D Kelly	Orient Point, NY	08/26/91	R Dauphinee	Scituate, MA	29	08/04/92
24	S Penta	Boston, MA	07/30/92	E Vacchelli	Boston, MA	25	08/04/92
33	B Billerman	Newburyport, MA	07/01/92	B Billerman	Newburyport, MA	34	08/05/92
30	D Kelly	Orient Point, NY	09/02/90	C Cyrus	Westport, Ct		08/05/92
20	J Mettler	Fishers Is., NY	09/07/91	B Schobel	Fall River, MA	20	08/05/92
20	T Marburger	Northport, NY	01/05/92	A Weymouth	Portland, ME		08/06/92
20	R Nystrom	Bridgeport, CT	01/19/92	T DeLoreto Jr.	Niantic R., CT	20	08/06/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
26	D Mann	Quick's Hole, MA	08/02/92	A Belliveau	Quick's Hole, MA		08/06/92
16	J Karolides	Danvers, MA	06/17/92	T Dukas	Danvers, MA	18	08/06/92
16	R Ries	Cold Spring Harbor, NY	10/23/91	D Lawton	Plymouth, MA	18	08/07/92
33	B Billerman	Plum Island, MA	07/17/92	L Quirion	Newburyport, MA	35	08/07/92
28	A Stearns	Winthrop, MA	07/26/92	D Brown	Boston, MA		08/07/92
16	J Sullivan	Newburyport, MA	07/05/91	K Black	Merrimack R., MA	19	08/08/92
18	D Kay	Somerset, MA	10/22/91	A Marques Jr.	Fall River, MA	26	08/08/92
29	D Kelly	Orient Pt., NY	10/13/89	P Savoie	Fishers Is., NY	32	08/08/92
18	J Karolides	Danvers, MA	05/22/92	J Karolides	Danvers, MA	19	08/08/92
24	J Foti	Verrazano Bridge, NY	07/02/92	D Whelan	Sandy Hook, NJ	28	08/08/92
33	J Della Porta	Dorchester, MA	07/14/92	C Payne	Boston, MA	34	08/08/92
23	P Chowansky	Normandy Beach, NJ	12/14/91	D Hubbard	Newbury, MA	24	08/09/92
22	N DelPrato	Boston, MA	07/07/92	M Lopriore	Lynn, MA		08/09/92
23	J Della Porta	Swampscott, MA	09/11/91	A Cote	Durham, NH	28	08/09/92
18	R Ries	Cold Spring Harbor, NY	09/30/90	R Ries	Cold Spring Harbor, NY	19	08/09/92

Tautog

8	R Skorney	Raritan Bay, NJ	09/27/91	E Gerba	Raritan Bay, NJ	13	04/15/92
11	J Samyn	Prospect Pt., NY	10/01/91	J Somers	Prospect Pt., NY	14	05/09/92
8	K Cooper	N. Wildwood, NJ	10/19/91	R Ameye	N. Wildwood, NJ	09	05/18/92
14	B McDowell	Eatons Neck, NY	05/24/92	J Ginsberg	Eatons Neck, NY	14	05/30/92
17	T Murphy	Chesapeake Bay, VA	10/23/91	T Bennett	Chesapeake Bay, VA	18	05/31/92
10	J Wright	VA Beach, VA	04/12/92	S Hollenzer	VA Beach, VA	10	06/08/92
11	B Longstreet	Atlantic Bch. Reef, NY	04/19/92	K Case	Atlantic Bch. Reef, NY	12	06/13/92
8	B Longstreet	Atlantic Bch. Reef, NY	04/25/92	K Case	Atlantic Bch. Reef, NY	08	06/13/92
13	JC Wright	Chesapeake Bay, VA	05/17/92	JC Wright	Chesapeake Bay, VA	13	06/17/92
14	B McDowell	Eatons Neck, NY	05/24/92	M Coric	Eatons Neck, NY	14	06/25/92
10	W Anderson	Provincetown, MA	06/07/92	K Finerty	Provincetown, MA	16	07/05/92

Weakfish

22	G Ottavio	Cape May Pt., NJ	05/24/92	J Shockley	Cape May Pt., NJ	23	06/13/92
20	G Ottavio	Cape May Pt., NJ	06/20/92	M Celia	Cape May Pt., NJ	24	06/26/92
20	G Ottavio	Cape May Pt., NJ	07/04/92	J Worthington	Cape May Pt., NJ		07/05/92
23	G Ottavio	Cape May Pt., NJ	07/04/92	V Fiorentino	Cape May Pt., NJ	25	07/10/92
22	G Ottavio	Cape May Pt., NJ	07/03/92	J Worthington	Cape May Pt., NJ	23	07/11/92

Winter Flounder

10	W Brett	Provincetown, MA	06/26/92	K Finerty	Provincetown, MA	12	07/05/92
13	W Brett	Provincetown, MA	06/26/92	F Meads	Provincetown, MA		08/22/92

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Book Reviews

THE EVERGLADES: River of Grass

by MARJORY STONEMAN DOUGLAS

Pineapple Press, Sarasota, FL.

