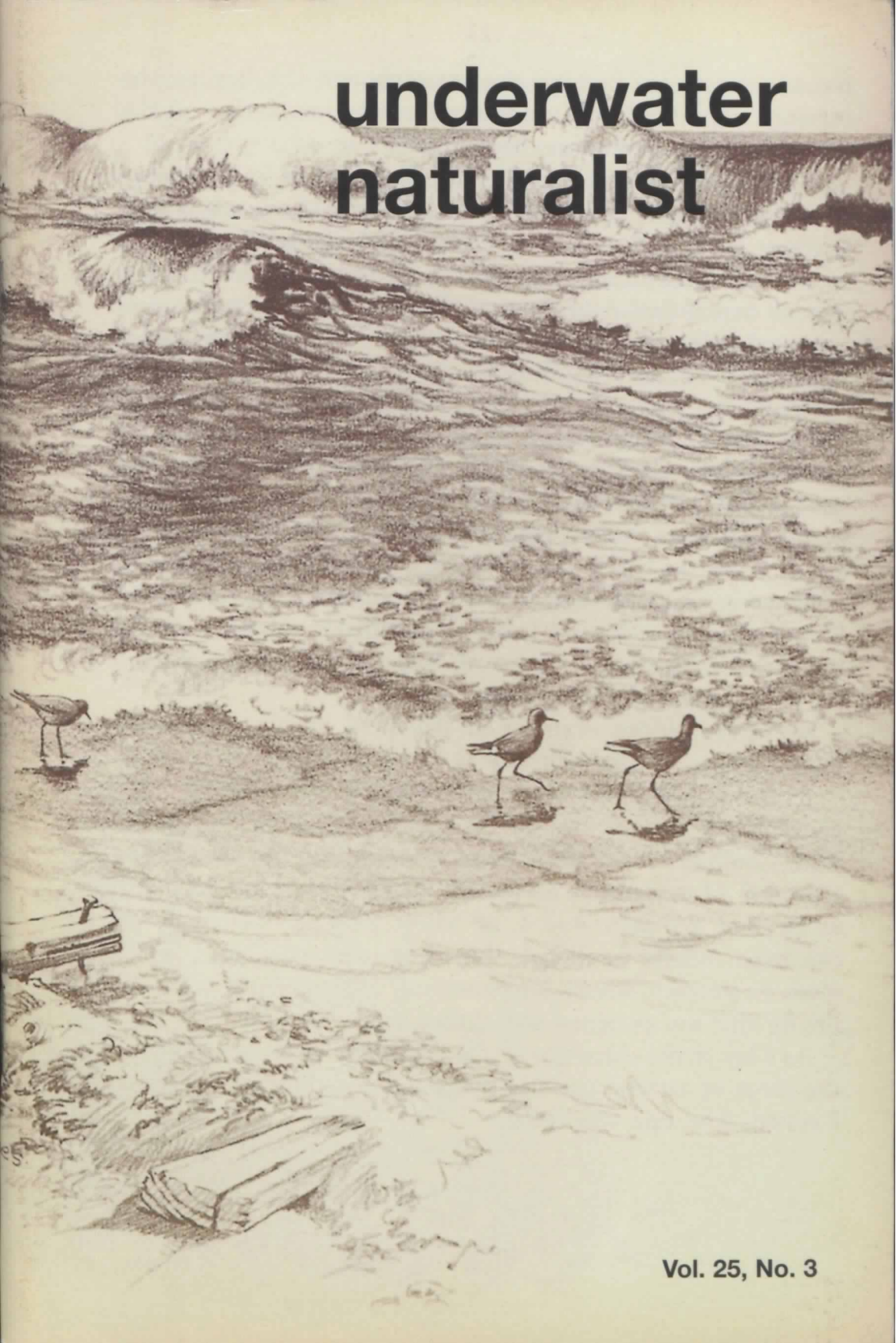
underwater naturalist



Vol. 25, No. 3

AMERICAN LITTORAL SOCIETY
2001 FIELD TRIPS

Here are a few brief descriptions of some of the field trips still open for 2001. Come join ALS for a little exploration and adventure. See our national field trip schedule for cost, leaders, deadlines, and more information about the trips themselves.

March 2-10
Florida Everglades and Florida West Coast
An exploration of the state's best wildlife spots. Great birding, easy hiking, a chance to swim on both coasts of Florida.

March 27-April 5
Coastal California
Starting in Santa Cruz, we will work our way down the magnificent coastline of California, with stops in Ano Nuevo State Park, Pigeon Point Lighthouse, Point Lobos State Reserve, the town of Monterey with the Aquarium and Cannery Row, and end up at Big Sur Lodge. We will hike redwood forests, explore salt marshes, and kayak along the coast and bays.

April 1-7
Crane River, Nebraska
Explore America's heartland during the amazing spring bird migration along the Platte River. The annual layover by hundreds of thousands of migrating cranes and water birds has been called one of the top ten wildlife spectacles in North America. Side trips include the Doorly Zoo, Kingdoms of the Sea Aquarium, State Museum of Natural History, and of course, various stops along the river.

May 21-27
Belize
Experience six days of geographic and cultural diversity in this English-speaking, Central American country. We'll see wetlands, birding habitats, Mayan ruins, barrier coral reefs, and waterfalls while hiking, taking river trips, and snorkelling.

July 3-12
Alaska: Mountains and Coast
Starting in Anchorage heading north to Denali and then south to the Kenai Peninsula we will cover it all in our 10-day ramble around Alaska. Highlights include Denali Natinal Park, a river trip in Talkeetna, a whale watching boat trip in Seward. We'll hike all around, to lakes, glaciers, and mountains (not the big ones)

July 17-26
Alaska: Southeast Island Hop
The Alaska State Ferry system will be our main form of transportation as we explore the southeastern region of Alaska for 10 days by boat, plane, kayak, bike, and foot. Highlights include Misty Fjords and Glacier Bay National Parks, petroglyph trails, fish hatcheries, glaciers, whale watching, and amazing flora and fauna.

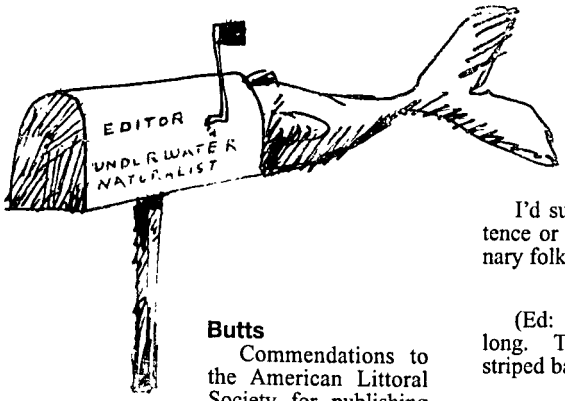
Bulletin of the American Littoral Society

Volume 25, Number 3

Cover Illustration
by Bob Hines
from *The Edge of the Sea*, by Rachel L. Carson

Underwater Naturalist is the bulletin of the American Littoral Society, Sandy Hook, Highlands, NJ, 07732, and is mailed to members only as part of their dues. $15 for students, $25 for individuals, and $30 for clubs.

Note: Past volumes of Underwater Naturalist and individual articles are available on microfiche from UMI, Ann Arbor, MI 48106.



Butts

Commendations to the American Littoral Society for publishing one of the finest Bulletins of the Underwater Naturalist (Volume 25 #2).

Kathleen Register's "Cigarette Butts As Litter -- Toxic As Well As Ugly," is a fine piece of scientific research and reporting. Not only are cigarette butts toxic to *Daphnia* -- but to humans. With smokers nearly a third of the planet's populations, this article should be a wake up call to them.

The US Army had a technique prior to the filter called "field stripping", in which butts were shredded before being discarded. The answer here was dilution is the solution to pollution. With the advent of plastic filter fibers, field stripping is outdated. I propose that we encourage smokers to carry their butts, save them, and recycle them by putting them in gallon jugs of water and use the solution as their drinking water supply. Maybe this dilution will be a solution to pollution.

Tom Stock, Kings Park, NY

Ticks

I have been on a few field trips with Rob Villani and I am still amazed at his many talents. His article on the barrier islands shows that he can write as well.

The article covered the topic in a manner that was interesting and entertaining and very clearly written...

The last time, I believe, I was on a trip with him was to Fire Island National Seashore. He made the day a wonderful learning experience and even helped me with some photography tips. (I got some great images.) One caveat however... on a trip to Connequot, he said deer ticks wouldn't be a problem because it was November and too cold. Uh! Uh! Found a deer tick on my thigh when I got home?! Still have the little bugger in alcohol.

Dave Shlakman, Howard Beach, NY

Cobia

The article on page 22 about the cobia is too puzzling for me to let it go, as I'd like to have had another sentence or two to make it more intelligible.

About how long is the fish? 1/4 inch? 1 foot? We don't yet use millimeters and would appreciate an easier approximation.

Is the fish edible? It looks a bit like an eel, is it related in some way? (the Kobi on page 19 was characterized as eel-like.) Even though knowledgeable people might understand, I'm speaking for those just possibly interested but casual observers without much knowledge.

I'd suggest that the author add another sentence or two to make the article useful to ordinary folk. Thanks

R L Ganz, Long Branch, NJ

(Ed: The cobia on page 22 were about 2" long. They are more elongated than, say, a striped bass. They are delicious.)

Correction:

In our last issue there was a mistake in Kathleen Register's article "Cigarette Butts as Litter--Toxic As Well As Ugly". On page 25, the line "1.1 trillion people smoke" should read "1.1 billion people smoke". Philip Morris predicts we won't have 1.1 trillion until next year, if their new advertising campaign is successful.

The Voyage of the Challenger - the Atlantic

by C.WYVILLE THOMSON
Edited by Dave Bulloch.
Section headings added.

Third in a series of pieces from earlier works on marine sciences.

In 1878, two years after the Challenger *returned home to England, C.W. Thomson published the first account of the expedition in two volumes that were not part of the* Challenger Reports.

These volumes give a detailed account of the ship's operations, how the naval contingent went about making physical measurements, how equipment was operated, and the problems encountered as well as the findings of the scientists as the ship's track extended across the ocean and samples were pulled up from previously unplumbed depths.

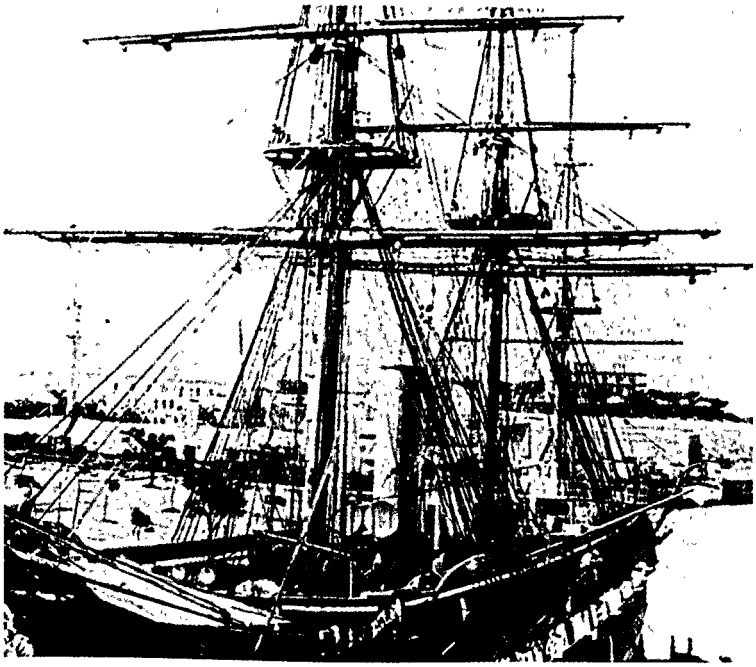
Nets and trawls retrieved specimens from near the surface and the mid-waters; trawls and bottom samplers took benthic and buried organisms. Thomson and his colleagues were amazed by the plethora of shelled creatures, both calcareous and siliceous, found in the upper waters and were confounded by the differences in shell deposits on the bottom sediments from place to place. They resolved this dilemma as the following excerpt will attest.

It may perhaps be well, before going into the story of our own experiences, to sketch in a few words the train of circumstances which led to the dispatch of *H.M.S.Challenger* on a voyage of scientific research and discovery "round the world." The wonderful project of establishing a telegraphic communication between the Old World and the New directed the attention of practical men to a region about which up to that time but little had been known with certainty, and about which there had been a great deal of hazy misconception -- the bottom of the deep sea. To procure information sufficient to enable them to prepare for the laying of a telegraph cable, sounding expeditions were organized by both of the Governments specially interested, across the Atlantic Ocean. Ingenious contrivances were suggested and applied, not merely for determining the exact depth, but for bringing up samples of the bottom sufficient to test the composition and character of the deposits in the process of formation on the sea-bed.

Dave Bulloch is director of the Society's Southeast Regional Office. He is a frequent contributor to this journal.

Lifeless zone?

In the meantime another class of students, working for the increase of knowledge, though perhaps with less immediate bearing upon the progress of the human race or the advance of their own interests, had been investigating the forms and natures of living things, the external conditions upon which their frail lives depend, and the laws under which they are localized or distributed upon the surface of the earth; and, judging from the scanty data laboriously accumulated with the imperfect appliances at that time at their disposal, had come to the conclusion that life at the bottom of the sea was confined to a narrow border round the land; that at a depth of 100 fathoms plants almost entirely disappeared and animals were scarce, and represented those animal groups only which are among the most simple in their organization; while at 300 fathoms the sea-bottom became a desolate waste, the physical conditions being such as to preclude the possibility of the existence of living things. However, doubts began to be entertained whether the bottom of the sea was in truth the desert which we had hitherto supposed it to be, or whether, it might not



The Challenger *at Bermuda in 1873 after beating across the Atlantic from Portsmouth, England.*

prove a new zoological region open to investigation and discovery, and peopled by peculiar faunae suited to its most peculiar conditions.

This new view, however, progressed but slowly, for it was almost as difficult to believe that creatures comparable with those of which we have experience in the upper world could live at the bottom of the sea, as that they could live in a vacuum or in the fire. Of many of the conditions at great depths we as yet know nothing, but some of them were as easily determined by calculation as by experiment, and we knew that an animal at a depth of 1000 fathoms must bear a weight of a ton on the square inch, and at a depth of 3000 the almost inconceivable weight of three tons; and we had every reason to believe that the sun's light is almost all cut off at a depth of 50 fathoms, and therefore the existence of plants upon which animals primarily depend for their food is impossible at great depths. These considerations alone seemed to place this question beyond the region of reasonable inquiry, and it was not until a considerable amount of evidence had been brought forward that what was called the "antibiotic" prejudice was in any degree overcome.

Life found at great depths

About this time another class of facts which gave the whole subject a singular interest were forcing themselves upon the attention of naturalists. Some dredgers, particularly our indefatigable brother-naturalists of Scandinavia, pushed their dredging operations to the utmost limit practicable in the northern seas by ordinary means, to depths of 300 to 400 fathoms, and found contrary to the general impression of the British school, that at these depths, there was no lack of animal life, and that further, many of the animal forms were new and unfamiliar, while many showed a much closer relation to the inhabitants of the seas of former, geological periods than to the marine fauna of the present day.

In the year 1868, when the question was thus undecided, Dr. Carpenter and I induced the Council of the Royal Society to apply to the Admiralty to place means at our disposal to go into the whole question of the physical and biological conditions of the sea-bottom in the neighborhood of the British Islands. The Admiralty assented, and, in the autumn of 1868, through about two months of wretched weather, we knocked about in the *Lightning* between Scotland and Faroe.

Nine tolerable days fortunately checkered the uniformity of the heavy weather, and on those we registered some remarkable results.

We found that there was an abundance of animal life at the bottom of the sea to a depth of 600 fathoms at least, and the life there was not confined to the more simply organized animals, but extended very irrespectively through all the invertebrate classes, and even included some true bony fishes.

These results and many others were attained or suggested by our first season's very imperfect work, and they were regarded as so interesting and suggestive that with even greater willingness than before the Admiralty placed a gun-boat at...[our] disposal...for two succeeding summers during which time one or more of us prosecuted the same line of inquiry, confirmed the result of the previous years, and added many new facts. We succeeded in dredging to the depth of 2435 fathoms. Even at that depth the invertebrate sub-kingdoms are still fairly represented.

Challenger Expedition

Dr. Carpenter addressed a letter to the First Lord of the Admiralty, urging the dispatch of a circumnavigating expedition thoroughly equipped, and with a competent scientific staff, to traverse the great ocean basins and prepare sections showing their physical and biological conditions, along certain lines. A committee was appointed by the Royal Society, and a comprehensive scheme was drawn up.

The *Challenger*, a spar-decked corvette of 2306 tons, with auxiliary steam to 1234 horse-power, and usually mounting eighteen 68-pounders, was chosen for the service; and Captain Nares, a surveying officer of great experience, and singularly well suited in every way for such a post, was selected to take command. When it was suggested to me at the commencement of the negotiations to join the expedition as director of the civilian scientific staff, the sacrifice appeared in every way too great; but, as the various arrangements progressed, so many friendly plans were proposed on all hands to smooth away every difficulty, that I finally accepted a post which to a younger naturalist, without the ties of a family and a responsible home appointment, would be perhaps among the most delightful the world could offer.

The bottom of the Atlantic

After passing over about 80 miles of volcanic mud and sand, products of the disintegration of the volcanic rocks of the islands of the Canary group, the first four soundings, to a distance of 300 miles from Santa Cruz at depths varying from 1525 to 2220 fathoms, yielded "globigerina ooze" of the usual character. This "modern chalk" consists, first of all, of a creamy surface layer made up of little else than the shells, most of them almost entire, of *Globigerina*, *Pulvinulina*, and *Orbulina*, with a relatively small proportion of finely divided matter, consisting chiefly of coccoliths and rhabdoliths, and a still smaller proportion of the spines and tests of radiolarians, and fragments of the spicules of sponges. Mixed with these there are usually a considerable number of the dead shells of pteropods in a more or less mutilated and disintegrated condition; and living among the ooze, at all events at moderate depths, there are scattered examples of many foraminifera of the cristellarian and milioline groups, and the sponges, corals, starfishes, and higher invertebrates, which, with a few fishes belonging to certain well-defined families, complete the fauna of the region. Next we have a layer an inch or two in thickness, somewhat more firm in consistence, in which most of the shells of all kinds are more or less broken up, and their fragments cemented together by a calcareous paste, the result of the complete disintegration of many of them; and beneath this a nearly uniform calcareous paste, colored gray by decomposed organic matter, and containing whole and fragmentary shells only sparsely scattered through it. Excellent samples, showing the gradual passage from one condition into the other, are often brought up in the tube of the sounding-machine.

Origin of globigerina ooze

Since the time of our departure, Mr. Murray has been paying the closest attention to the question of the origin of this calcareous formation, which is of so great interest and importance on account of its anomalous character and its enormous extension. Very early in the voyage, he formed the opinion that all the organisms entering its composition at the bottom are dead, and that all of them live abundantly at the surface and at intermediate depths, over the globigerina ooze area, the ooze being formed by the subsiding of these shells to the bottom after death.

Mr. Murray has combined with a careful examination of the soundings a constant use of the tow-net, usually at the surface, but also at depths from ten to a thousand fathoms; and he finds the closest relation to exist between the surface fauna of any particular locality and the deposit which is taking place at the bottom. In all seas, from the equator to the polar ice, the tow-net contains *Globigerinae*. They are more abundant, and of a larger size, in warmer seas: several varieties attaining a large size, and presenting marked varietal characters, are found in the intertropical area of the Atlantic.

Globigerina, *Pulvinulina* and *Orbulina* are foraminiferans, single-celled organisms who can fashion multi-chambered tests that look very much like tiny snail shells. Forams vary in size from microscopic to more than 12 cm. in diameter. Abundant in the fossil record, they have long been used to trace the lineage of sedimentary layers. Over thirty-five thousand species are known of which four thousand exist today.

In a related phylum, single-celled organisms build outer shells of pie-plate structures called coccoliths. Coccolithophorids are small, averaging five to ten microns in diameter but are the most abundant lime-secreting organisms in the world. The same phylum also includes the *Rhabdosphera* whose rod-like structures are called rhabdoliths.

Pteropods (sea butterflies) belong to the animal kingdom and are members of the phylum mollusca. They are basically snails that have adapted to living in the open sea.

Living *Globigerinae*

The living *Globigerinae* from the tow-net are singularly different in appearance from the dead shells we find at the bottom. The shell is clear and transparent, and each of the pores which penetrate it is surrounded by a raised crest, the crest round adjacent pores coalescing into a roughly hexagonal network, so that the pore appears to lie at the bottom of a hexagonal pit. At each angle of this hexagon the crest gives off a delicate flexible calcareous spine, which is sometimes four or five times the diameter of the shell in length. The spines radiate symmetrically from the direction of the centre of each chamber of the shell, and the sheaves of long transparent needles, crossing one another in different directions, have a very beautiful effect. The smaller inner chambers of the shell are entirely filled with an orange-yellow sarcode; and the large terminal chamber usually contains only a small irregular mass, or two or three small masses run together, of the same yellow sarcode stuck against one side, the remainder of the chamber being empty. No definite arrangement, and no approach to structure, was observed in the sarcode; and no differentiation, with the exception of bright-yellow oil-globules, very much like those found in some of the radiolarians, which are scattered apparently irregularly in the sarcode.

When the living *Globigerina* is examined under very favorable circumstances -- that is to say, when it can be at once placed under a tolerably high power of the microscope in fresh still sea-water -- the

sarcodic contents of the chambers may be seen to exude gradually though the pores of the shell, and spread out until they form a kind of flocculent fringe round the shell, filling up the spaces among the roots of the spines, and rising up a little way along their length. This external coating of the sarcode is rendered very visible by the oil-globules. At the same time an infinitely delicate sheath of sarcode containing minute transparent granules, but no oil-globules, rises on each side of the spines to its extremity, and may be seen creeping up one side and down the other of the spine. If the cell in which the *Globigerina* is floating receives a sudden shock, or if a drop of some irritating fluid be added to the water, the whole mass of sarcode retreats into the shell with great rapidity, drawing the oil-globules along with it, and the outline of the surface of the shell and of the hair-like spines is left as sharp as before the exodus of the sarcode.

C. Wyville Thomson, right, leader of the scientific staff on the Challenger, *Rudolf von Willemoës-Suhm, center, a young German naturalist with the expedition, and a member of the ship's crew all rest for a while at St. Thomas in the Virgin Islands after the expedition's first ocean crossing.* (Courtesy Trustees of the British Museum [Natural History])

Janthina

Along with the foraminiferan shells, some other shells of much larger size enter in in varying proportions into the composition of the ooze, or perhaps may rather be said to be mixed with it. These are principally shells of pteropods, with a few of those of heteropods, and of pelagic *Epitoniacea*. Of the *Epitoniacea* one or two only of the shell-making genera are pelagic, and the only important one of these is the genus *Janthina*, which inhabits a spiral shell, like a snail-shell, of a most lovely blue. *Janthina* floats by spreading out its "foot" on the surface, but is more usually found attached to ... *Vellela*, *Physalia*, and *Porpita*, or in the Mid-Atlantic, in the wandering islands of gulf-weed. At certain seasons, a peculiar kind of membranous float or raft is secreted from the animal, like a crescentic piece of honey-comb with the cells filled with air. The egg-sacs, which are not unlike those of the common whelk, are attached beneath the float; and when the float is complete, and the egg-sacs full, the creature disengages it, and leaves the eggs to be hatched as it drifts about on the surface in the warmth and sunlight.

The shells of *Janthina* are common in the globigerina ooze. They are not infrequently cast up on the shore on the west coasts of Ireland and Scotland, and even on the Shetlands and the Faroe Islands. They are not, however, inhabitants of our Northern Seas. They are drifted along and scattered about by our beneficent ameliorator, the Gulf-stream.

Carinaria

The *Heteropoda* are very close to the *Epitoniacea*, and in most modern works on zoology they are associated with them as a subclass. They are entirely pelagic, and as it is only under peculiar circumstances that one can stop a ship in mid-ocean and hunt for them, they are little known. One or two of their shells are met with in collections; one especially, *Carinaria*, a beautiful little glassy boat, which one would take at first for some form of paper-nautilus. The shell of *Carinaria* gives no idea, however, of

the form of the animal which is sometimes abundant in calm weather on the surface in warm seas. The shell hangs below the animal, connected with it by a kind of neck, and is merely meant for the protection of some very vital organs, including the heart, the gills, and the liver. The remainder of the animal is ten times the size of the shell, and forms a large sac, usually gelatinous and very transparent, often dotted over with purple pigment spots. The bodies of these creatures are large, some of them not less than five or six inches in length, but, like most free, floating animals, they are very soft, formed mainly of a "connective tissue," with little in it but sea-water. In this way their bulk is greatly increased without materially adding to their weight, and they weigh little more than an equal bulk of sea-water, and require little exertion to float or swim.

Pteropods

The *Pteropoda* are farther removed than the *Heteropoda* are from the typical *Epitoniacea*, and are much simpler in structure. The head is not so markedly separated from the body, and the organs of sense are rudimentary. The body is conical and sometime spiral, and is very usually contained in a delicate shell, sometimes spiral in form, more frequently conical or tubular. The foot is modified into two wing-like appendages, one on either side of the mouth. These are frequently brightly colored when the animal is living, and different parts of the body show iridescent blues and greens. Multitudes of these little things may now and then be seen on the surface of the water, fluttering with their wings and glittering in the sunshine.

The pteropods are much smaller than the larger forms among the heteropods; the largest of the present day are not more than about an inch in length. They make up for their small size, however, by their numbers. Everywhere in the high seas they absolutely swarm. They are not always to be taken in the tow-net, as they seem to have a habit, in the heat of the day and when there is any wind, of swimming a little way below the surface; but in a fine calm evening, no matter where, a haul of the towing-net can scarcely be made without catching many of them.

The most widely distributed species in the Atlantic seems to be *Diacria trispinosa*, with a little pocket-like shell of some weight and strength, shaded purple and white. Several species of *Cavolina* are abundant. *Clio pyramidata*, with a fretted shell whose ornament reminds one of some of the fossil genera, is perhaps the species most frequently seen on the surface, and the one which shows the iridescent coloring with the greatest brilliancy. The *Pteropoda* extend far to the northward; one *Limacina helicina*, with a delicate but very elegant spiral shell, and another, *Clione borealis*, are frequently seen by arctic voyagers in such numbers that they actually color the surface of the sea in patches of many miles in extent, and they are said to form a considerable item in the food of the (bowhead) whale, which strains them out of the water as it passes though his mouth, with his whalebone sieve.

Changes in bottom sediment composition

The next seven soundings, extending along the section to a distance of about 1500 miles from Teneriffe, and at depths varying from 3150 to 2575 fathoms, are marked on the chart "red clay." According to our present experience, the deposit of globigerina ooze is limited in the open oceans, such as the Atlantic, the Southern Sea, and the Pacific to water of a certain depth, the extreme limit of the pure characteristic formation being placed at a depth of somewhere about 2250 fathoms.

Crossing from these shallower regions occupied by the ooze into deeper soundings, we find universally that the calcareous formation gradually passes into, and finally is replaced by, an extremely fine clay, which occupies, speaking generally, all depths below 2500 fathoms, and consists almost entirely of a silicate of the red oxide of iron and alumina. The clay is

often mixed with other inorganic matter, particularly with particles graduating up to the size of large nodules of peroxide of manganese [Ed: manganese dioxide] and in volcanic regions, or in their neighborhood, with fragments of pumice. The transition is very slow and extends over several hundred fathoms of increasing depth; the shells gradually lose their sharpness of outline, assume a kind of "rotten" look and a brownish color, and become more and more mixed with a fine amorphous red-brown powder, which increases steadily in proportion until the lime has almost entirely disappeared. This brown matter is in the finest possible state of subdivision, so fine that when, after sifting it to separate any organisms it might contain, we put it into jars to settle, it remained for days in suspension.

In indicating the nature of the bottom on the charts, we came from experience, and without any theoretical consideration, to use three terms for soundings in deep water. Two of these "gl.oz." and "r.cl." were very definite, and indicated strongly marked formations, with apparently but few characters in common; but we frequently got soundings which we could not exactly call either "globigerina ooze" or "red clay"; and before we were fully aware of the nature of these we were in the habit of indicating them as "gray ooze"(gr.oz.). We now recognize the gray ooze as an intermediate stage between the globigerina ooze and the red clay; we find that on one side, the red clay contains more and more of the material of the calcareous ooze, while on the other the ooze is mixed with an increasing proportion of red clay.

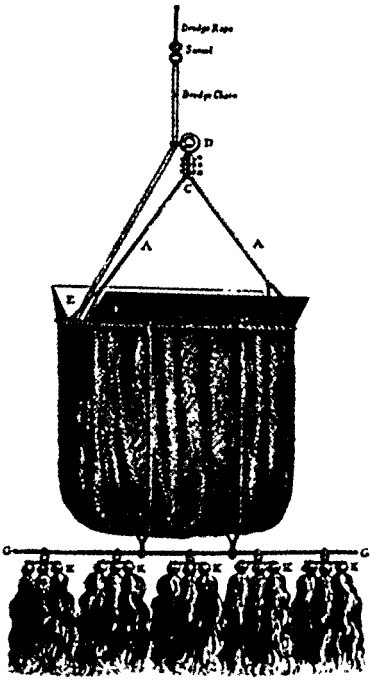
The depth goes on increasing to a distance of 1150 miles from Teneriffe when it reaches 3150 fathoms; there the clay is pure and smooth, and contains scarcely a trace of lime. From this great depth the bottom gradually rises; and, with decreasing depth, the gray color and the calcareous composition of the ooze return. Three soundings in 2050, 1900, and 1950 fathoms on the "Dolphin Rise" gave highly characteristic examples of the globigerina formation. Passing from the middle plateau of the Atlantic into the western trough, with depths a little over 3000 fathoms, the red clay returned in all its purity; and our last sounding, in 1420 fathoms, before reaching Sombrero, restored the globigerina ooze with its peculiar associated fauna...

The mean depth of the red-clay soundings is about 2750 fathoms. The general concurrence of many observations [was] ...whenever the depth increases from about 2200 to 2600 fathoms, the modern chalk formation of the Atlantic passes into clay.

Origin of red clay

The nature and origin of this vast deposit of clay are a question of very greatest interest. My first impression was, that it might be the most minutely divided material, the ultimate sediment, produced by the disintegration of the land, by rivers, and by the action of the sea on exposed coasts, and held in suspension and distributed by ocean currents, and only making itself manifest in places unoccupied by the globigerina ooze. Several circumstances seemed, however, to negate this mode of origin. The formation seemed too uniform; whenever we met with it, it had the same character, and it only varied in composition in containing less or more carbonate of lime.

Again, we were gradually becoming more convinced that all the important elements of the globigerina ooze lived on the surface; and it seemed evident that, so long as the conditions on the surface remained the same, no alteration of contour at the bottom could possibly prevent its accumulation; and the surface conditions in the Mid-Atlantic were very uniform, a moderate surface current of a very equal temperature passing continuously over elevations and depressions, and everywhere yielding to the tow-net the ooze-foraminifera in the same proportion. The Mid-Atlantic swarms with pelagic mollusca; and in moderate depths, the shells of these are constantly mixed with the globigerina ooze, sometimes in number sufficient to



Dredge used on the Challenger *for deep sea sampling. One drag could take as long as half a day.*

make up a considerable portion of its bulk. It is clear these shells must fall in equal numbers upon the red clay; but scarcely a trace of one is ever brought up by the dredge on the red-clay area. It might be possible to explain the absence of shell-secreting animals living on the bottom by the supposition that the nature of the deposit was injurious to them; but the idea of a current sufficiently strong to sweep them away, if falling from the surface, is negated by the extreme fineness of the sediments which is being laid down. The absence of surface shells appears to be intelligible only on the supposition that they are in some way removed by chemical action.

We conclude, therefore, that the red clay is not an additional substance introduced from without, and occupying certain depressed regions on account of some law regulating its deposition; but that it is produced by the removal, by some means or other, over these areas, of the carbonate of lime, which forms probably about 98 percent of the material of the globigerina ooze. We can trace, indeed, every successive stage in the removal of the carbonate of lime, in descending the slope of the ridge or plateau where the globigerina ooze is forming, to the region of the clay. We find, first, that the shells of pteropods and other surface mollusca which are constantly falling on the bottom, are absent; or, if a few remain, they are brittle and yellow, and evidently decaying rapidly. These shells of mollusca decompose more easily, and disappear sooner, than the smaller and apparently more delicate shells of rhizopods. The smaller foraminifera now give way, and are found in lessening proportion to the larger; the coccoliths first lose their thin outer border and then disappear; and the clubs of the rhabdoliths get worn out of shape, and are last seen, under a high power, as minute cylinders scattered over the field. The larger foraminifera are attacked, and instead of being vividly white and delicately sculptured, they become brown and worn, and finally break up, each according to its fashion: the chamber-walls of *Globigerina* fall into wedge-shaped pieces, which quickly disappear; and the thick rough crust breaks away from the surface of *Orbulina*, leaving a thin inner sphere, at first beautifully transparent, but soon becoming opaque and crumbling away.

In the mean time, the proportion of the amorphous red clay to the calcareous elements of all kinds increases, until the latter disappear, with the exception of a few scattered shells of the larger foraminifera, which are still found, even in the most characteristic samples of red clay.

There seems no room left for doubt that the red clay is essentially the insoluble residue, the ash, as it were, of the calcareous organisms which form the globigerina ooze after the calcareous matter has been by some means removed. An ordinary

mixture of calcareous foraminifera with the shells of pteropods, forming a fair sample of globigerina ooze from near St. Thomas was carefully washed, and subjected, by Mr. Buchanan, to the action of weak acid; and he found that there remained, after the carbonate of lime had been removed, about one percent of a reddish mud, consisting of silica, alumina, and the red oxide of iron. This experiment has been frequently repeated with different samples of globigerina ooze, and always with the result that a small proportion of a red sediment remains, which possesses all the characters of the red clay.

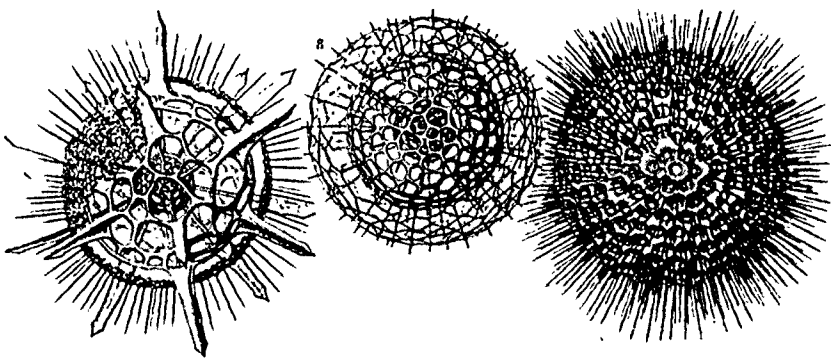
Radiolarian ooze

Our dredgings in the Atlantic, and a subsequent careful examination of the soundings, certainly gave us the impression that the siliceous bodies, including the spicules of sponges, the spicules and tests of radiolarians, and the frustules of diatoms , which occur in appreciable proportion in the globigerina ooze, diminish in number, and that the more delicate of them disappear in the transition from the calcareous ooze to the red clay; and it is only by the light of subsequent observations that we are now aware that this is by no means necessarily the case. I think it may be well to anticipate here those later results in order to make the nature of the deep-sea deposits more clear.

On the 23rd of March, 1875, in the Pacific, in lat. 11 degrees 24' N., long. 143 degrees 16'E., between the Caroline and Ladrone groups, we sounded in 4575 fathoms. The bottom was such as would naturally have been marked on the chart, from its general appearance, "red clay": it was a fine deposit, reddish brown in color, and it contained scarcely a trace of lime. It was somewhat different, however, from ordinary red clay -- more gritty; and the lower part of the contents of the sounding-tube seemed to have been compacted into a somewhat coherent cake, as if already a stage toward hardening into stone. When placed under the microscope, it was found to contain so large a proportion of the tests of radiolarians, that Mr. Murray proposed for it the name "radiolarian ooze".

Radiolaria

The radiolaria, which play so important a part in supplying material for these new geological formations, are not very familiar to British naturalists. Sixty to eighty miles from the shore [of Britain], these forms, which frequently occur in the Atlantic, the Mediterranean, the Pacific, and all moderately warm seas in sufficient numbers to discolor the water, become



The glassy skeletons of radiolarians were discovered in the Challenger's *deepest bottom samples. More than 3,500 different species of this simple microscopic animal were collected on the expedition. (From the* Challenger Report, *Zoology, Vol. 18.)*

abundant. The radiolaria form a class of the *Protozoa* and consist essentially of a little mass of sarcode [extensible protoplasm], with no very definite bias as to form, but tending, when irritated to assume more or less that of a sphere...The body may be naked, a mere sphere of sarcode giving off pseudopoda; or it may have a more or less fully-developed skeleton; sometimes in the form of siliceous spicules, very like the spicules of sponges, disposed in an irregular network over the surface...In the two groups which are of greatest importance in a geological point of view, the skeleton is much more regular and complete...in [one] it consists of a delicate external shell, minutely fenestrated, and often presenting very remarkable and beautiful forms; in the [other] it is essentially internal, and is formed of a varying number of siliceous spicules, radiating from a center round which the sarcode is accumulated.

Radiolarian abundance related to depth

The observation of the great abundance of radiolaria tests at great depths led to the reconsideration of the deposits from the deepest soundings; and Mr. Murray now believes, that shortly after the red clay has assumed its most characteristic form, by the total removal of the calcareous shells of the foraminifera, at a depth of say 3000 fathoms, the deposit in many cases begins gradually to alter again, by the increasing proportion of the shells of radiolarians, until, at such extreme depths as that of the sounding of the 23rd of March, it has once more assumed the character of an almost purely organic formation -- the shells of which it is chiefly composed being, however, in this case siliceous, while in the former they were calcareous. The radiolarian ooze, although consisting in great part of the tests of radiolarians, contains a very considerable proportion of red clay.

We have every reason to believe, from a series of observations as yet very incomplete, with the tow-net at different depths, that while foraminifera are apparently confined to a comparatively superficial belt, radiolarians exist at all depths in the water of the ocean. At the surface and a little beneath it the tow-net yields certain species; when sunk to greater depths, additional species are constantly found; and in the deposit at the bottom, species occur which have been detected neither on the surface nor at 1000 fathoms, the greatest depth at which the tow-net has been systematically used; and specimens taken near the bottom of species which occur on or near the surface give us the impression of being generally larger and better developed.