427 p. \$17.95.

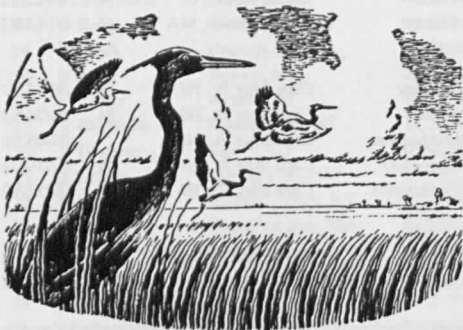
MARJORY STONEMAN DOUGLAS:

Voice of the River

Pineapple Press, Sarasota, FL.

258 p. \$9.95 (paper).

The subject here is the Everglades, the river of grass, and Douglas, who became the single most powerful agent for the defense and more recently the possible restoration of this south Florida ecological treasure. Her pioneer work about the Everglades was first published in 1947 and has gone through 17 printings and four publishers. Pineapple Press has done her and the book proud with this handsome edition.



This is the story of a large swatch of swamp, ditched and drained, nibbled around the edges, the possible site of a jetport, the recent target of Hurricane Andrew. Through it all the Everglades still live, and water from the north sheets down on its way to Florida. People crowd its edges and fight for its water, but deep within the 'glades still host a myriad of wildlife. Douglas's book tells about it, beautifully. The history is here from the Spanish conquerors to the real estate boomers, the tomato growers and the alligator poachers. Good stuff.



The second volume listed here is Douglas' autobiography, born in Minnesota, raised and educated in New England, and moved to Florida (after a blessedly brief marriage to a check bouncing reporter for the Newark Evening News) where she worked on newspapers and gradually became infatuated with the Everglades. She is 102 years old at this writing, still fighting her favorite battle. Her story is wonderful and well told here.

SEASHORES

by JOHN C. KRICHER

Houghton Mifflin, New York.

126 p. \$4.95 (paper).

A terrific little guide to the shore. Fits in the back pocket, or, for that matter, in the shirt pocket. Well bound, well illustrated, covering almost 200 living things you'd expect to find on a beach, mudflat, of shallow water. Included are seaweeds, shellfish, fish, birds, plants, and mammals, each with a good simple drawing and short description.

This is one of the "Peterson First Guides," with others dealing with stars, birds, bugs, rocks, and the like. Good for teachers, students, and out-of-the-gate beach strollers. The idea is to hook you with this book and then move you up to the fancier Peterson books. This is a good marketing scheme, but don't let that deter you. This is also a good book, sort of like a compact version of the Golden Guide series.

THE GULF OF MEXICO

by ROBERT H. GORE

Pineapple Press, Sarasota, FL.

338 p. \$24.95.

This is a deft compendium of information about the Gulf of Mexico, which the author calls the American Mediterranean. Its 1000 miles across and has 3600 miles of shoreline, half sandy beach. Its deepest parts are a mile below the surface. It has volcanoes on its Mexican coast, barrier islands, lagoons, bayous, oil and gas, shrimp, oysters, hurricanes (a map shows that the path of the 1947 storm is almost identical to Hurricane Andrew of August, 1992).

And it has people, both around its edges and out there fishing, drilling, and dumping. Gore tells all about the good Gulf, what bad things we are doing to it, and how we'd better change our ways.

He dedicates the book "To the vanished coastal Indians of the Gulf of Mexico, who knew what they were losing, and to the present coastal, populace, who may not." Change a few words here and there and Gore's dedication could be used on almost any such book. "The Gulf of Mexico" is filled with facts and wisdom, a worthwhile book to read once through and then consult often.



The following book was reviewed by Ned Vizzini, a sixth grader at Woodward School, Brooklyn, NY.

PHYSTY The True Story of a Young Whale's Rescue

by RICHARD ELLIS

Courage Books, Philadelphia.

54 p. \$9.98.

Physty, the true story of a sperm whale that beached itself on Fire Island in 1981, is an enjoyable non-fiction tale. All 54 pages are packed with facts, and the pictures are well-handled.

Physty is a good story for kids who are beyond picture books, but not quite ready for Judy Blume. If you take out all the pictures, Physty becomes a scientific report on the sperm whale. This effect will keep adults interested (if) while they read to their children.