Now, if it be the case that ooze-bearing foraminifera are confined to an upper layer of say not more than 500 fathoms in thickness, the supply of their shells, and consequently the supply of the red clay, which, according to our view, is to a great extent the product of their decomposition, must be pretty constant over the area where foraminifera abound; while, on the other hand, if the radiolarians live at all depths of the sea, the number of their skeletons falling to the bottom at one place must increase with the increasing depth of the water; and it becomes quite intelligible that, in a bed which is being formed at the prodigious depth of five and one-half nautical miles, the tests of the radiolarians should so preponderate over the red clay as to entirely alter the character of the deposit.

EPILOGUE TO "THE VOYAGE OF THE CHALLENGER - THE ATLANTIC" AND "A BRIEF HISTORY OF OCEAN EXPLORATION" (VOL 24 #4)

Either in the preface or introduction, every introductory text on oceanography makes a passing reference to the voyage of the *Challenger*. About all that is said is that it took place from 1873 to 1876 and marked the beginning of oceanography. The first statement is loosely true; the voyage began in December 1872 and ended in

May 1876. The second is patently false as "A Brief History of Ocean Exploration" and the early excerpts in "The Voyage of the Challenger" clearly attest. (The "History" appeared in 1882, a part of one of fifty quarto volumes of the *Challenger Reports*).

The naval complement of the *Challenger* was comprised of twenty-three officers and a crew of over two hundred. The officers, aside from their normal duties directing ship's operations also were responsible for charting, hydrography, meteorological observations, magnetic measurements as well as directing the practical operation of dredging, trawling, sounding, measuring sea temperatures at various depths, and coring.

The scientific staff was comprised of five men (a sixth died at sea shortly after departure) -- C.Wyville Thomson, regius professor of natural history at the University of Edinburgh; his secretary and artist, J.J.Wild; J.Y. Buchanan, chemist; H.N. Mosely, naturalist, and John Murray. Murray was a last minute addition and proved to be an essential linchpin in the completion of the whole project.

Deep sea exploration then, as it is today, was no easy task. A single sounding to 3000 fathoms of water took one and a half hours, while trawling or dredging at that depth took a minimum of twelve hours.

Over the course of the voyage, they dredged at 354 stations. About a third of ship's time was spent sailing from station to station, a third on station, and the rest in port.

Specimens had to be examined, preserved, and catalogued immediately after being brought aboard. Water samples were subjected to gas analysis immediately and samples sealed for later analysis.

Much of the work involved viewing and preserving microscopic specimens, no easy matter on a rolling ship. Thomson commented "every article, even the smallest, must not only have its place, but must be secured in it."

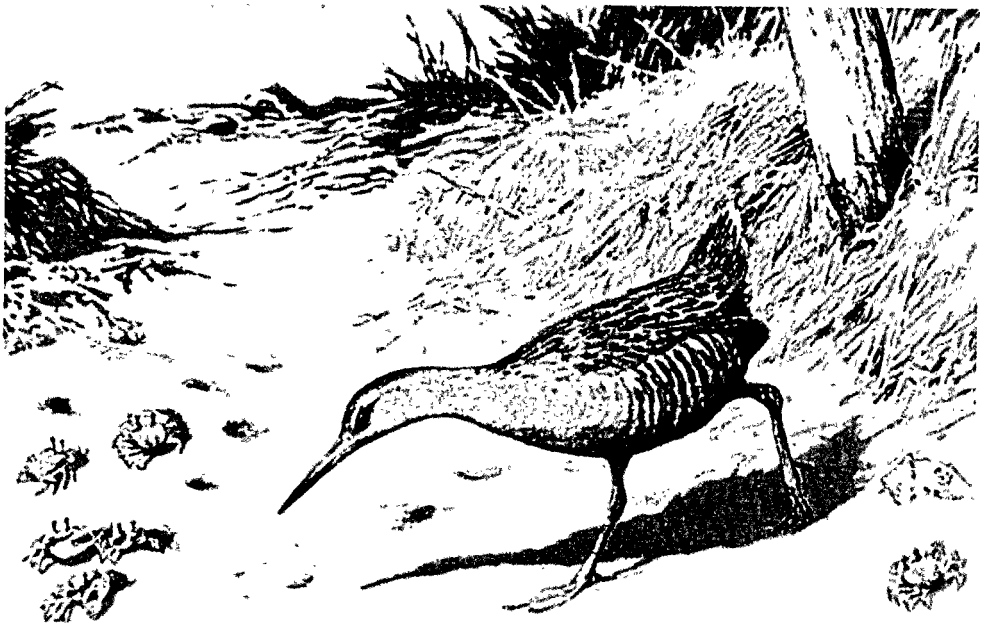
Thomson believed relations between the scientists and the ship's officers remained cordial over the entire voyage. He remarked that the officers referred to the scientists as "the philosphers -- not, I fear, from the proper feeling of respect, but rather with good-natured indulgence, because we are fond of talking about evolution and other-wise holding on to loose ropes and because our education has been sadly neglected in the matter of cringles and toggles and grummets, and other implements by means of which England holds her place among the nations."

Not all the officers held such a sanguine view. One recollected that "the romance of deep water trawling or dredging in the *Challenger* when repeated several hundred times, was regarded from two different points of view; the one was the officers who had to stand for ten to twelve hours at a stretch carrying on the work...and who did not know much about, or scientifically appreciate, the minute differences between one starfish, one shrimp, one seacucumber, and another. The other point of view was the naturalists to whom some new worm, coral, or echinoderm is a joy forever, who retires to a comfortable cabin to describe with enthusiasm this new animal, which we, with much weariness of spirit, to the tune of the donkey engine only, had dragged up for him from the bottom of the sea."

Upon returning to Scotland, Thomson sent the specimens collected on land to the British Museum and disbursed the sea collections to a long list of European scientists upon their agreement to write up and illustrate their results for publication in the Reports. Thomson died in 1882, well before the Reports were completed but John Murray took charge of their publication which stretched out into the twentieth century. Murray went on to become a noted oceanographer in his own right. DKB □

The Top 25

by OWEN HATTERAS



Clapper rail and fiddler crabs from Wanderer on my Native Shore.

I have been asked by the editors of *Underwater Naturalist* to gather an annotated list of 25 or so books about the coast that I have read and enjoyed. Here they are in no particular order. Some of these books are out of print but may be available in libraries. Also you can check the book services on the internet that track down used books.

Disclosing such a list is fraught with danger. Somewhere, someone may be at work on a classic that will knock one of the below mentioned books off the shelf. Recently, I heard an interview with John McPhee on National Public Radio, and he dropped hints that he was writing about anadromous fishes. He alluded to maps of the area around Holyoke, Massachusetts, so I suspect his quarry is the American shad (I was right; he was collecting information for a piece in *The New Yorker* about the Connecticut River and shad behavior).

And, there have been a rash of books about how to endanger your life or broaden your horizons -- climbing Everest, catching swordfish on the Grand Banks, crossing the US by boat (*River Horse*, by William Least Heat Moon), or sailing the inside passage from Seattle to Alaska. As I sit here, someone may be swimming down the Mississippi River underwater, or trolling for 1000-pound black marlin from a surfboard. It's good to know that we can look forward to books we haven't imagined. But, enough small talk; here is the list:

Owen Hatteras is a retired textile executive who now lives on the coast of South Carolina.

The Bottom of the Harbor, by Joseph Mitchell. A collection of pieces from *The New Yorker* about New York harbor, the waterfront, the harbor bottom, the rats, the saloons, and the shad fishermen and other denizens, and about a draggerman from Stonington, Connecticut. Mitchell wrote other pieces that have been collected in *Up in the Old Hotel and Other Stories*. Terrific.

Wanderer on My Native Shore, by George Reiger. From the weakfish of Peconic Bay, Long Island, to the Georgia salt marshes, with plenty of colorful places in between.

The Sea Around Us, Beneath the Sea Wind, or *The Edge of the Sea*, or anything else that Rachel Carson wrote.

Salt Water Fishing, by Van Campen Heilner. This is a good way to look back at east coast surf fishing in the 1930s. He also touches on big game fishing in the Caribbean.

The Herring Gull's World, by Niko Tinbergen. Classic study of bird behavior.

Alaska Blues, by Joe Upton. A commercial fisherman from Seattle describes a typical season of salmon trolling and netting in Southeast Alaska 25 years ago. He starts in spring, goes north with the season, and catches fish.

Working on the Edge, by Spike Walker. An absolutely terrifying description of how to make lots of money fishing for crabs in the Bering Sea -- wintertime, pushing 700-pound crab traps around the heaving deck with cold, wet hands, while ice-coated rigging and 40 knot winds threaten the patched boat's stability.

Three River Books: *The Hudson River: A Natural and Unnatural History*, by Robert Boyle; *Natural Lives, Modern Times: People and Places of the Delaware River*, by Bruce Stutz; and *A River Lost: The Life and Death of the Columbia River*, by Blaine Harden. Despite being dammed up, boiled by power plants, and polluted by cities and farms, rivers sooner or later get to the sea. These books will last.

Hermit crab atop coral from The Living Dock at Panacea.

So Excellent a Fishe, by Archie Carr. The big sea turtles by a terrific, caring biologist.

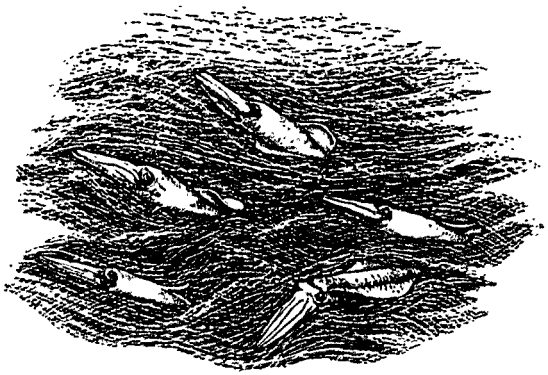
The Seaside Reader, edited by D. W. Bennett. Excerpts from about 25 books dealing with the sea, scuba diving, shipwrecks, sand dunes, and estuaries.

National Fisherman, the monthly newspaper for commercial fishermen -- landing statistics, new boat designs, arguments between sports and commercials, good reporting and good photography. Tempers often flare in the letters to the editor.

Cod, by Mark Kurlansky. Subtitled "A Biography of the Fish that Changed the World," this is a story of the discovery of immense schools of codfish off the shores of North America and the nations that sent wooden sailing ships and iron men to catch them. Follow that with *Lament for an Ocean: The Collapse of the Atlantic Cod Fishery -- A True Crime Story*, by Michael Harris. Scientists, fishermen, politicians, and bureaucrats fiddling while a fishery burns.

The Log from the Sea of Cortez, by John Steinbeck, being the narrative por-

tion of "Sea of Cortez," the report of the Steinbeck-Ricketts expedition in the Gulf of Mexico in 1940 to collect marine specimens. Then read *Between Pacific Tides*, Ricketts et al., Ricketts busy in California tidepools.



Squid from The Living Dock at Panacea.

The Run, by John Hay. The spring run of herring in a Cape Cod stream as reported by one of the coast's prime naturalist writers.

Waves and Beaches, by Willard Bascom. Almost all you need to know about the whys of waves, the small, regular ones and the big, scary ones, and about the shorelines they beat upon.

Living with the _____ Shore, edited by Orrin Pilkey of Duke University. Fill in the blank with any coastal state and you have a guide to its shoreline and how to cope sensibly with its tendency to misbehave. (And *Living by the Rules of the Sea*, Bush, Pilkey, and Neal).

A Geologist's View of Cape Cod, by Arthur A. Stahler. How this stately collection of sand was formed and how it moves.

The Windbirds, by Peter Matthiessen. Elegant natural histories of the shorebirds of North America (and don't forget his *Men's Lives* about the surfman and baymen of the South Fork.)

Life and Death of a Saltmarsh, by John and Mildred Teal. Still far and away the best description of how saltwater wetlands work and how they are threatened.

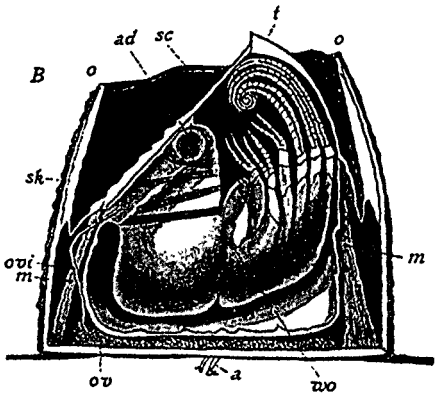
The Book of the Seashore, by H. J. Shannon. A keen eye cast on the less obvious creatures of the beach -- insects, for example.

The Sea Beach at Ebbtide, by Augusta Foote Arnold, 100 years old and still going strong. Its subtitle is "A guide to the study of seaweeds and other lower animal life found between tide-marks."

The Living Dock at Panacea, by Jack Rudloe, good coverage of seashore wildlife of the Gulf Coast by a marine specimen collector.

Beautiful Swimmers, by William Warner, describing with care and sensitivity the blue crab, its Chesapeake Bay haunts and the people who catch them.

Ocean Wanderers: Migratory Seabirds of the World, by Ronald M. Lockley. Covering most of the pelagics. Superb photography.



Balanus. B, anatomy· *a*, antennules; *ad*, adductor; *m*, muscles of scuta and terga; *o*, edge of parapet: *ov*, ovary; *ovi*, oviduct, *sc*, scutum; *sk*, parapet; *t*, tergum; *wo*, female aperture.

Barnacle cross-section from The Sea-Beach at Ebb-Tide.

Profiles in Saltwater Angling, by George Reiger, biographical sketches of some of the oldtime angling greats -- Michael Lerner, Ernest Hemingway, Zane Grey, and their ilk.

Living Resources of the Sea, by Lionel A. Walford. A pioneering work that forecast the limits of sea harvesting. Out of print but worth trying to track down.

Up until now, I have listed books about the littoral that you may want to read at your leisure for your pleasure. A list of a second kind of coastal book -- the field guide -- follows. These are the books you will consult if you need to identify a shore creature. Most of these are available as paperbacks.

The Peterson field guides to Atlantic seashore, Atlantic coast fishes, Pacific coast fishes, and Eugene Kaplan's Southeastern and Caribbean seashores.

A Beachcomber's Botany, by Loren C. Petry. Published by the Chatham (Cape Cod, MA) Conservation Commission.

Fishes of the Gulf of Maine, by Henry B. Bigelow and William C. Schroeder. Parts of this volume date back to the twenties, and lots has been learned since then, but this is still one of the great books about fish. It's both a field guide and a natural history. (Out of print, but many libraries have or can get it).

Birds of North America, by Robbins, Bruun, & Zinn. I like this guide better than Peterson because it is a single volume, while Peterson divides the country at the Rockies.

The Encyclopedia of Fish Cookery, by A. J. McClane. Big format book with lots of fish information and recipes. The striking photography is by Arie deZanger.

Most assuredly I have left out something important, and you are welcome to cheer or hiss. Please feel free to add to the list by sending me a note care of the Littoral Society. Thanks to Don Bourne, Bonnie McCay, Frank Steimle, Dave Grant, and Mickey Cohen for their suggestions, some of which I followed. □

Barnacles from The Edge of the Sea.

Dolphin Assisted Therapy or Gimmickry

by JIM CURTIS

Throughout the ages, dolphins have performed a variety of "services" for the benefit of the human race. These have ranged from being important religious symbols within the folklore of ancient civilizations to their emergence in the modern era as commercially valuable marketing tools and tourist attractions. One of the latest discoveries is the industry of "Dolphin Assisted Therapy" (DAT). But although dolphins have long been associated with notions of alternative living, extending this association to "alternative healing" has raised ethical and moral questions concerning the exploitation of false hopes and justifying dolphin captivity.

The conceptual foundations of DAT are generally recognized to have begun in 1971 during an auspicious encounter between a group of adolescent dolphins and the retarded brother of educational anthropologist, Dr. Betsy Smith. She observed behavioral changes in both the dolphins and her brother, and realized the potential therapeutic applications of such encounters. Since these humble beginnings, DAT has grown to become a global industry and an increasingly popular field of scientific investigation. Researchers studying DAT techniques currently number in their hundreds, while countries such as Australia, Japan, the Ukraine, Israel, Great Britain, and the United States have all been actively involved in the creation and establishment of DAT programs and centers.

The early developmental stages of DAT focused on the ability of dolphins to motivate behavioral and cognitive changes in disabled children. Captive dolphins were used as stimuli to elicit responses that indicated that some degree of positive learning had occurred. The underlying rationale for this approach was the belief that the attention span of disabled children would increase significantly because of their desire to interact with the dolphins. By successfully performing tasks that challenged their area of disability, the children would be rewarded with a dolphin encounter that involved swimming, touching, feeding, patting, or kissing the animal. This method of positive reinforcement was claimed to achieve learning improvements within the children that were dramatically greater than those attained in a classroom environment.

It is little coincidence that the conceptual emergence of DAT occurred at a time when there was intense interest in the intelligence and learning capabilities of dolphins. Combined with a host of claims concerning their therapeutic and healing "powers" DAT soon expanded beyond its early foundations of simply providing a stimulating teaching environment. People afflicted by cerebral palsy, autism, spinal cord injuries, strokes, cancer, post traumatic stress, chronic depression, attention deficit disorder, Down's syndrome, muscular dystrophy, blindness, deafness, anorexia, and dyslexia are now all part of the burgeoning DAT market. Although once dismissed as merely a "New Age" fad, the growing popularity and attention being generated by DAT suggests that such a broad dismissal can no longer be justified.

Some of the claimed therapeutic effects of dolphins have included improvements in the psychological well-being of "clients" due to raised levels of happiness, confidence, and self-esteem, profound states of relaxation that help create stronger immune systems, and even bold assertions that cancerous tumors have

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Human interactions with dolphins have a long history. This bottlenose was one of several that took up residence in a Florida Keys lagoon, free to come and go as it pleased.

shrunk. But many of these benefits are extremely subjective and are therefore impossible to quantify. Instead of being supported by scientific evidence, they are based more on a "feeling" and a sense of faith that dolphins are healers. Such subjective notions of dolphin healing have been a significant source of frustration for researchers studying the science of DAT. Rather than simply accepting the therapeutic effects, their aim is to discover the mechanisms that create these positive responses in the belief that they may be physiological as opposed to psychological. Some of the hypotheses being put forward include theories that a dolphin's sonar is capable of stimulating the production of specific hormones, altering brainwaves and causing cavitation within the soft tissue of the human body. However, there remains a strong element of skepticism toward such scientific theories given that dolphins have long been associated with a variety of "New Age" claims that have served to tarnish the credibility of this emerging field of scientific research.

At the 1996 International Symposium on Dolphin Assisted Therapy, a paper was presented by Dr. W.L. Martens entitled

"Human Attitudes Towards Dolphin Assisted Therapy: The Essential Tension Between Science and Faith." The paper highlighted how the field of DAT was characterized by contrasting approaches based on science and faith. It also acknowledged that despite the differences between them, they both had the "desire to make a difference in the lives of people who need the kind of help that dolphins are willing to offer." But given that most dolphins used for DAT are held in captivity, their "willingness" to participate is questionable.

What is often forgotten in discussions of DAT are the dolphins themselves. They are wild animals with natural instincts and patterns of behavior that have evolved over millions of years. They are accustomed to living freely in the world's open waters and hunting for their own food. But these practices are deemed as "inconvenient" for DAT sessions as the dolphins are invariably required to be continually present and responsive, and this means that they have to be held in captivity and forced to rely on being hand fed. Although some DAT centers claim that their holding pens, pools, and lagoons are designed to allow the dolphins to come and go as they please, a member of the same family group, such as a young calf, will often be kept captive to ensure that it returns. Combined with the fact that they have had their pronounced natural instinct to hunt living fish compromised, the dolphins have little choice but to return to captivity.

In addition to taking away a dolphin's freedom and natural instincts, there are numerous other issues associated with captivity. There have been documented accounts of dolphins suffering from bleeding ulcers, blindness, respiratory infections, stress, behavioral abnormalities, breeding difficulties, and poisoning. High mortality rates are another problem, with captive dolphins usually only living between 5 and 7 years compared to the 30- to 40-year lifespan of their wild counterparts. The enclosed spaces of some holding areas have also driven many dolphins to silence. This is a result of the dolphins curtailing the use of their sonar because of the signals bouncing back off the surrounding walls. The psychological repercussions of this effect have been likened to imprisoning a sighted animal in an enclosure of mirrors. As well as becoming non-communicative, captive dolphins can also become highly aggressive. There have been reported incidents of humans sustaining bruises, broken bones, bites, and even hospitalizations because of the aggressive behavior of a captive dolphin.

These negative impacts are made even more intolerable given the flaws inherent to many DAT studies that have been used to justify dolphin captivity. Despite the growing scientific element of the field, its credibility has been plagued by insufficient and dubious empirical data, the absence of standard criteria for measuring therapeutic progress, subjective anecdotal results, and inadequate research protocols. Some studies have been so preoccupied with highlighting the "wondrous" healing effects of dolphins that they fail to consider other influences. These may relate to the body's instinctive reactions to water immersion, such as heightened sensory perceptions, reduced anxiety and pain relief, and the feeling of importance an individual may receive by being personally supervised by a trainer, instructor, or carer while in the water. There is also the problem of relying on the responses of DAT clients and their family and friends. The financial and emotional expenditure that they have invariably invested can often provide them with enough impetus to "see" dramatic improvements even though they may not exist. Although the stimulating effects of dolphins are undeniable, these additional factors illustrate there are other variables that can affect client responses, and makes defending dolphin captivity for the sake of DAT hard to justify.

The other growing concern associated with DAT relates to the exploitation of false or misplaced hopes. Claims that dol-

phins can cure ailments ranging from tobacco addiction to cancer have obviously attracted the attention of a wide range of prospective clients. For many of them, dolphins offer a last hope, and it is this desperation that is being exploited. The thought of being miraculously cured can result in their investing precious finances and emotions, and given their significant investment, it is understandable why they place so much faith in DAT. This is because they cannot financially or emotionally afford not to believe in the potential healing powers of these "mystical" animals. Dolphins are therefore not the only victims when it comes to criticizing the ethics of DAT.

In the wake of the growing concerns being directed at DAT and dolphin captivity, there are numerous alternatives being proposed. For example, hydrotherapy and domestic animal programs have been cited as genuine alternatives given that they have produced documented benefits similar to those claimed by DAT enthusiasts. But the common response to this argument is that dolphins provide the optimal motivational setting for generating improvements within people. This may partially be true, but the results may be good enough to challenge the use of captive dolphins. Simulating dolphin interactions through virtual reality has also been considered, but the therapeutic mechanisms of dolphins are currently not understood well enough for accurate artificial replication. Another alternative involves using wild rather than captive dolphins. Although the possible issue of exploiting false hope remains, the captivity concerns are at least alleviated. Interacting with wild dolphins can also be a much more rewarding experience. Instead of being forced to interact, it is the dolphin's choice whether to approach or not. This makes the encounter all the more special by creating a profound sense of importance within the person who has attracted the dolphin's attention. It also illustrates that wild dolphins have a lot more to offer than just being a "reward" which is often the main role of their captive counterparts.

As the claimed therapeutic effects of dolphins garner more attention, the potential to exploit dolphins and human vulnerabilities, often for economic gain, will continue to be a major concern. For many DAT clients, the prospect of interacting with a dolphin offers a rare chance of happiness and hope; emotional commodities that may be lacking in their own lives. However, they unfortunately seem to be so preoccupied, envious and jealous of these qualities that they have little qualm with taking them away from another animal for their own personal gain. Although humans have no right to consider their own happiness as being more important than that of a dolphin, this is basically the underlying premise of DAT, and for its proponents to argue that it also benefits dolphins is little more than a vain defense of questionable ethics and morals. Dolphins are wild animals deserving of their freedom, not "faith healers" capable of remarkable cures. Humans should be smart enough to realize and accept this reality. □

Field Notes

Rattled While Fishing

by STEVE SAUTNER

After an evening of trout fishing with my friend on the upper Delaware River below Hancock, New York, in late July, we began the long walk back to my truck in the dark. The trail we took paralleled a railroad grade, then meandered into a wooded area. Eventually it became too dark to see, so out came the flashlights and the walk continued. Suddenly, from directly underfoot, there emitted perhaps the single most infamous sound in all of nature: a distinct rattle. This, of course, was immediately followed by an explosion of yelling, running, and flying fishing tackle. When we realized that neither of us were hurt, we dashed back to the scene to find a three-foot timber rattlesnake (*Crotalus horridus*), coiled in the center of the path, its tail pointed up emitting its namesake warning. As it turned out, my friend had accidentally stepped on it. When he glanced down, he saw it take a swipe at me just as we heard it for first time. Thankfully, it missed, though I wonder whether it could have penetrated my heavy nylon waders. The snake appeared to be in its dark phase, with black bands contrasting over a brown body. Rattlers are members of the pit viper clan, hunting at night by detecting heat with "pits" located on each side of its face. This one was probably using the trail to intercept field mice, which are abundant along that particular stretch of the Delaware. Finally, after the snake had enough of our gawking, it slithered off the path, rattling away as it disappeared into the forest. □

Steve Sautner works for the Bronz Zoo and fishes often. Drawing by Dave Taft.

Field Notes

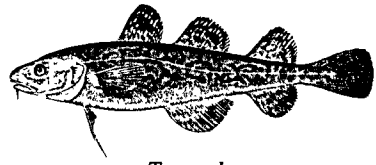
Fish Collections From The Hudson River In And Around Port Liberte, New Jersey

by DON DORFMAN

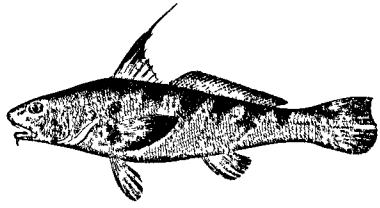
Fishes were collected from the canals and from the adjacent Clairmont channel, in the Hudson River, Jersey City, New Jersey, on seven dates over a two year period, from March, 1999 to August, 2000. Collections were made by timed, duplicate trawls (three minutes per trawl) at five stations for a total of 70 trawls over the two years. The collections totaled 914 fishes representing 36 species (Table 1). The dominant species included striped bass (34 percent of the total), weakfish (11 percent), tomcod (10 percent), bay anchovy (9 percent), blueback herring (8 percent), and winter flounder (7 percent). All of the fishes were returned to the river after identification. Fewest fishes were collected in March of both years. The largest collections occurred each year in August. Most of the fishes collected were zero year class (i.e. spawned in the year of collection).

The canal probably offers some protection for smaller fishes, although larger fishes can and do enter the canals. For example, a three-foot, short-nosed sturgeon was collected (and released) in a canal. The walls confining the canals, and the docks within them have algal growths. These provide habitat for small invertebrates, including amphipods. These, along with benthic worms, and phytoplankton provide food sources for the smaller fishes. In addition, two shrimp species (*Crangon septemspinosa* and *Palaemonetes pugio*) are abundant in the canals during certain times of the year.

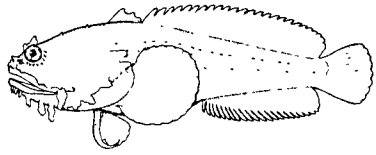
Don Dorfman is a natural science professor at Monmouth University and a frequent UN contributor.



Tomcod



Northern Kingfish



Toadfish

An analysis of biodiversity (Margalef Diversity) was made, along with evenness (Simpson Diversity for Evenness), by including all of the fish species collected, and their numbers for the two year period. This analysis is more indicative of the use of the river by fishes over time. A diversity of 11.821, and an evenness of 0.864 was obtained. The value for diversity is relatively high (i.e. shows biodiversity). For evenness, a value of 1.000 is the maximum value attainable, and would occur if the number of individuals were equal for all 36 fish species collected. Generally, the large number of species may imply a healthy environment. Conversely, few species are indicative of more polluted habitats. □

Table 1
Fishes caught in the Hudson River, in and around Port Liberte, Jersey City, New Jersey, 1999-2000.

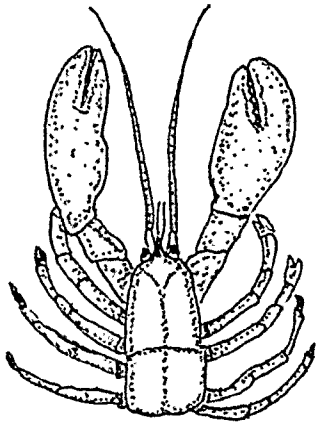
Scientific name	Common name	Number caught
Morone saxatilis	Striped bass	311
Cynoscion regalis	Weakfish	97
Microgadus tomcod	Tomcod	92
Ancoa mitchilli	Bay anchovy	84
Alosa aestivalis	Blueback herring	72
Pseudopleuronectes americanus	Winter flounder	61
Prionotus evolans	Striped searobin	33
Syngnathus fuscus	Pipefish	21
Menticirrhus saxatilis	Northern kingfish	20
Leiostomus xanthurus	Spot	16
Paralichthys dentatus	Summer flounder	16
Brevoortia tyrranus	Menhaden	12
Pomotomus saltatrix	Bluefish	10
Alosa pseudoharengus	Alewife	8
Menidia menidia	Silversides	6
Sphyraena borealis	Northern barracuda	6
Stenotomus chrysops	Scup	5
Urophycis regia	Spotted hake	5
Morone americana	White perch	5
Clupea harengus	Sea herring	5
Scophthalmus aquosus	Windowpane	4
Sphoeroides maculatus	Puffer	4
Tautoga onitis	Blackfish	3
Gobiosoma bosc	Goby	2
Synodus foetans	Lizardfish	2
Centropristes striata	Sea bass	2
Rachycentron canadum	Cobia	2
Selene vomer	Lookdown	2
Vomer setapinnis	Moonfish	1
Opsanus tau	Toadfish	1
Anguilla rostrata	American eel	1
Acipenser brevirostrum	Shortnose sturgeon	1
Peprilus triacanthus	Butterfish	1
Caranx hippos	Jack	1
Fundulus heteroclitus	Mummichog	1
Urophycis chuss	Red hake	1

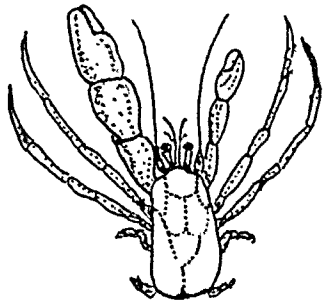
Field Notes

The Great Sandy Hook Lobster Hunt

by DAVE GRANT

What we know is a drop.
What we don't know is an ocean.
– Isaac Newton





Anterior portions of lobster (Homarus), *left, and long-clawed hermit crab* (Pagurus longicarpus).

Last summer I was down at the Atlantic Highlands, N.J., docks discussing fishing regulations and the state of the industry with one of the mates from the fishing fleet. Actually, I was minding my own business doing some water testing while listening to his latest unsolicited tirade about how the industry was being destroyed by: (1) "The state people" (it's always "the state"), and other "politicians, clerks-and-jerks" who want to "cram a bunch of worthless fluke-fishing regulations down the throats of fishermen" and (2) "Other fishermen" (it's always "other fishermen"), who just don't understand the business.

This sort of discussion, interspersed with the latest round of off-color jokes and fishing stories is pretty typical herding behavior between anyone carrying a fishing pole down at the docks. I always listen politely and occasionally throw in my two cents (plus a joke that is unlikely to offend anyone within earshot, of course. Never pass up the opportunity to take a pot-shot at a snooty politician or a Parisian.)

During his commentary he mentioned something that piqued my curiosity, and anything involving fluke, those harbingers of summer that we all anticipate so eagerly, interests me. After expressing the usual relief about successfully "getting through the worm season" -- spiritless spring fishing for winter flounder with those "damned sand and blood worms" (Read: expensive, delicate and a pain to handle), he casually mentioned that while fluke fishing off the Cedars ("right off the ocean beach") at Sandy Hook, he noticed

Dave Grant is director of the Ocean Institute at Sandy Hook and the Society's Chief Naturalist. He did the drawing.

that the fish were spitting up baby lobsters. This is interesting since the adolescent years of a number of creatures like lobsters are still a bit of a mystery, and this area is open, featureless sandy bottom. Not where you'd expect to find a lobster at such a vulnerable time in its life cycle. Also, one of the concerns raised about the massive beach restoration projects along the New Jersey coast is the potential interference that sand pumping might present to the recruitment of bottom organisms. It was worthwhile looking into this for a number of reasons.

I have found a wide assortment of things in a fluke's stomach, including other flounders, but never lobsters. Still, it had a hint of truth to it and of course, these guys are never in doubt about what they see, so I expressed interest in checking it out and suggested he preserve a batch in a bottle of rubbing alcohol when he cleaned his next fluke.

This led to another tirade about the dockside filleting rules that the state has imposed to monitor the size of the catch of certain species, and "the mess and extra time delays it creates for his customers" (Read: Cuts into the mate's tips). More about this at another time. What I was most interested in was the lobster tale and after receiving some of the story from the skipper (he nodded once), I accepted an invitation to join them on the next fishing trip.

Arriving a week later for my fishing excursion, I concealed my disappointment when I was proudly presented with a jar of peroxide ("It's all we had in the first-aid kit.") containing the remains of several "baby lobsters." I didn't want to dampen the enthusiasm of the captain or mate so, authoritatively, I scrutinized the jar and announced "I can't wait to get this back to the lab for a closer look."

It was an honest mistake. If you have never seen a baby lobster, and most of us never will, a partially digested hermit crab (in this case *Pagurus iongicarpmus*, our most common inshore species) looks the way you might picture one. When juvenile lobsters have developed a tail and start to disperse, they swim forward with outstretched claws. Lobster researchers call it "the Superman Stage."' The first time I saw a small one swimming in a Maine tidepool I could immediately understand why.

Having seen that and plenty of hermit crabs out of their shells over the years, I could also see the similarities between these two crustaceans and understand the confusion. So it's no fluke that experienced fishermen confuse them, and after a careful investigation back at the lab I gently reported my findings.

Although they appeared a bit skeptical, everyone seemed satisfied, except me. The problem I now face is, how does the fluke feed on the hermit crab? I've encountered fluke and windowpanes (*Scopthalmus*) many times while snorkeling off the beach. They dig in and align themselves lengthwise on top of the sand ridges formed by the waves and the only thing that moves is their eyes.

As bottom water flows back-and-forth with the surge, they wait in the sand to ambush prey (including, apparently, hermit crabs) as they sweep across the ridge.

Do they gulp the crabs down, shell and all? If so, how do they get rid of the shell? Is it crushed or spit out? (Unlikely since they don't have crushing teeth like a blackfish, for example.) Do they selectively prey on crabs that have shed recently or catch them while they are switching shells? This raises all sorts of questions about their feeding behavior.

The mystery about "baby lobsters" is solved, but now I wonder about the hermit crab puzzle. There were no shells inside the fluke that we caught on our fishing trip so now I'm left with a new riddle.

There's just too much to learn out there in the sea, and too little time to do it, but next summer when I'm snorkeling in the surf, I'll be observing the next fluke I see very carefully. □

Algal Bloom in the Florida Keys

by LINDA WALTERS AND KEVIN BEACH

Dramatic increases in macroalgal biomasses are becoming more common in coastal tropical and temperate waters around the globe. These blooms have frequently been found to be caused directly or indirectly by humans and involve species of algae that have evolved mechanisms that enable them to rapidly invade and occupy available space. Asexual reproduction via vegetative fragmentation is gaining increased recognition as a mechanism for rapid population expansion in many nearshore marine flora and fauna. Vegetative fragments are live portions of individuals physically separated from the adults that are able to survive by attaching to the substrate. It has long been recognized that large fragments (length: greater than 10 centimeters) of hard and soft corals, sponges and macroalgae are able to incorporate vegetative fragmentation into their survival strategy as a mechanism for persistence in areas where there are no refuges from predators or severe storms. Recently, it has been documented that small fragments (length: 1 - 5 centimeters) from two common genera of tropical green algae, *Halimeda* and *Caulerpa*, are able to produce new rhizoids within days and continue growing as clones.

Dr. Kevin Beach collecting algal photosynthetic physiology data on Conch Reef at 7 meters.

Dr. Walters is an assistant professor at University of Central Florida, focusing on the ecology of algae and invertebrates. Dr. Beach is an assistant professor at University of Tampa specializing in algal physiology. Photos by L. Walters.

To date, the best-documented case of a

macroalgal bloom is the accidental introduction of the green alga *Caulerpa taxifolia* from the Monaco Aquarium into the Mediterranean Sea in 1984. It has spread rapidly throughout these waters at a rate of 50 km/year, and it has been hypothesized that this rapid dispersal is the result of vegetative fragmentation. Densities of *C. taxifolia* as high as 8000 fronds/m^2 are now common in the Mediterranean Sea, with maximal heights of fronds at 85 cm and biomass measures reaching 11.5 kg/m^2. Additionally, *C. taxifolia* outcompetes native algae and seagrass species, while being avoided by resident herbivorous fishes and urchins.

Over the past decade, there has been a significant increase in the abundance of the brown alga *Dictyota* in the Florida Keys. During this time, the abundance of *Dictyota* (primarily *D. pulchella and D. menstrualis*) has increased by over 47% on some reefs and this genus is now the dominant species across most of the reef tract. Biomass levels have been measured as high as 0.73 kg/m^2. Although this is only 1/15th of the biomass attained by *Caulerpa taxifolia* in the Mediterranean Sea, pristine coral reefs generally have one of the lowest standing stocks of macroalgae of any aquatic ecosystem. Clearly, something is awry on coral reefs of the Florida Keys.

It is presently not known if this huge increase in the abundance of *Dictyota* is the result of anthropogenic impacts or natural system variation. Nor is much known about the biology and ecology of this brown alga. To determine if successful fragmentation may have contributed to the bloom of *Dictyota*, we studied the fate of small fragments (length: 1- 4 centimeters) of *Dictyota menstrualis* during the summer of 1999 and found that this species is the most successful ever observed. Over 65% of these small fragments survived and rapidly attached to sand grains or other organisms. The bigger the fragment, the more successful the survival. All fragments that attached did so within 5 days; most were attached within 48 hours.

Graduate student Laura Wick collecting Dictyota *biomass data at 7 meters.*

Fragments of this delicate alga are created on an ongoing basis by boat anchors, direct contact by inexperienced divers and snorkelers, herbivores (mostly reef fish) that reject bites or are sloppy eaters, and water motion, especially when flow rates are high due to storm activity. Over 18 fragments per square meter were generated on a daily basis on Conch Reef during calm weather conditions in August 1999. These fragments were primarily the result of herbivory. Fall and winter storms can create even larger numbers of fragments; these fragments often are mostly intact individuals that have become dislodged from the substrate. Past hurricanes in the Florida Keys and in other regions of the Caribbean have reduced attached *Dictyota* cover to close to zero. However, in all cases, the population rebounded within weeks. Part of this rapid recovery is hypothesized to be the result of successful fragment attachment and growth. With the rise in boat-oriented tourism (popular reefs

presently experience more than 3000 visitors each day during the high season), the expected increase in herbivore numbers due to recently imposed Florida Keys National Marine Sanctuary regulations, and current Atlantic Basin hurricane trends, it is likely that the size of the fragment pool and thus the number of clonally produced individuals of *Dictyota* will continue to increase on reefs throughout the Florida Keys.