My problems with Physty were mainly technical. Pages 47-50 weren't sown into the seam, and they promptly fell out when I opened the book. I hope it's an isolated incident. Also, many of the words will stretch a six-year-old's vocabulary and 54 pages is a little long for a bedtime story.

Still, if you've got a child who's eager to learn, Physty may be what you are looking for. It's a pleasant introduction to an interesting subject: the whale.

NV

A Guided Tour Through the Firestone Library Angling Collection At Princeton University

by DWIGHT A. KLETT

Over the years, my research in the area of European culture has occasioned visits to the Firestone Library at Princeton University. I have come to know almost every inch of the dimly lit subterranean "B" level, which houses the monographs and journals I most frequently consult. During my first visit to this vast basement realm, I was drawn — perhaps as a result of my initial disorientation — to a beacon of light shining through the long dark rows of books. Following it to its source, I found myself in a rather strange room where a number of scholars, all puffing away at cigarettes or pipes, were busily engaged in their studies. The whole scene was presided over by a rather macabre-looking group of death masks staring emptily into space from a dusty perch against the back wall. After a quick look about, I left the room again and until very recently, have always avoided it, as I am allergic to smoke.

Recently, I happened to inquire about this odd room when talking with a friend of mine who works at Firestone. I was duly informed that it is the one and only Smoker's Lounge — a grudging concession on the library's part to a persistent special interest. To my great surprise, my friend, who knows of my penchant for angling, told me that a great many books on this and related subjects are located, on the left hand side of the lounge in shelving units not immediately apparent considering the ever-present pall of smoke. My friend hastened to add that an adjacent room, accessible to visitors only in the presence of library personnel, also contains a sizeable number of books on fishing. This, I found out, is the so-called "Dead Fish Room" named for the

mounted angling trophies gracing its walls.

So went my introduction to what is officially known as the Princeton University Angling Collection, a portion of which is also housed in a number of library vaults hidden away from view.

As it turns out, this collection of approximately 8,000 volumes is one of the largest of its kind in the world and contains a significant proportion of all books ever published on angling and its many related topics. Unfortunately, it also has the distinction of being one of Princeton's least-used resources. Indeed, while it is well-known in library circles, its existence is a complete mystery to all but a few members of the general public.

The Firestone Library came to possess its enormous angling collection through the generous donations of three of its alumni, C. Otto von Kienbusch '06, Eugene V. Connett, III '12, and Kenneth H. Rockey '16 — all ardent bibliophiles as well as inveterate fishermen.

The Kienbusch books, housed in the "Dead Fish Room," are largely limited to editions on freshwater fly-fishing, their former owner's greatest passion. They are the most rare and valuable of the



A humanities professor at Rutgers University, New Jersey, Klett is an avid outdoorsman, bibliophile, and conservationist.

collection and include such classics as *A Treatyse of Fysshynge Wyth an Angle*, written, as legend has it, by Dame Juliana Berners around 1450 and published in 1496 as the first English book on angling; Thomas Barker's *The Arte of Angling* (1651), which contains the first known mention of the fishing reel; Izaak Walton's pastoral favorite *The Compleat Angler* (in its 1653 first edition); and G.P.R. Pulman's *Vade Mecum of Fly-Fishing* (1846), important for its introduction of the dry fly. Kienbusch's collection will interest those who wish to trace the history of fly-fishing, step by step, from its beginnings.

Readers seeking modern, how-to-oriented books on both fresh and saltwater fishing can consult the Rockey volumes, which make up the largest part of Princeton's angling collection. In accordance with Kenneth Rockey's wish, these books are accessible to browsers and available for circulation. Even the rare volumes such as the numerous early editions of Walton's *Compleat Angler* starting with the fourth (1668) aside are in the open stacks located in the infamous Smoker's Lounge.

The Rockey collection specializes in the nineteenth and twentieth centuries and contains books, journals, government publications, and popular magazines on almost every imaginable aspect of the sport of fishing including some in a number of different languages to boot. Browsers can find angling guides covering most continents (Rockey himself fished many fresh and saltwater environments around the globe), books on every conceivable fishing technique and tackle application, angling histories and reminiscences, and treatises on game fish ranging from trout and muskie to herring and shark. Scientific studies on fish farming and commercial exploitation as well as marine ecology and the depletion of fish stocks; practical guides to the cleaning and cooking of fish; and books discussing fish and fishing in diverse contexts such as diving, snorkeling, photography, underwater explora-

tion, boating, hiking, and camping also abound.