Other aspects of the biology of *Dictyota* additionally emphasize the importance of better understanding this genus. First, fragments or new recruits of *Dictyota* can quickly overgrow other sessile reef organisms, including corals, sponges, and other macroalgae. In 1999, many hosts were so overgrown by *Dictyota* that scientific divers did not notice the host when censusing reef biodiversity. Overgrowth of this sort can reduce the chances of survival of the host (or its genes) by significantly reducing light penetration, uptake of nutrients, and reproductive output. Additionally, epiphytes increase overall weight, drag, and the likelihood of dislodgment of the host. However, under extreme conditions, such as mid-day exposure during extreme low tides in tropical waters, water-retaining epiphytes, such as *Dictyota*, may slow down desiccation of their hosts, enabling the host to survive.

The ubiquitous, calcified, green alga *Halimeda* is often heavily epiphytized by *Dictyota*. *Halimeda* is an essential part of the biological diversity as well as geology of the Florida Keys reef tract. In fact, in the upper Florida Keys, 50 to 70% of the new sediment (sand) is created from segments of dead *Halimeda*. Over 50% of the population of *Halimeda* on Conch Reef was at least fifty percent covered by epiphytic *Dictyota* in August 1999. To understand the interaction between *Dictyota* and *Halimeda*, we are conducting both laboratory and field experiments. Findings to date demonstrate that *Halimeda* grows at a slower rate when overgrown by *Dictyota* and deposits less calcium carbonate in its cell walls. This reduction in calcium carbonate deposition likely makes *Halimeda* more susceptible to damage from predators and storm damage. Additionally, overgrowth by *Dictyota* impacts *Halimeda* by not only blocking sunlight and decreasing photosynthesis, but also by elevating respiration rates. Elevated rates of respiration (a process that takes away from growth) may be due to plant versus plant chemical warfare, a battle that *Dictyota* appears to be winning.

Dictyota produces a suite of novel, noxious secondary chemicals that have anti-herbivore properties. *Dictyota* deters feeding by many species of fish, sea urchins, and some gastropods. Some fish however, including the stoplight, redband and princess parrotfish, queen and French angelfish and the ocean surgeonfish repeatedly take bites of *Dictyota* and then immediately reject the bites once they taste the nasty chemicals. Some species, however, have evolved ways to use *Dictyota's* chemicals to their own advantage. One type of amphipod that can tolerate these chemicals, preferentially builds domiciles on *Dictyota*; this response provides the invertebrate with a food source while simultaneously protecting it from predators that avoid *Dictyota*. Likewise, if a decorator crab places *Dictyota* through the hooked setae on its back, fish predation on the crab is significantly decreased when compared to a crab decorated with more palatable species of algae.

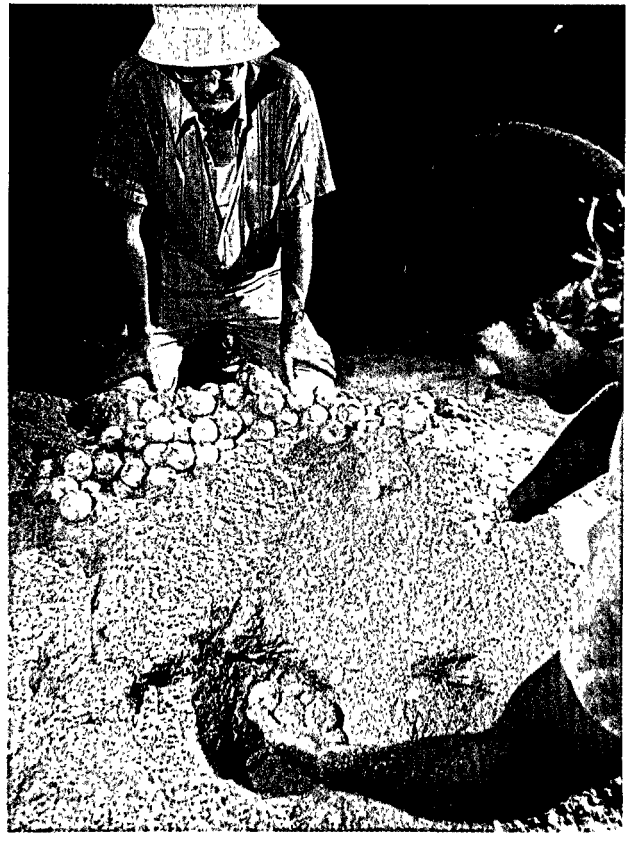
As stated, it is not yet known why the abundance of the brown alga *Dictyota* has recently increased so markedly in the Florida Keys. Nutrient increases are being examined as one possibility. A recent increase in the size of the fragment pool is also being considered. Alternatively, it may be a combination of these two possibilities. Whatever the cause, it is important to gain a better understanding of this genus to both preserve reef biodiversity and the economy in this wonderful and unique region of the United States. □

The Plight of the Leatherback Turtle

by JOHN WNEK

Working with an endangered species is a humbling experience. It reminds us that life is fragile and that we are sharing this earth with many others. It also reminds us that we, as a species, make the greatest impact on others. One endangered species, the leatherback turtle *(Dermochelys coriacea),* like other sea turtles, has become the focus of conservation efforts. Leatherback turtles, the largest of all sea turtle species, grow to over six feet (carapace length) and 1200 pounds. They are found throughout the world but the sight of these creatures is becoming a distant memory.

The life of a leatherback turtle is demanding, especially for the female, which must travel the oceans, reproduce, and try to survive ever-changing conditions. Sharks attack sea turtles. Humans have made a greater negative impact on the leatherback turtle population, including their precious eggs, by poaching, digging up the turtle eggs to sell. But there are some positive programs focusing on the leatherback turtle. We will follow a female leatherback turtle, named Adrienne, through her difficult life journey. We will also focus on a dedicated group of conservationists at the Pacuare Reserve in Costa Rica who are hoping to make a difference in the leatherback turtle population.



Ping pong-sized sea turtle eggs can be excavated from a nest and moved to safer quarters for protection from poachers and four-footed nest raiders. There can be up to 150 eggs in a leatherback's nest.

Adrienne began her life several decades ago hatched on a beach in Central America on the Caribbean Sea. As a hatchling, Adrienne climbed out of her nest deep in the sand, then made her way to the ocean where she began her journey.

Submitted by John Wnek, participant in a 1999 summer program at the Pacuare Reserve in Costa Rica. All of the facts about the leatherback turtle were obtained through field obervations and the research of Stanley Rodriquez, manager of the Pacuare Reserve.

She experienced much history, surviving through World War II, the Cold War, and fall of the Berlin Wall. She had to be strong as she was one out of a thousand turtles that survived past hatchings becoming an adult. Hatchlings are extremely vulnerable, especially the journey from the nest to the ocean when they fall prey to birds and mammals.

It takes three days for hatchlings to reach the ocean from the nest. After the successful turtles take their first swim, they must make it past the reefs crowded with sharks waiting for an easy meal. Adrienne, being a female leatherback, began her journey traveling north along the western Atlantic, following the Gulf Stream, then south along the European and North African coasts back to Central America. Adrienne will complete this cycle at least four times during her life. Sometime between the ages of eight and fifteen, she returned to her nesting area, ready to mate, producing her first bundle of eggs. Adrienne returned to the same beach where she was hatched to deposit her eggs as do all female leatherbacks. In fact, conservation programs have relocated eggs to other beaches. But when those hatchlings became reproductive adults, they returned to the same beach where their mother deposited the eggs, not where they were hatched. As a younger turtle, Adrienne returned to the beach every year for four years to deposit her eggs, then every two years. After 12 years as a reproductive adult, she then returned every three years, then every four years and finally every ten years. Adrienne came back to the same beach an average of six times within the same nesting season to deposit eggs.

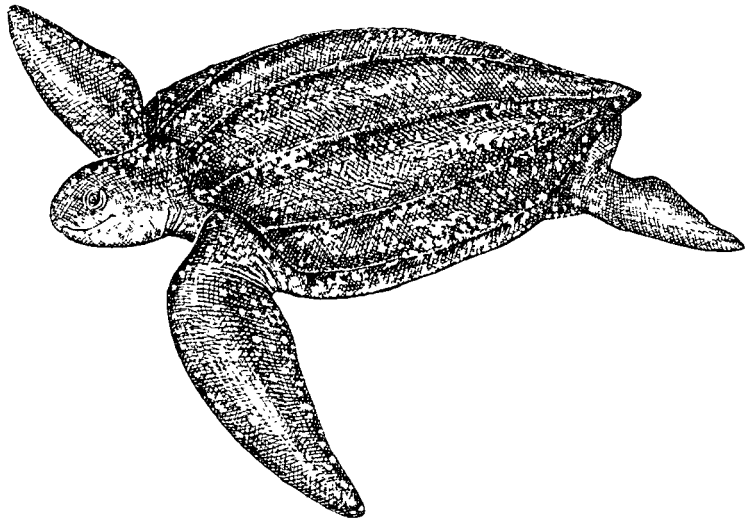
Leatherback turtles deposit an average of 100 eggs, most of which are fertilized. Eggs are deposited in deep nests about 30 inches (80 centimeters) dug by the turtle with her rear flippers. Leatherbacks deposit the fertilized eggs first, then a layer of unfertilized eggs is deposited on top. The layer of unfertilized eggs act as a protective barrier, helping to regulate the temperature in the nest, and provide an initial barrier against predators including raccoons and birds. Also, the incubation temperature of the nest is important to determine the sex of the turtles. Males develop between 28-31°C , while females develop between 31-35°C. Anything above 35°C is fatal.

Adrienne, making her final egg deposit, made her last trip to the Pacuare Reserve in late June, the last month of leatherback nesting season. Adrienne's final deposit was a tribute to her determination and her mission to carry on her lineage. She deposited her eggs where a group of dedicated conservationists shared the same mission.

The 800 hectare Pacuare Nature Reserve, located north of Limon, Costa Rica, on the Caribbean Sea, has six kilometers (four miles) of nesting beachfront. The focus of Pacuare is a turtle protection program attracting naturalists, conservationists, and volunteers throughout the world. The primary nesting turtles are leatherbacks and greens. The reserve is managed by the Endangered Wildlife Trust / Rainforest Concern, a non-profit conservation program of the United Kingdom. Managing operations at the Pacuare Reserve is Stanley Rodriquez, a leatherback turtle expert. His staff consists of Fiona Windward of the United Kingdom, who manages the volunteers and turtle patrols, and her assistant Wilian Perez of Ecuador. The Coast Guard of Costa Rica also plays a role at the reserve by patrolling the waters for poachers.

The leatherback's eggs are poached, then sold in many areas throughout the world. Poachers in Costa Rica can make $50 per nest (50 cents per egg), which seems minimal. But the average salary of a Costa Rican is $200 per month, making it profitable to poach. There are penalties for poaching leatherback eggs including a $1 fine per egg and jail time. But other turtle species, like ridley turtles, have legal quotas making it impossible to

enforce the regulations since all sea turtle eggs are similar in size and shape. Poachers, worrying about getting caught, try to pull the eggs out of the nesting turtles quickly. Therefore, they cut open the back of the nesting female and pull out the eggs, leaving her to die on the beach. Last year, between 250-300 leatherbacks were killed on Panama beaches alone.



Leatherbacks are truly pelagic, streamlined with broad shoulders, a strongly tapered carapace, and seven dorso-longitudinal ridges. They can reach 1200 pounds and have been recorded diving to depths of more than 3000 feet.

At night, the leatherbacks deposit their eggs along the beaches; thus most of the patrols are late at night into the early morning hours. The patrols also discourage poachers from coming on the beaches at the reserve. The day is the time to catch some rest and clean the beaches of debris that may cause problems for the young hatchlings making their way to the water. Stanley Rodriquez uses a small hatchling house where turtle eggs are incubated, then released as hatchlings to the sea. It takes between 70 and 90 days for the turtles to incubate and hatch. Statistically, according to Stanley Rodriquez, the reserve boasts a 70% hatchling success rate in the incubation house, while there is a 74% success rate in natural nests on the beaches. Overall, the success rate is impressive, well above the 5% success rate found at other nesting sites throughout Central America.

On a cloudy evening in late June, Wilian Perez led a turtle patrol. Leatherbacks instinctively deposit eggs in non-developed areas on the beaches because bright lights from inhabited areas tend to discourage turtles from coming on the beach. The Pacuare Reserve has no lights (no electricity); the lack of light keeps the area hidden from poachers. As we headed north on the beach we received a call from another patrol that there was a large leatherback turtle climbing up on the beach. We then rushed up the beach about two kilometers (1.3 miles) where we encountered a massive leatherback, Adrienne. She appeared tired as she began to dig herself into the sand with her powerful front flippers. She dug a pit to support her body, then began using her rear flippers like hands scooping sand out of a small hole, but as she continued to dig, she hit water. She had not moved far enough up on the beach. After exerting a great amount of energy climbing and digging, she had to move her massive front flippers to relocate herself. She seemed extremely tired, but would not leave the beach until she completed her task. She moved up on the beach, but still not far enough. She began to dig her nest and hit water again. She took whatever energy she could muster, pulled herself up on the beach and began to dig a third time. Wilian said that the entire process could take at least an hour and a half.

Adrienne secured herself and began to dig her nest using her hind flippers. We watched as she dug; then we positioned ourselves to receive her eggs. When a leatherback deposits eggs, she goes into a relaxed state making it easy to obtain the eggs, take measurements, and check the condition of the flippers. As she was digging, we noticed that Adrienne was missing her tags on her rear flippers, and that she had a hole in her right hind flipper possibly caused by a shark bite. When she could not dig any deeper she became perfectly still. It was time for the eggs to be deposited. Adrienne moved her tail with contractions, releasing eggs into the hole. We gathered the eggs, putting them into a bag to relocate the bundle to a second nest, one more difficult for poachers to find. As she deposited her eggs, tears ran down from her eyes. Wilian told us that leatherbacks have no eye protection against the wind and sand; therefore they secrete a saline solution to protect their eyes while on the beach.

Adrienne released her eggs as an inconsistent mixture of both fertilized and unfertilized eggs, indicating that she was old. Wilian felt that this would be her last time on the beach, not only this season, but forever. We tagged her hind flippers, and took measurements on her carapace, which measured five feet. She rested after depositing her eggs, then used her flippers to cover the nesting area. As she filled in her nest with sand, a patrol member and I dug a second nest to deposit her eggs. We layered the eggs exactly as they had been deposited, then packed the nest. Adrienne did a good job disguising her nest, but it would still be easy for poachers to determine her nest site, marked by her tracks from the sea edge. Poachers use metal sticks to find the soft sand pockets where eggs may be located.

Adrienne slowly made her way back to the sea. It seemed that the brightness of the sea and feel of the salty spray from the warm Caribbean led her back. Using her front flippers, she pulled her massive, exhausted body slowly toward the breaking surf, never looking back. There sat a group of tired, yet satisfied volunteers who had nothing to say, but wondered about the future of Adrienne and the leatherback turtle species. □

AMERICAN LITTORAL SOCIETY REGIONAL OFFICES

The Society maintains regional offices where members may keep up with local issues and events. Call the chapters for newsletters and local field trip information.

New Jersey
Highlands, NJ 07732
732-291-0055

South Jersey
P.O. Box 1306
Tuckerton, NJ 08087
609-294-3111

135 East Davis
Wildwood, NJ 08260
609-729-9262

NY/NJ Harbor Baykeeper
Highlands, NJ 07732
732-291-0176

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28 West 9th Road
Broad Channel, NY 11693
718-634-6467

Southeast Region
4154 Keats Drive
Sarasota, FL 34241
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Delaware Riverkeeper
P.O. Box 326
Washington Crossing, PA 18977
215-369-1188

Project Reefkeeper
2809 Bird Ave., Suite 16
Miami, FL 33133
305-358-4600

Cape Florida Project
An Ecological Restoration
1200 South Crandon Blvd.
Key Biscayne, FL 33149
305-361-0611

www.littoralsociety.org

TAGGING REPORT

compiled by PAM CARLSEN

Tautog, commonly called blackfish, are a fun fish to catch. Found on structures or reefs, they are recreationally fished from Massachusetts to Virginia. In the family, *Labridae*, which are wrasses (fish with lips), they have strong jaws and prominent teeth. With these characteristics, they are able to crush and grind mollusks and crustaceans. Green crabs are a favorite bait of sport fishermen.

Our members tag substantial numbers of tautog: 235 in 1998 and 292 in 1999. Robert Pirone, Mt Vernon, NY, is one of our blackfish taggers. He fishes in Western Long Island Sound near the famous Execution Light. Recently we received this letter from him: "On October third, I had a great thrill when I recaptured a tagged blackfish which my records show I tagged in the exact same spot two years earlier. This fish #461877, tagged 11/3/98, at 15" was now 18". I released the fish once again tag intact, so hopefully, I can recapture it in another two years."

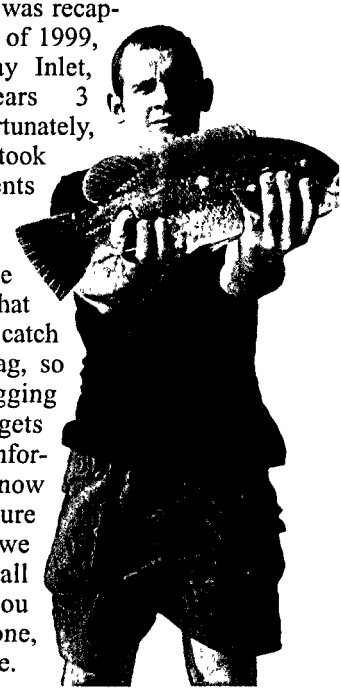
When you are out for a day of fishing on wrecks or reefs, black sea bass occupy these areas along with the blackfish. Black sea bass differ from striped bass in that they never venture into rivers. In bays and sounds, they seem to favor water 20 - 50' deep, but in the ocean can be found in water over 100'. One of our taggers, Capt. Monty Hawkins, Ocean City, MD, regularly tags sea bass offshore in water 85 - 115'. He has had 12 recaptures, many onboard his own charterboat, where he has released them tag intact. He writes, "Everytime one of the old timers says releasing sea bass does no good because 'They've burst their bladder', I love to tell them about the boat's tag returns. It really knocks the wind from their sails and sometimes opens their eyes to a new kind of fishing, catch and release. Just in the last 12 years, Ocean City party boats have gone from 'Over the rail, into a pail' to throwing back a great percentage of fish. In some instances, 75% perhaps even better some days."

We prefer all tags to be removed and sent in, so we can verify the tag number. If you choose to release the fish with the tag intact, make sure you have read and recorded the number correctly.

TWO NEW RECORDS SET for TIME OUT WITH TAGS:

-a fluke (summer flounder), tagged by Robert Anderson Jr. on the south shore of Long Island at 11 1/2", on 6/25/91, was recaptured at Fire Island reef in 60 feet of water on 6/26/99, 26" - 6.59 lbs. (one day over eight years).

-a striped bass tagged 5/24/88 by Francis Urban at the Verrazano Bridge, NY, 23"-4 lbs., was recaptured in August of 1999, at E. Rockaway Inlet, NY (11 years 3 months). Unfortunately, the recapturer took no measurements on this fish. It is very important to "get the word out," on what to do when you catch a fish with a tag, so we or any tagging organization gets the complete information. We now have a recapture flyer, which we include in all returns. If you would like one, contact the office.



Robert Pirone's recapture of his own blackfish.

TAGGING RETURNS

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
Atlantic Cod							
20	A Alosso	Offshr., Salem, MA	6/14/97	U Fisherman	Offshr., SE Tilleys	25	10/24/98
20	A Alosso	Offshr , Scituate, MA	07/13/97	Pigeon Cove Foods	Landed-Gloucester, MA		11/10/98
Black Sea Bass							
9	M O'Connell	NY Harbor	08/30/98	S Witkowski	Bayonne, NJ	10	09/20/98
12	C Kennedy	Cape May, NJ	08/17/98	W Miller	Cape May, NJ	12	10/13/98
Bluefish							
14	A Schweithelm	Asharoken, NY	07/26/98	H Fin	Pt. Washington, NY	15	09/16/98
24	A Anderson	Block Is., RI	05/16/98	U Fisherman	The Race, L.I. Sound		09/23/98
14	A Schweithelm	Asharoken, NY	08/06/98	L Servedio	Middle of L I Sound		09/25/98
25	A Anderson	Block Is., RI	08/20/98	M Williams	The Race, L I Sound		09/30/98
29	A Anderson	Charlestown, RI	09/28/98	F Gelzheiser	Fairfield, CT		10/18/98
27	A Anderson	Block Is., RI	08/17/98	B Niedzielski	Montauk, NY		10/22/98
22	T Spinelli	Offshr., "Mudhole", NJ	06/05/98	A Webe	2 mi E Seaside Hts., NJ		11/01/98
14	T Matraxia	Island Beach St. Pk., NJ	10/10/98	M Tabor	L. Rappahannock R., VA	16	11/10/98
22	G Blank	East R , NYC	10/31/98	C Jusino	Hell Gate, NY		11/15/98
21	G Blank	East River, NY	10/30/98	M McLeod	1 mi E Triboro Brdg., NY		12/05/98
Fluke							
12	S Fries	Brighton Beach, NY	08/23/98	R Boysa	Coney Is., NY		09/12/98
14	W Filce	Mantoloking, NJ	09/17/97	R Curran	NE Barnegat Inlet, NJ	18	09/12/98
13	B Carlsen	Shrewsbury R., NJ	07/07/98	G Bachert	Sandy Hook Chan., NJ	13	09/12/98
10	V Galgano	Long Branch, NJ	06/20/98	J Cygan	Deal, NJ		09/12/98
12	J Gibbons	Spring Lake Beach, NJ	08/19/96	F Celovsky	Ambrose Chan , NY		09/13/98
12	J White	State Boat Chan., NY	06/13/98	I Smith	Babylon, NY	14	09/14/98
14	S Klaumenzer	Great Bay, NJ	07/19/97	R Keith	Island Beach St. Pk , NJ	17	09/15/98
12	R Wolfskeil	Atlantic Highlands, NJ	06/28/98	L Henss	Leonardo, NJ	14	09/15/98
14	W Filce	Pt Pleasant, NJ	05/19/98	L Carr Jr	Pt. Pleasant, NJ	15	09/15/98
14	S Knapik	Wantagh, NY	08/12/98	H Freeze	Wantagh, NY	15	09/16/98
13	D Miklos	Offshr , Barnegat Lt , NJ	09/03/98	J Gould	Barnegat Inlet, NJ	13	09/16/98
22	G Bachert	Flynn's Knoll, NJ	06/10/98	C Selagyi	Sandy Hook, NJ		09/17/98
12	J Gibbons	Atlantic Beach, NY	06/28/98	R Schuman	Reynold's Chan., NY	15	09/17/98
11	R Anderson Jr.	Fire Is. Inlet, NY	06/06/98	G Gates	Robert Moses Brdg , NY		09/19/98
12	L Ruch Jr	Asbury Pk , NJ	07/19/97	R O'Connor	Harvey Cedars Jump, NJ	15	09/19/98
16	T Ritchie	N. Wildwood, NJ	05/20/98	J Spayd	Stone Harbor, NJ	17	09/19/98
12	W Filce	Manasquan R., NJ	07/17/97	J Lazarek	Rockaway Inlet, NY		09/20/98
14	T Matraxia	Sandy Hook Chan., NJ	08/23/98	H Nakamura	Sandy Hook, NJ	17	09/20/98
13	P Fagan	McCrie's Shoal, NJ	08/23/98	G Maroldo	Cape May Pt., NJ	13	09/26/98
13	S Carlsen	Deal, NJ	09/19/97	D Monar	Sandy Hook Bay, NJ	18	09/28/98
14	J Gibbons	Atlantic Beach, NY	06/02/98	W Bryan	Long Beach, NY	16	09/30/98
14	W Filce	Sea Girt, NJ	09/13/98	B Noble	Manasquan Inlet, NJ	14	10/02/98
18	G Buono	Staten Is., NY	09/07/98	R Razminas	Asbury Pk., NJ	19	10/02/98
15	S Carlsen	Deal, NJ	06/24/98	J Steib	Bradley Beach, NJ	15	10/09/98
12	R Romanow	Jones Inlet, NY	08/28/98	F Wurum	Manasquan Ridge, NJ	15	10/09/98
11	G Nigro	Sandy Hook, NJ	05/31/98	F Yaeger	Belmar, NJ	15	10/11/98
15	N Fiorillo Jr.	Sandy Hook Bay, NJ	08/14/98	B Troncone	Sandy Hook Bay, NJ	17	10/16/98
15	C Kennedy	Cape May Pt., NJ	09/29/98	A Martinez	2 mi. E Cape May Lt , NJ	15	10/17/98
13	J Hickey Jr.	Spring Lake, NJ	07/06/96	NMFS, NE Ctr.	Island Beach St Pk., NJ	16	10/23/98
11	S Carlsen	Deal, NJ	06/24/98	E Layton Jr.	Spring Lake, NJ	12	10/24/98
12	C Kennedy	Lower DE Bay, NJ	06/24/98	D Byrne	Sea Girt, NJ	14	10/31/98
12	R Wolfskeil	Atlantic Highlands, NJ	06/28/98	G Bachert	Highlands Brdg., NJ	14	11/01/98
14	W Filce	Mantoloking, NJ	09/17/97	F/V Old Mystic	2 5 mi. E Block Is , RI	16	11/12/98
14	J Hickey Jr	Pt. Pleasant, NJ	10/05/97	F/V Deborah Lee	17 mi. S Block Is., RI	16	11/19/98
13	F Bovasso	Pt Pleasant, NJ	09/22/97	J Vayda	Lavalette, NJ	18	12/11/98
14	B Goodman	Jones Inlet, NY	07/03/98	R Collins	Offshr., VA Coast	14	12/15/98
14	W Filce	Mantoloking, NJ	08/02/97	D Pannelli	Cape May, NJ		12/20/98
15	W Filce	Ortley Beach, NJ	07/03/98	F/V Susan Rose	Offshr., Norfolk Canyon, VA		12/23/98
14	W Filce	Pt. Pleasant, NJ	08/24/96	F/V Susan Rose	Offshr., Norfolk Canyon, VA		12/23/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
Pilotfish							
11	S Carlsen	Deal, NJ	09/11/98	M Iannacone Jr.	Island Beach St. Pk., NJ	11	09/16/98
Snook							
30	J O'Keeffe	Stuart, FL	07/23/98	B Miller	Evans Crary Brdg., FL	32	09/20/98
Spot							
10	JC Wright	Rudee Inlet, VA	09/10/98	C Grant Jr.	New River Inlet, VA		11/12/98
Spotted Seatrout							
13	D George	Pass Christian, MS	10/10/98	D George	Pass Christian, MS	13	10/18/98
Striped Bass							
21	R Grobarz	Sandy Hook, NJ	06/13/98	D Glynn	Statue of Liberty, NY	25	09/10/98
14	E Petronio Jr.	Pt. Judith, RI	10/11/95	W Crandall	Galilee, RI	26	09/10/98
23	T Marburger	Northport, NY	05/17/98	F Stunkel	Stamford, CT	23	09/10/98
26	R Conklin	Moriches Inlet, NY	11/13/95	E Kent	The Race, L.I. Sound	30	09/10/98
30	S Fries	Montauk, NY	07/29/97	S Johnson	2 mi. off Montauk, NY		09/10/98
27	J Dotsey	Montauk, NY	08/06/98	V McDiarmid	Montauk Pt., NY	27	09/10/98
20	E Petronio Jr.	Pt. Judith, RI	06/23/98	W Crandall	Galilee, RI		09/11/98
36	F Como	Hempstead, NY	06/20/97	S Pitches	Montauk Pt., NY		09/11/98
24	E Petronio Jr.	Pt. Judith, RI	06/23/98	W Crandall	Galilee, RI		09/11/98
18	D Sowerby	York Beach, ME	09/05/97	B Damato	Ipswich, MA	22	09/11/98
25	J Rossi	Raritan Bay, NY	05/20/98	B Flannery	Sandy Hook Chan., NJ		09/11/98
33	A Young	Mattituck, NY	08/26/98	R Migdalski	Orient Pt., NY	33	09/11/98
23	J Della Porta	Swampscott, MA	07/24/98	T Denly	Boston, MA	24	09/11/98
19	N Fiorillo Jr.	Flynn's Knoll, NJ	11/23/97	J Cushing	3 mi. N Bath, ME	23	09/12/98
21	E Petronio Jr.	Pt. Judith, RI	07/09/98	H Doran Jr.	Snug Harbor, RI	21	09/12/98
19	K Hollins	Island Beach St. Pk., NJ	08/14/98	M Christopher	Barnegat, NJ	22	09/12/98
13	D Zurheide	Bay Ridge, NY	07/09/98	R Notine	Ambrose Chan., NY	14	09/12/98
27	A Anderson	Montauk Pt., NY	10/11/97	R Rainville	Provincetown, MA	28	09/12/98
22	B Garfield	Portland, ME	07/22/98	S Morrilly	Newburyport, MA	22	09/12/98
23	W Stuven	Eaton's Neck, NY	10/30/97	P Sepessy	Northport, NY	25	09/12/98
18	B Stiles	Montauk, NY	10/22/97	D Bryant	Martha's Vineyard, MA		09/12/98
22	G White	Piscataqua R., NH	08/21/98	C Tompkins	Boston, MA	24	09/12/98
24	R Grobarz	Sandy Hook, NJ	08/12/98	R Hoff	Lido Beach, NY		09/13/98
22	B Garfield	Portland, ME	08/11/97	R Salzer	Newburyport, MA	23	09/13/98
25	D Kelly	Sag Harbor, NY	05/06/98	M Mait	Montauk Lt., NY	25	09/13/98
34	J Mettler	Fishers Is., NY	10/11/97	C Muli	Fishers Is., NY		09/13/98
26	P Grippo	Montauk Pt., NY	09/03/98	H Sarin	Montauk Pt., NY	28	09/13/98
35	B White	Old Orchard Lt., NY	05/12/98	R Rainville	Provincetown, MA		09/13/98
21	R Conklin	Moriches Inlet, NY	05/04/98	L Reeve	Moriches Inlet, NY	22	09/13/98
31	A Anderson	Montauk Pt., NY	09/07/98	R Martin Jr	Montauk Pt., NY	31	09/14/98
16	T Lynch	Stamford, CT	10/16/96	F Zieba	Stamford, CT	20	09/14/98
22	J Della Porta	Swampscott, MA	06/17/98	J Pothier	Boston, MA	24	09/14/98
15	M LeBlanc	E. Providence, RI	07/17/98	R Oliveira	E. Providence, RI	18	09/15/98
17	T Marburger	Northport, NY	01/23/96	S Behlman	Cotuit, MA	27	09/15/98
31	D Kelly	Orient Pt., NY	07/17/97	F Truskowski	Little Gull Is., NY		09/15/98
14	A Schweithelm	Northport, NY	12/20/97	J Rivera	Stratford, CT	18	09/15/98
18	M Simmons	Barnegat Lt., NJ	12/03/96	C Mastrangelo	Kings Park, NY	25	09/15/98
16	M Murray	Gloucester Hbr., MA	08/22/98	M Doane	Gloucester, MA		09/16/98
22	A LoCascio	Pt. Washington, NY	06/24/98	G Snediker	Montauk Pt., NY		09/16/98
20	B Garfield	Portland, ME	08/09/98	W Murphy	Boston, MA		09/16/98
18	R Grobarz	Seaside Pk., NJ	11/19/97	D Jalbert	Salem, MA	18	09/17/98
19	R Pearson Jr.	Croton Bay, NY	04/03/98	J Boardman	Tiverton, RI	19	09/17/98
24	P Hartsgrove	Monmouth Beach, NJ	10/02/97	M Blandino	E. Rockaway Inlet, NY	30	09/18/98
40	A Anderson	Montauk Pt., NY	05/26/98	P Pratt	1/4 mi. S CT River, CT		09/18/98
33	J Della Porta	Nahant, MA	07/15/98	P Houle	Nahant, MA	36	09/19/98
23	R Nystrom	Fairfield, CT	08/03/97	W Yackel	Middle Ground, L.I. Sound	28	09/19/98
	M Wahlgren	Newburyport, MA	06/15/98	J Shaw	Salisbury, MA	27	09/19/98
27	H Sweet	Bristol, RI	09/05/96	R Fletcher	Narragansett Bay, RI	30	09/19/98
31	A Anderson	Block Is., RI	07/06/98	J George	Montauk Pt., NY		09/19/98
24	J Ragusa	Fire Is. Lt., NY	05/07/98	A McElroy	Seaside Hts., NJ	28	09/20/98
22	P Hierholzer	Offshr., Sea Isle City, NJ	12/03/97	C Fleming	Salem Harbor, MA	22	09/20/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
22	K Hollins	Island Beach St. Pk., NJ	08/25/98	D Turton	Barnegat Inlet, NJ		09/20/98
27	F Casey	Boston, MA	08/24/98	R Francescon	Boston, MA	27	09/20/98
19	F Stunkel	Stamford, CT	11/18/96	T Leonard	Yarmouth, ME	23	09/20/98
18	R Haug	Moriches Bay, NY	09/16/97	M Laube	Moriches Inlet, NY	19	09/21/98
27	L Gonnello	Sandy Hook, NJ	06/01/98	C Decrescenzo	Rockaway, NY	30	09/21/98
16	R Tye	Ocean View, VA	12/13/97	U Fisherman	S of Kent Is., MD	21	09/21/98
22	F Jessup	Moriches Inlet, NY	07/05/95	G Andrade	S. Dartmouth, MA	29	09/21/98
18	J Della Porta	Swampscott, MA	08/25/98	C Wilson	Revere, MA	20	09/22/98
19	W Johnson	Stamford, CT	07/10/95	L McLoughlin	Mamaroneck, NY	20	09/22/98
38	D Kelly	Sag Harbor, NY	05/21/98	S Haber	Tobay Beach, NY	39	09/22/98
26	JC Wright	Ches. Bay Brdg. Tun., VA	06/06/98	B Manders	W of Tilghman Is., MD	29	09/22/98
16	P Lowcher	Sea Bright, NJ	08/09/98	J Buckel	Navesink R., NJ	16	09/23/98
18	A Anderson	Pt. Judith, RI	11/01/97	R Salzer	Newburyport, MA	21	09/23/98
13	K Kyker	Norwalk, CT	10/12/96	B Simmons	Saugatuck R., CT	14	09/23/98
21	J Della Porta	Swampscott, MA	08/25/98	R Corner	Barnstable, MA	25	09/23/98
28	A LoCascio	Manhasset Bay, NY	06/13/96	M Tooker	Montauk, NY		09/23/98
30	S Fries	Montauk, NY	08/05/98	M Wynne	Montauk, NY		09/23/98
32	D Goldberg	Montauk Pt., NY	08/05/98	J Curtain	Montauk, NY		09/23/98
21	A Anderson	Pt. Judith, RI	10/30/97	K Shepherd	Revere, MA	22	09/24/98
28	H Schauer	Martha's Vineyard, MA	05/07/98	P Cummings	E. Sandwich, MA	29	09/24/98
32	A Anderson	Montauk Pt., NY	10/14/97	J Wascholl	Fishers Is , NY	33	09/24/98
26	J Posh	Milford, CT	07/24/95	K Francis	Narragansett, RI	34	09/24/98
14	J Karolides	Danvers, MA	09/22/95	N Bellanceau	Thames R., CT	18	09/24/98
26	C Lienau	Montauk Pt , NY	08/13/98	A Macaluso	Moriches Inlet, NY	28	09/24/98
27	A Anderson	Block Is , RI	09/24/96	E Gaffney	Valient Rock, CT	33	09/24/98
32	B Garfield	Richmond Is., ME	07/25/98	J Lalumiere	Plum Is , MA	24	09/24/98
28	B Shillingford	Brown Shoal, DE Bay, NJ	11/01/97	R Gardner	Cape Cod Bay, MA	32	09/25/98
21	F Stunkel	Darien, CT	08/16/97	G Walter	Wellfleet, MA	23	09/25/98
25	E Scola	Montauk Lt., NY	08/15/98	D Cagno	Montauk Pt , NY	26	09/25/98
21	R Kalenka	Shinnecock Bay, NY	06/03/98	A Buccola	Montauk, NY	23	09/25/98
26	G Nigro	Sandy Hook, NJ	06/30/96	J McIntosh	Fishers Is., NY	33	09/25/98
23	G Cardel	Eatons Neck, NY	08/30/96	T Trembinski	Eatons Neck, NY	29	09/26/98
33	M Favale	Boston, MA	08/24/96	P Killoy	Provincetown, MA		09/26/98
32	B Garfield	Portland, ME	08/21/98	J Burgess	Sandy Neck, MA	34	09/26/98
30	R Locke	Provincetown, MA	05/28/98	R Trotto	Boston, MA	32	09/27/98
20	T Marburger	Northport, NY	04/29/93	D Krah	Bath, ME	29	09/27/98
28	D Kelly	Montauk Pt., NY	11/23/96	M Mouton	Montauk Pt , NY	30	09/27/98
19	G Hall	Bay Head, NJ	08/02/98	A Alvarez	Sea Gate, NY		09/27/98
23	R Locke	Provincetown, MA	07/02/98	D Pelrine	Eastham, MA	23	09/28/98
20	I Gordon	Jamaica Bay, NY	10/06/93	F Diana	Montauk Pt., NY	27	09/28/98
22	M Lewchik	Old Saybrook, CT	07/04/93	M Hartman	Bridgeport, CT	33	09/28/98
19	J Beck	Cape May Pt., NJ	07/12/98	J McCarthy	Cape May Pt., NJ	24	09/28/98
21	A Anderson	Pt Judith, RI	10/22/97	A Palladino	Nahant, MA		09/28/98
22	T Marburger	Northport, NY	05/05/98	S Mosher	Groton, CT		09/29/98
15	G Kerkhan	Brick Beach, NJ	11/30/97	B Grotton	Edwards Dam, ME		09/29/98
28	A Anderson	Block Is , RI	09/19/96	R Onorato	Montauk Pt , NY	37	09/30/98
24	T Rinaldi	Duck Pond Pt., NY	08/09/96	B Russo	Orient Pt., NY	30	09/30/98
22	L Richards	Atlantic Beach, NY	05/23/98	A Maiorana	Rockaway, NY	26	09/30/98
20	T Sobka	Shrewsbury R., NJ	04/21/98	M Lucey	Middletown, RI		10/01/98
18	P Chowansky	Sea Girt, NJ	12/05/95	W Bryan	Deb's Inlet, NY	28	10/01/98