Highlights of the enormous Rockey collection include Genio C. Scott's classic *Fishing in American Waters* (1869). This is a personal favorite not only because it is largely devoted to the New York Bight area I myself fish, but also because it contains some of the best engravings and angling poetry to be found anywhere. Zane Grey's swash-buckling *Tales of Swordfish and Tuna* (1927); Kip Farrington's comprehensive *Fishing the Atlantic, Offshore and On* (1949); Philip "Crunch and Des" Wylie's *Denizens of the Deep* (1953); and George W. Reiger's thoroughly researched *Profiles in Saltwater Angling* (1973), an indispensable and unequalled history of American ocean fishing, are also part of the collection.

The Connett collection, the third and final portion of Princeton's angling treasure is housed in unseen vaults. Included are Connett's personal copies of the more than 200 books on fishing and other field sports published by the now defunct Derrydale Press, a publishing house operated by Connett himself and renowned for its unparalleled typographical art. Perhaps the jewel of the collection is a volume entitled *American Big Game Fishing* (1935). Edited by Connett, it contains chapters on a variety of popular gamefish written by the likes of Van Campen Heilner, Charles Lehmann, Dave Newell, Otto Scheer, Kip Farrington, and George C. Thomas III. A most famous chapter on marlin was contributed by Ernest Hemingway.

I have here only scratched the surface of the Firestone Library angling holdings. I hope this brief tour through the collection will motivate those interested in the great sport of angling or in just about any aspect of the world's rivers, lakes, and oceans to seek out, learn from, and enjoy its riches.

NOTE: Autographed copies of PROFILES IN SALTWATER ANGLING (out of print) are available from the American Littoral Society for \$35 pp.

Then and Now, or Great Classics Revised...

A bunch of us were sitting around a campfire after negotiating a particularly rugged stretch of the Upper Delaware River, where the whitewater in some rapids was a good six inches high. Fletcher Selkirk, one of the paddlers, started reading from a book he had recently saved from the local trashpile. Its title: *FISH & WILDLIFE: The Story of the Work of the U.S. Fish and Wildlife Service*, published in 1955 by Coward-McCann, New York.

The book outlines the birth of the Service in 1940, its goals and functions. Certain paragraphs and sentences popped out:

"Many of the functions of the Fish and Wildlife Service, while unpublicized and little in the public eye, are nevertheless tremendously important to the safety of its charges. For example the small item — small to the uninitiated, that is — of predator control, which receives little attention from the general public, resulted in one year in the elimination of 50,661 coyotes, 1633 wolves, 13,476 bobcats and lynxes, 714 stock-killing bears and 197 mountain lions, all of which had been killing valuable game in and about our refuges...

"...a second purpose of its activity involves the importation of new species of wildlife."

"...a third purpose includes...the control of fish movements in inland waters..."

Over the subtitle "End of the Trail for a Killer" is a picture of a treed mountain lion and the comforting words "...here a successful mountain-lion hunt has ended as it usually does with the killer — in this case a young one — treed by the dogs and the killer's days at an end...they are ruthless in their killing — in one instance a single lion attacked a herd of sheep and killed 192 in a single night." (One can almost hear Edward Abbey cheering from his desert grave.)

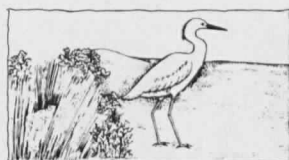
It gets better: "Wolves, who have in the past outwitted many a refuge protector, now find that they have a new and more tricky enemy. The airplane — swift, maneuverable, and able to spot him from afar — is being used against this slinking killer of wildlife...wolf hunting from a plane requires great skill on the part of the pilot and even greater skill on the part of the marksman riding with him."

There's more: trapping and killing black bears and foxes, clubbing fish, and spreading sodium arsenite to control pond weeds.

The point here is not to pick on the US Fish & Wildlife Service. The view of wildlife — something to control, genetically improve, and redirect — was held by most state and federal agencies two generations ago. And to be even fairer, some of the book does deal with habitat protection. However, we are still prone to judge living things as good or bad. Good: butterflies, striped bass, pandas, warblers. Bad: spiders, sea robins, bats, hawks. After all, spiders lurk in dark, wet places; sea robins are bait stealers; bats get tangled in your hair and suck your blood; and hawks kill birds, including ducks and warblers.

Think this kind of silly reasoning is done with? Then why is Alaska thinking of killing off wolves to protect moose? Why did New Jersey recently consider stocking non-native Pacific salmon in the Delaware River? And why do some states still have bounties on foxes?

D . W. Bennett
Executive Director



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A photograph of a diver in a blue wetsuit holding a large shark underwater. The diver is wearing a mask and has a watch on their left wrist. The shark is held horizontally in front of the diver. The background is a dark, blue underwater environment with some rocky structures.

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