22	T Marburger	Northport, NY	05/01/97	K O'Farrell	Cape Cod Canal, MA	28	10/02/98
9	G Horvath	Trenton, NJ	09/13/98	G Horvath	Trenton, NJ	09	10/02/98
32	F Coronato	Old Orchard Lt., NY	05/10/98	S O'Brien	Nantucket, MA	36	10/02/98
30	A Anderson	Block Is., RI	09/21/96	J Bragan	Montauk, NY		10/02/98
24	F Stunkel	Eatons Pt., NY	09/02/97	J Ziobo	Stratford, CT	28	10/02/98
25	W Kobel Jr.	Eatons Neck, NY	08/24/98	T Herman	Fairfield, CT		10/02/98
20	P Grippo	Haunts Cr., NY	06/09/97	P Sladen	Wareham, MA	24	10/03/98
21	T Marburger	Shinnecock Inlet, NY	08/23/98	S Finne	Quogue, NY		10/03/98
25	M Simmons	Barnegat Light, NJ	06/06/97	C Phillips	Loveladies, NJ	28	10/03/98
16	M Murray	Gloucester Hbr., MA	08/20/98	J Favazza	Gloucester, MA	18	10/03/98
20	J Karolides	Beverly, MA	09/24/98	N Therrien	Danvers, MA	21	10/03/98
35	A Anderson	Montauk Pt., NY	10/13/97	T Langton	Montauk Pt., NY	36	10/03/98
23	A Anderson	Block Is., RI	05/06/98	C Simonds Jr.	Greenfield, NH	26	10/03/98
33	R Maimone	Rye, NH	09/24/98	S Borys	Rock Harbor, MA		10/03/98
16	B Dimento	Ipswich, MA	07/26/98	N Hursh	Plum Is., MA		10/03/98
29	K Bilodeau	Groton Pt., CT	09/20/97	P Hadley	Groton, Ct	34	10/03/98
20	R Leja	Bridgeport, CT	06/16/96	W Andujar	Seaside Park, NJ	30	10/03/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
31	A Anderson	Block Is., RI	06/01/98	C Sakaski	Montauk Pt., NY		10/03/98
25	A Anderson	Block Is , RI	05/17/98	J Thurston	Tiverton, RI	27	10/04/98
21	F Stunkel	Stamford, CT	09/14/97	R Stasinos	Stamford, CT	23	10/04/98
19	R Kyker	Norwalk, CT	05/30/98	C Finlay Jr.	Norwalk, CT	21	10/04/98
25	A D'Amato	Cape May Inlet, NJ	11/18/97	S Sikula	Orient Pt., NY	28	10/04/98
43	R Maimone	Rye, NH	06/28/98	M Hadfield	Piscataqua R., NH	44	10/04/98
27	A Anderson	Block Is., RI	07/30/97	G Muller Jr	Breezy Pt., NY	29	10/04/98
29	W Perlman	Atlantic Beach, NY	06/15/98	B Longstreet	E. Rockaway Inlet, NY	31	10/04/98
18	G Horvath	Barnegat Inlet, NJ	09/09/98	T Ezyske	Barnegat Inlet, NJ	19	10/04/98
18	D Sowerby	York Beach, ME	09/22/98	T Crawford	Rockport, MA		10/05/98
17	J Karolides	Danvers, MA	08/27/95	T Sledzik	New London, CT	26	10/05/98
32	S Jakubowski	Sandy Hook, NJ	06/09/98	D Schleifer	Montauk, NY		10/05/98
20	GR Gray	Charlestown, RI	05/22/98	D Caron	Quonochontaug Pond, RI	23	10/05/98
19	G Horvath	Barnegat Inlet, NJ	08/14/97	A Romano	Barnegat Bay, NJ	24	10/05/98
20	P Grippo	Black Banks, Wantagh, NY	09/25/97	R Soto	Riverdale, NY	25	10/05/98
18	M Simmons	Barnegat Light, NJ	11/18/97	G Bossi	Newburyport, MA		10/05/98
23	P Johnson Sr	Charlestown, RI	10/05/97	P Davis	Sandwich, MA		10/06/98
35	D Hoxsie	Lord's Pt., CT	05/27/98	T Sledzik	Stonington, CT	38	10/06/98
17	G Nigro	Sandy Hook, NJ	11/23/96	M Simmons	Barnegat Lt., NJ	23	10/06/98
16	H Sweet	Warren, RI	09/02/98	K Miner	Barrington, RI		10/06/98
24	A Anderson	Montauk Pt., NY	07/03/97	C Lehr	Montauk, NY	26	10/06/98
20	M Berger	Jones Inlet, NY	11/01/97	J Vashalifski	Charlestown, RI	20	10/07/98
20	J Mettler	Fishers Is., NY	09/01/93	T Bigos	The Race, L.I. Sound	31	10/07/98
25	S Sturgeon	Cape Cod Bay, MA	06/18/98	S Ou	Marblehead, MA	28	10/07/98
37	J Posh	Stratford, CT	08/30/98	T Hodun	Stratford, CT	38	10/07/98
23	B Semansek	Indian R., DE	08/19/98	J Krawczyk	Indian R. Inlet, DE	24	10/08/98
23	R Kyker	Westport, CT	08/29/98	U Fisherman	Westport, CT		10/08/98
28	L Gonnello	Buoy 4, Ambrose Chan., NY	10/05/98	T Baricevich	Sandy Hook, NJ	28	10/08/98
26	A Anderson	Block Is., RI	06/25/98	P Druken	Cuttyhunk, MA	26	10/08/98
18	C Wilcox III	Moriches Inlet, NY	07/14/97	R Lamberti	Moriches, NY	23	10/08/98
22	M Strober	Governors Is., NY	09/27/97	H Leemann	Governors Is , NY	23	10/09/98
31	W Perlman	Breezy Pt , NY	08/04/98	G Amato	Sandy Hook, NJ	33	10/10/98
21	R Nystrom	Bridgeport, CT	08/02/98	T Hodun	Devon, CT	22	10/10/98
22	W Stuven	Eatons Neck, NY	06/24/97	R Urtnowski	Glen Cove, NY	23	10/10/98
23	G Husta	Little Egg Inlet, NJ	05/14/97	H Pence	Union Beach, NJ	27	10/10/98
20	T Shaheen	Navesink, NJ	05/04/96	B Schreiber	Montauk, NY	26	10/10/98
20	T Marburger	Northport, NY	05/11/93	C Bessette	Sandy Shoals, CT	30	10/10/98
32	A Pietraniello	Staten Is., NY	10/11/97	D Marino	Hoffman & Swinburne Is., NY		10/10/98
28	D Brodeur	Milford, CT	07/24/98	R Dirienzo	Milford, CT	30	10/10/98
30	A Schweithelm	Montauk, NY	06/09/95	J White	Montauk, NY	43	10/11/98
15	M Simmons	Barnegat Lt., NJ	10/06/98	W Maier	High Bar Harbor, NJ		10/11/98
33	R Nystrom	Devon, CT	10/19/97	J Fisher	Duxbury, MA	34	10/11/98
37	S Fries	Montauk, NY	10/14/97	A Egan	Montauk Pt , NY	38	10/11/98
16	R Kyker	Stamford, CT	06/25/95	P D'Agostino	Manhasset Bay, NY	21	10/12/98
31	P Walton	Staten Is., NY	06/11/98	P Fusco	Raritan Bay, NY	31	10/12/98
27	C Wilcox III	Moriches Inlet, NY	12/02/96	E Wendol	Orient Pt., NY	33	10/12/98
28	H Sweet	Block Is , RI	06/23/98	R Toffey	Block Is., RI	30	10/13/98
19	A Schweithelm	Crab Meadow Beach, NY	09/01/97	B Saunders	Crab Meadow Beach, NY	20	10/13/98
22	G Kerkhan	Surf City, NJ	11/01/96	K Adams	Little Egg Inlet, NJ	28	10/13/98
20	R Conklin	Moriches Inlet, NY	08/19/98	B Young	Moriches Inlet, NY	21	10/13/98
28	R Nystrom	Bridgeport, CT	08/15/98	R Leja	Bridgeport, CT	29	10/13/98
23	C Carroll Jr.	Sea Bright, NJ	06/30/98	R Burnup	Sea Bright, NJ	25	10/14/98
27	M Sebastiani	Mullica R., NJ	04/08/98	M Coccia	Great Sedge Is., NJ	33	10/14/98
22	R Grobarz	Sandy Hook, NJ	10/19/95	C Buchta	Sandy Hook, NJ	31	10/14/98
18	A LoCascio	Little Neck Bay, NY	02/28/98	B Simmons	Southport, CT	20	10/15/98
25	G Cardel	Eatons Neck, NY	11/10/93	G Benkert	Manhasset Bay, NY		10/15/98
27	T Marburger	Northport, NY	04/28/98	G Benkert	Manhasset Bay, NY		10/15/98
20	G Kerkhan	York, ME	09/15/98	S MacLeod	Barnstable Hbr., MA	21	10/15/98
21	R Nystrom	Bridgeport, CT	10/29/97	R Nystrom	Bridgeport, CT	22	10/15/98
20	R Nystrom	Fairfield, CT	05/20/98	B Simmons	Southport, CT	21	10/15/98
18	R Ries	Cold Spring Harbor, NY	08/02/98	A Albano	Cold Spring Harbor, NY		10/15/98
19	A LoCascio	Manhasset Bay, NY	10/24/98	G Benkert	Manhasset Bay, NY		10/15/98
26	T Marburger	Shinnecock Inlet, NY	06/23/98	R Pikoulas	Shinnecock Bay, NY	28	10/15/98
24	W Perlman	Tin Can Grounds, NY	11/28/97	P Fraccalvieri	Fire Is., NY	26	10/15/98
32	A Schweithelm	Montauk, NY	06/11/93	E Ramsey	Bay Shore, NY	40	10/15/98
21	T Marburger	Northport, NY	04/29/93	M Hobbs	L.I. Sound, NY		10/15/98
28	D Sowerby	York Harbor, ME	09/19/98	G Combs	Stonington, CT	30	10/15/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
31	S Fries	Montauk Pt., NY	08/04/98	P Litt	Montauk, NY		10/15/98
25	J Foti	Staten Is., NY	05/23/98	R Jordan	Horton's Pt , NY	29	10/15/98
20	E Petronio Jr	Pt Judith, RI	06/10/98	R Gameau	Narragansett, RI		10/15/98
24	A D'Amato	Cape May, NJ	04/22/98	P Bonito	CT River, CT	25	10/15/98
26	R Locke	Provincetown, MA	08/22/98	W Reimer	Montauk, NY		10/15/98
29	N Fiorillo Jr.	Flynn's Knoll, NJ	11/26/97	D Partusch	Shrewsbury R., NJ	31	10/16/98
25	M Berger	Atlantic Beach Brdg., NY	05/16/98	S Siecinski	Keansburg, NJ		10/16/98
37	P Johnson Sr.	Block Is., RI	07/30/97	J Mantakis	Moriches Inlet, NY	39	10/16/98
15	T Marburger	Northport, NY	04/29/96	J Steneck	Oyster Bay, NY	17	10/16/98
24	K Hollins	Island Beach St. Pk., NJ	08/24/98	R Sanchez	Island Beach St. Pk., NJ	24	10/16/98
24	W Perlman	Atlantic Beach, NY	11/23/98	J Dymant	Atlantic Beach, NY	24	10/16/98
27	R Allen	Ches. Bay Brdg. Tun., VA	01/03/98	R Richtmyre	Thimble Shoals Lt., VA		10/17/98
22	D Zurheide	Bay Ridge, NY	07/09/98	J Wilson	Flynn's Knoll, NJ		10/17/98
20	D Adams	Aberdeen, MD	04/18/98	K Coley	Onancock, VA	20	10/17/98
22	N Jalbert	Block Is., RI	08/02/98	B Morel	Block Is., RI		10/17/98
17	P Grippo	3rd Wantagh Brdg., NY	07/22/97	R Marcel	Massapequa, NY		10/17/98
24	R Nystrom	Fairfield, CT	06/29/97	L Bonilla	Fairfield, CT	28	10/17/98
21	R Conklin	Moriches Inlet, NY	07/11/97	G Hulsen	E. Moriches, NY	23	10/17/98
32	J Posh	Fishers Is., NY	07/31/95	R Rzepko	Milford, CT	35	10/17/98
18	E Petronio Jr.	Pt. Judith, RI	06/23/98	T Martin	East Beach, RI		10/17/98
19	D Furtado	Mt. Hope Bay, MA	09/27/98	D Crepeau	Pt. Judith, RI	19	10/17/98
26	L Gonnello	Ambrose Chan., NY	06/22/98	R Lurye	Rockaway, NY		10/18/98
16	A Schweithelm	Asharoken, NY	08/06/98	J Porinchak	Northport, NY		10/18/98
14	E Petronio Jr.	Pt Judith, RI	07/23/96	D Barber	Stonington, CT	20	10/19/98
23	L Hickey	Cape May, NJ	10/16/98	H Speer	Cape May, NJ	24	10/19/98
17	E Petronio Jr	Pt. Judith, RI	07/07/97	B Diehler	Sea Bright Brdg , NJ	24	10/19/98
24	L Gonnello	Flynns Knoll, NJ	06/20/97	T Brys	Sandy Hook, NJ	27	10/20/98
17	R Conklin	Moriches Inlet, NY	07/10/96	T Bardony	Robert Moses Brdg., NY	22	10/20/98
34	R Nystrom	Devon, CT	10/07/98	G Muller	Stratford, CT		10/20/98
20	A Schweithelm	Northport, NY	05/24/98	M Phillips	Westport, CT	21	10/20/98
36	R Nystrom	Devon, CT	10/19/97	M Aiken	Housatonic R., CT	42	10/20/98
32	C Wilcox III	Moriches Inlet, NY	11/21/97	R Pino	Little Compton, RI	34	10/20/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
24	W Perlman	Atlantic Beach, NY	06/14/97	A Canino	Jamaica Bay, NY		10/21/98
24	R Nystrom	Fairfield, CT	08/31/97	R Holmes	Bridgeport, CT		10/21/98
36	R Paganini	E. Rockaway Inlet, NY	10/29/97	M Hoffman	E. Rockaway Inlet, NY		10/22/98
17	G Horvath	Manasquan Inlet, NJ	11/23/97	E Nichols	Shinnecock Bay, NY		10/22/98
22	A Anderson	Block Is., RI	06/09/98	I Albinson	Montauk, NY	23	10/22/98
22	P Lowcher	Sea Bright, NJ	05/13/98	T Jacobellis	Oyster Bay Beach, NY	24	10/22/98
21	R Leja	Bridgeport, CT	09/10/94	S Durkov	Milford, CT		10/23/98
16	R Stasinos	Stamford, CT	10/04/98	R Stasinos	Stamford, CT	17	10/23/98
24	J Ragusa Sr.	Fair Harbor, NY	09/17/97	C Krencicki	Island Beach St. Pk., NJ	28	10/23/98
20	R Leja	Bridgeport, CT	07/28/96	S Durkov	Milford, CT		10/23/98
27	T Sledzik	Mystic, CT	06/14/97	B Morrow	Mystic R., CT	30	10/23/98
20	G Kerkhan	Deal, NJ	05/25/96	J Buckel	Sandy Hook, NJ	28	10/23/98
20	F Stunkel	Stamford, CT	11/20/97	R Stasinos	Stamford, CT	22	10/24/98
15	R Stasinos	Stamford, CT	09/27/98	P Egley	Mamaroneck, NY	15	10/24/98
13	H Sweet	Warren, RI	06/05/98	H Sweet	Warren R., RI	15	10/24/98
18	D Furtado	Fall River, MA	08/23/98	F Murphy	Portsmouth, RI	20	10/24/98
21	G Blank	East R , NYC	10/23/98	M Strober	UN, East R., NYC	21	10/24/98
15	R Stasinos	Stamford, CT	10/04/98	W Lowitz	Noroton Bay, CT	17	10/24/98
25	D Pinson	Nomans Land, MA	06/20/98	B Reimels	Block Is., RI	25	10/24/98
20	S Keiper	Indian R., DE	10/02/98	G Kaminski	Indian R., DE		10/24/98
23	R Pearson Jr.	Croton Bay, NY	05/03/98	L McLeod	Centerville, MA	24	10/24/98
31	R Locke	Provincetown, MA	07/18/96	S Witthuhn	Montauk, NY	33	10/24/98
26	W Perlman	Atlantic Beach, NY	07/01/98	W Marker	Atlantic Beach, NY	28	10/25/98
20	T Marburger	Northport, NY	05/12/92	R Dolci	Little Egg Inlet, NJ	32	10/25/98
23	A LoCascio	Manhasset Bay, NY	06/17/98	V D'Amato	Verrazano Brdg., NY	24	10/25/98
28	J Della Porta	Lynn, MA	09/09/98	D Menton	Cape Cod Canal, MA	30	10/25/98
17	M Simmons	Barnegat Lt., NJ	12/06/95	J Krell	Canarsie Pier, NY	23	10/26/98
30	JC Wright	Ches. Bay Brdg. Tun., VA	05/19/98	R Hancock	MMBT, Suffolk, VA		10/26/98
15	J O'Keefe	Stratford, CT	05/01/98	T Hodun	Stratford, CT	18	10/26/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
35	S Jakubowski	Bay Ridge, NY	05/27/98	A Tzatzimakis	Fire Is. Inlet, NY		10/26/98
33	A Anderson	Montauk Pt., NY	06/27/98	M Collins	Barnegat Bay, NJ	34	10/27/98
22	J Della Porta	Lynn, MA	08/30/98	J Quartararo	Mantoloking, NJ		10/27/98
22	T Marburger	Shinnecock Inlet, NY	08/27/95	E Carter	E. Quogue, NY	37	10/27/98
14	R Kyker	Norwalk, CT	05/09/97	C Gargiulo	New Rochelle, NY	18	10/27/98
22	R Leja	Bridgeport, CT	10/03/94	B Biedinger	Shrewsbury R., NJ	30	10/27/98
25	C Kennedy	Cape May Pt , NJ	11/07/96	N Gallaccio	SE Cape May Lt., NJ	27	10/28/98
14	C Carroll Jr.	Keyport, NJ	04/10/98	M McGovern	Brooklyn, NY	17	10/28/98
19	G Kerkhan	Sea Bright, NJ	07/04/96	E Adams	Sandy Hook, NJ	25	10/28/98
17	R Conklin	Peconic R , NY	04/29/97	W Self	Reedville, VA		10/28/98
12	A Perednia	East River, NY	10/19/97	J Medina	Lower East R., NY		10/28/98
36	R Maimone	Rye, NH	07/04/98	R Day	Delaware Bay	37	10/28/98
22	D Kelly	Orient Point, NY	10/21/91	J Kametler	Orient Pt., NY	33	10/28/98
21	A Schweithelm	Northport, NY	09/17/98	R Fiedler	Greenport, NY	23	10/28/98
27	F Coronato	Old Orchard Lt., NY	04/26/98	J Mohres	Montauk Lt., NY	30	10/29/98
24	R Vogel	Flynn's Knoll, NJ	07/29/97	J Fazio	Jamaica Bay, NY	24	10/29/98
21	G Ciriello	Sandy Hook, NJ	06/25/96	J Fazio	Jamaica Bay, NY	22	10/29/98
28	C Wilcox III	Moriches Inlet, NY	11/11/97	E Edgerley	Charlestown, RI	32	10/29/98
24	T Marburger	Northport, NY	05/13/97	W Marker	Atlantic Beach, NY	28	10/29/98
18	P Grippo	Black Banks, L I , NY	07/23/97	E Fernandez	Rockaway Inlet, NY	24	10/30/98
22	A D'Amato	4 mi S Cape May, NJ	12/10/97	M McGovern	Norton's Pt , NY	22	10/30/98
25	F Stunkel	Stamford, CT	09/10/98	S Kellner	Southold, NY		10/30/98
27	R Nystrom	Devon, CT	10/25/98	C Elser	Stratford, CT	29	10/30/98
26	R Chmiel	Fisher's Island, NY	08/11/97	A Lojck	Sandy Hook, NJ	28	10/30/98
24	R Nystrom	Stratford, CT	06/23/98	J Fredericks	Sunken Meadow St. Pk., NY	27	10/30/98
18	J Dotsey	Long Beach, NY	10/19/95	R Roth	Mantoloking, NJ	22	10/31/98
21	G Kerkhan	Provincetown, MA	10/04/98	B Merrick	Old Lyme, CT		10/31/98
24	W Marker	E Rockaway Inlet, NY	08/22/98	G Lake	Atlantic Bridge Brdg., NY		10/31/98
24	A Anderson	Block Is., RI	06/01/98	A Lavallee	Block Is., RI	25	10/31/98
21	R Layser	Potomac R., MD	02/22/98	R Cunanan	Virginia Beach, VA	21	10/31/98
27	S Fries	Tin Can Grounds, NY	11/19/95	C Hedberg	Westhampton Beach, NY		10/31/98
27	R Stroz	Shrewsbury R., NJ	11/01/96	P Egley	Mamaroneck, NY	29	10/31/98
26	A Anderson	Block Is., RI	06/10/98	W Kump	Robert Moses Brdg., NY	28	10/31/98
22	R Nystrom	Fairfield, CT	08/10/97	H Leeman	East R., NY	24	10/31/98
21	F Coronato	West Bank Lt., NY	11/18/97	K Ashe	Ambrose Chan. #13	27	11/01/98
26	J Beaver	Sandy Hook, NJ	07/03/98	R Ranno	Ellis Is., NY		11/01/98
28	A Anderson	Block Is., RI	06/19/97	S Carbone	Great Bay, NJ	30	11/01/98
27	A Anderson	Montauk Pt., NY	05/30/98	R Disbrow	Mantoloking, NJ	28	11/01/98
23	R Nystrom	Bridgeport, CT	03/15/98	W Klein	Norwalk, CT	27	11/01/98
37	A LoCascio	Execution Lt., NY	06/15/97	F Altomare	Cape May, NJ	39	11/01/98
24	R Allen	Ches. Bay Brdg. Tun., VA	03/07/98	C Charnock	Port Tangier, VA		11/02/98
20	J Della Porta	Swampscott, MA	05/30/98	T McCandless	Jamestown, RI	21	11/02/98
21	F Stunkel	Stamford, CT	07/02/98	W Ingram	Southampton, NY	24	11/02/98
28	A Anderson	Block Is., RI	05/17/98	W Lee	Raritan Reach, NY	28	11/02/98
23	R Allen	Ches Bay Brdg. Tun , VA	03/07/98	E Macurak	S of Smith Is., VA	26	11/03/98
19	F Stunkel	Stamford, CT	06/19/97	O VanHelmond	Westhampton, NY	22	11/03/98
25	R Leja	Bridgeport, CT	06/28/98	J Smiler	Old Field Pt., NY	27	11/03/98
18	T Marburger	Northport, NY	04/19/92	S Chiulli	Sandy Hook Chan., NJ	32	11/03/98
20	R Grobarz	Sea Bright, NJ	08/18/96	P Hofmann	Island Beach St Pk., NJ	25	11/03/98
21	D Kelly	Sag Harbor, NY	06/11/97	B Billerman	Pt. Pleasant, NJ	23	11/04/98
17	R Conklin	Norwalk, CT	10/10/98	R Noble	Darien, CT		11/04/98
20	T Marburger	Northport, NY	04/30/96	W Lee	Shrewsbury Rocks, NJ	29	11/04/98
24	R Nystrom	Stratford, CT	09/26/98	H Milam	Fire Is., NY	24	11/04/98
19	M LeBlanc	Rumstick Pt., RI	08/13/98	C Hall	Narragansett, RI	22	11/04/98
18	G Keenan	Shinnecock Bay, NY	05/17/94	A Seltzer	Sandy Hook, NJ	26	11/04/98
33	S Fries	Montauk Pt , NY	08/05/98	H Nicol	Holgate, NJ		11/05/98
16	G Dulka	Ches. Bay Brdg. Tun., VA	12/07/96	R Dickens	Hollywood, MD	18	11/05/98
25	A Anderson	Block Is., RI	07/08/98	D Pagano	Ship Bottom, NJ	26	11/05/98
20	J Ragusa Sr	Oaklyville, NY	09/27/97	T Heinz	Jamaica Bay, NY	25	11/05/98
20	R Leja	Bridgeport, CT	10/29/98	E Nanton	CT side, L I Sound		11/05/98
34	A Anderson	Montauk Pt , NY	10/03/97	R Berger	Stratford, CT	36	11/05/98
15	H Sweet	Warren, RI	07/12/98	W Pfeil	Jamestown, RI	16	11/05/98
26	E Zmara	Fire Is. Inlet, NY	08/10/97	A Randzio	Shark R. Inlet, NJ	32	11/05/98
19	D Zurheide	Secaucus, NJ	10/25/97	W Smagalski	Upper Hackensack R., NJ	21	11/06/98
18	R Stasinos	Stamford, CT	08/18/98	G Tischler	Greenwich, CT		11/06/98
22	R Conklin	Moriches Inlet, NY	07/11/98	J Stoner	Island Beach St. Pk., NJ	25	11/06/98
15	A Schweithelm	Northport, NY	11/29/97	W Huntley	S Cove, Saybrook, CT	16	11/06/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
13	P Lowcher	Rumson, NJ	05/20/97	N Fiorillo	Bradley Beach, NJ	20	11/07/98
40	J Posh	Stratford, CT	09/09/98	D Budde	Milford, CT	40	11/07/98
33	B White	Old Orchard Lt., NY	05/12/98	J Ragusa	Fire Is. Lt., NY	35	11/07/98
15	M Simmons	Barnegat Light, NJ	08/20/97	J Kovacs	Barnegat Inlet, NJ	24	11/07/98
26	W Stuven	Target Rock, L I. Sound	07/13/98	M Alimena	Eatons Neck, NY	28	11/07/98
27	M Favale	Boston, MA	07/26/98	K Lampert Jr.	Lafayette R., VA	29	11/07/98
18	R Conklin	Moriches Inlet, NY	08/19/98	G Grosselfinger	Moriches, NY		11/07/98
36	S Fries	Montauk Pt., NY	08/04/98	J Corcoran	Montauk Pt., NY		11/07/98
28	G Buono	Staten Is., NY	10/14/98	B Glynn	West Bank Lt., NY	28	11/07/98
23	P Lowcher	Sea Bright, NJ	05/13/98	F Coronato	Raritan Bay, NJ	25	11/07/98
27	A Anderson	Block Is , RI	06/17/98	R Crofton Jr.	Ches. Bay Brdg. Tun., VA		11/07/98
15	D Taft	Prospect Pt., NY	11/19/97	R Hodges	Barnegat Inlet, NJ	15	11/07/98
17	H Sweet	Warren, RI	09/27/98	R Weckwerth	Thames R., CT		11/08/98
26	T Marburger	Shinnecock Inlet, NY	06/28/98	J Weidner	Bay Head, NJ		11/08/98
19	G Horvath	Barnegat Inlet, NJ	09/15/98	R Alacevich	Barnegat Inlet, NJ		11/09/98
21	R Conklin	Moriches Inlet, NY	06/23/98	D Wyckoff	Island Beach St. Pk , NJ	24	11/09/98
30	J DeLuca	West Bank Lt., NY	10/29/95	S Wittenwiler	Delaware Bay, NJ	34	11/09/98
18	P Lowcher	Rumson, NJ	06/04/97	W Sadler	Sandy Hook, NJ	27	11/09/98
23	JC Wright	Ches Bay Brdg. Tun., VA	04/30/98	R Lay	Ches. Bay Brdg. Tun., VA	24	11/09/98
20	M Simmons	Barnegat Light, NJ	11/19/97	J Burke	Cuttyhunk, MA		11/09/98
22	R Nystrom	Bridgeport, CT	10/05/98	M Phillips	Bridgeport, CT		11/09/98
19	JC Wright	Virginia Beach, VA	10/27/98	S Long	Ches. Bay Brdg. Tun., VA		11/09/98
33	R Maimone	Rye, NH	05/28/98	S Rumbolo	Island Beach St. Pk., NJ		11/10/98
26	R Johnson	Sheepshead Bay, NY	08/14/96	F Jest	Ophelia, VA		11/10/98
20	R Allen	Cape Charles, VA	12/13/97	D Hill	Chesapeake Bay, MD	20	11/10/98
29	M Heffernan	Long Beach, NY	10/05/98	J Faczak	Sandy Hook, NJ	30	11/10/98
21	D Kelly	Sag Harbor, NY	05/19/98	G Ohlander	Fire Is. Inlet, NY	21	11/10/98
29	S Fries	Montauk, NY	07/29/97	J Doud	Chesapeake Bay, VA	32	11/10/98
23	G Blank	East R., NY	10/03/98	R Pearson	Breezy Pt., NY		11/10/98
20	G Blank	East R., NY	10/30/98	J Medina	Lower East R., NY		11/11/98
12	R Stasinos	Stamford, CT	09/27/98	M Olivo	Harlem R., NYC	12	11/11/98
25	A Young	Mattituck, NY	08/28/97	R Antunovich	E. Moriches, NY	30	11/11/98
21	F Stunkel	Stamford, CT	07/02/98	J Steeves	Stamford, CT	22	11/11/98
25	R Thulen	Norwalk, CT	08/03/98	J Reichart	Sound Beach, NY		11/11/98
	P Lowcher	Sea Bright, NJ	06/20/98	J Cohen	Breezy Pt., NY	20	11/11/98
22	T Cannuli	Corson's Inlet, NJ	10/12/98	A Blair	Avalon, NJ		11/12/98
23	D Kenney	Charlestown, RI	10/16/98	C Dunham	Lavallette, NJ	23	11/12/98
25	R Leja	Bridgeport, CT	10/24/95	J Hunt	Montauk, NY	34	11/12/98
32	C Husta	Little Egg Inlet, NJ	05/14/97	J McGuire	Tuckerton, NJ	34	11/12/98
32	A Schweithelm	Ft. Salonga, NY	06/16/96	D Keil	NW Montauk Lt., NY	39	11/12/98
20	R Wolfskeil	Ipswich, MA	09/26/98	D Burke	Manhasset Bay, NY		11/12/98
22	D Furtado	Mt. Hope Bay, MA	10/11/98	K Delanoy	Lavallette, NJ	24	11/13/98
18	R Conklin	Westport, CT	11/08/98	M Russo	Smithtown, NY	18	11/13/98
14	H Sweet	Warren, RI	06/27/98	V Adley	Bridgeport, CT	16	11/13/98
20	JC Wright	Ches. Bay Brdg. Tun., VA	05/28/98	B Holda	Reedville, VA		11/14/98
13	A Schweithelm	Northport, NY	04/18/98	K Krzyzewski	Southampton, NY		11/14/98
25	G Horvath	Barnegat Inlet, NJ	10/01/98	K Reilly	Barnegat Inlet, NJ		11/14/98
15	B Shillingford	Strathmere, NJ	07/12/96	J King	Strathmere, NJ	22	11/14/98
27	D Hoxsie	Charlestown, RI	06/28/98	P Jakits	Montauk, NY	29	11/14/98
20	D Sowerby	York River, ME	07/23/97	M Valentini	Barnegat Inlet, NJ		11/15/98
27	R Vogel	Sandy Hook, NJ	06/26/97	F Tenore	Romer Shoal, NJ	31	11/15/98
35	D O'Rourke	Old Orchard Lt., NY	05/03/98	G Crews	Oregon Inlet, NC		11/15/98
16	T Marburger	Northport, NY	11/17/98	P Dauk	Mid L.I Sound, NY	16	11/15/98
25	L Gonnello	Flynns Knoll, NJ	06/25/97	D DelaCruz	Randalls Is., NY	31	11/15/98
30	J Mayer	Montauk, NY	09/29/94	T McCarthy Jr	Montauk, NY	41	11/15/98
25	M LeBlanc	Barrington, RI	08/30/98	B Davies	Offshr., Harvey Cedars, NJ		11/15/98
19	K Hollins	Island Beach St. Pk., NJ	09/03/98	D Hall	Lavalette, NJ	22	11/15/98
21	J Foti	Staten Is , NY	06/07/98	D Shapiro	Princess Bay, NY	23	11/16/98
21	J Della Porta	Nahant, MA	07/17/98	E Hertello	Boston, MA	24	11/16/98
39	R Maimone	Rye, NH	07/04/98	A Dudas	Perth Amboy, NJ	39	11/16/98
29	B Baker	Martha's Vineyard, MA	06/26/97	J Slota	Cape May, NJ	31	11/16/98
26	A LoCascio	Throgs Neck Brdg., NY	09/05/97	T Cook	Jersey City, NJ	29	11/17/98
20	J Jarema	Sandy Hook, NJ	10/16/98	R Newallis Jr.	Flynn's Knoll, NJ	21	11/18/98
17	T Marburger	Northport, NY	04/14/98	R Beaudreault	Pawtucket, RI	18	11/18/98
25	A Anderson	Montauk Pt , NY	06/30/97	B Smith	York R., VA	29	11/18/98
15	T McCandless	Jamestown, RI	10/29/97	B DeLandri	E of Mamaroneck, NY	15	11/18/98
16	R Pearson Jr.	Breezy Pt., NY	05/23/98	B Curran	Island Beach St. Pk., NJ	20	11/19/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
18	GS Gray	Charlestown, RI	06/07/98	B Paige	Norwich, CT		11/19/98
40	D Sowerby	York Harbor, ME	08/02/98	M Klause	Delaware Bay, NJ	40	11/19/98
16	H Sweet	Warren, RI	07/30/98	D McLane	Southampton, NY	16	11/20/98
19	A Anderson	Galilee, RI	10/27/98	N Bellanceau	Norwich, CT	20	11/20/98
20	D Hawkins	Mattituck, NY	11/13/94	R Onorato	Montauk Pt., NY	39	11/20/98
19	E Petronio Jr.	Point Judith, RI	06/02/98	S Cecere	Bay Head, NJ	23	11/21/98
25	A Anderson	Block Is , RI	06/08/98	W Robbins	Ches. Bay Brdg Tun., VA	27	11/22/98
28	A Anderson	Block Is., RI	05/20/98	D Mulford	Delaware Bay, NJ	29	11/22/98
18	A Anderson	Galilee, RI	10/30/98	NMFS, NE Fish. Ctr.	Southampton, NY	18	11/22/98
23	A D'Amato	Cape May, NJ	04/16/98	D Blackman	Cape May, NJ	26	11/22/98
24	R Kyker	Norwalk, CT	09/14/97	J DiGiacomo	2 mi. E Cape May, NJ	26	11/22/98
14	E Petronio Jr.	Pt Judith, RI	05/13/95	D Holstein	New Haven, CT	20	11/22/98
26	G Drago	Montauk Pt., NY	06/15/98	P Mauld	Ches. Bay Brdg Tun., VA	29	11/22/98
23	T Rinaldi	Duck Pond Pt , NY	08/22/97	C Malta	Mantoloking, NJ	25	11/22/98
16	B Shillingford	Strathmere, NJ	10/01/95	R Lubinski	Prissywick Shoal, NJ	19	11/22/98
24	J Scully	Higgins Beach, ME	08/24/98	C Konta	Sea Bright, NJ		11/22/98
27	F Laskowski	Bridgeport, CT	08/02/97	E Taylor	Long Branch, NJ	28	11/22/98
27	W Marker	Atlantic Beach, NY	10/26/98	W Perlman	Atlantic Beach, NY	27	11/23/98
28	G Ruest	Block Is., RI	09/27/97	W Perlman	Atlantic Beach, NY	28	11/23/98
18	T Lake	Bay Ridge Flats, NY	11/24/95	R Kelly	Mantoloking, NJ	24	11/24/98
27	S Garna	Rhinebeck Brdg., NY	05/18/97	W Lee	Lower NY Bay	30	11/24/98
27	R Vogel	Breezy Pt., NY	08/06/98	L Ocone	Lavalette, NJ	27	11/24/98
27	R Nystrom	Westport, CT	10/24/98	M Pickering	Kismet, NY	29	11/24/98
21	T Galletta	Sandy Hook, NJ	10/28/98	J Phair	Flynn's Knoll, NJ		11/25/98
28	F Coronato	Old Orchard Lt., NY	04/25/98	S Schon	Sandy Hook, NJ	34	11/25/98
31	A Anderson	Block Is., RI	09/22/96	M Calise	Offshr., Sea Isle Lump, NJ	31	11/25/98
27	W Perlman	Tin Can Grounds, NY	08/06/98	T Antonelli	Overfall Shoals, NJ	28	11/25/98
22	R Grobarz	Sandy Hook, NJ	05/13/98	A Ristori	Island Beach St. Pk., NJ	26	11/25/98
22	JC Wright	Ches Bay Brdg. Tun., VA	04/30/98	B Quick	Island Beach St. Pk , NJ	23	11/25/98
19	F Marchesani	Margate, NJ	05/16/98	T Tabasso	Margate, NJ	20	11/27/98
24	G Ciriello	Sandy Hook, NJ	05/19/95	B Wittig	Old Saybrook, CT	35	11/27/98
21	J Karolides	Beverly, MA	06/03/94	T Tabasso	Margate, NJ		11/27/98
14	C Kennedy	Cape May Inlet, NJ	11/03/98	L Kreiser	Cape May Pt., NJ		11/28/98
30	W Kobel Jr	Eatons Neck, NY	06/28/97	V Arcabascio	Highlands, NJ	32	11/28/98
24	M Berger	Atlantic Beach Brdg , NY	05/11/96	S Sexton	Beach Haven Inlet, NJ	30	11/28/98
19	M Strober	Govenor's Island, NY	11/04/97	M Strober	Governor's Is , NY	20	11/28/98
18	W Johnson	Stamford, CT	07/14/97	W Abbott Jr	Ventnor, NJ		11/28/98
17	A Schweithelm	Asharoken, NY	07/02/98	P Grippo	Long Beach, NY	18	11/28/98
17	D Hoxsie	Charlestown, RI	08/18/97	F Balbino	Sandy Hook Bay, NJ	21	11/28/98
36	W Matyka Jr	Fisher Is., NY	07/04/96	T Kacprzyk	Jones Beach, NY	38	11/28/98
25	A Anderson	Block Is , RI	07/10/98	D deSatnick	Delaware Bay, NJ	27	11/28/98
20	P Chowansky	Sea Girt, NJ	05/30/98	T Turner	Offshr , Strathmere, NJ	22	11/29/98
21	R Leja	Bridgeport, CT	10/13/97	C Haws	Manasquan Inlet, NJ		11/29/98
21	W Quick	Harvey Cedars, NJ	05/23/98	M Skirka	Flynn's Knoll, NJ	22	11/29/98
19	E Petronio Jr.	Pt. Judith, RI	09/01/97	B Quick	Delaware Bay	24	11/29/98
25	R Kyker	Westport, CT	08/27/98	K Frers	Block Is , RI	25	11/29/98
24	R Nystrom	Bridgeport, CT	08/02/98	J Foremski	Cape May Pt , NJ	27	11/29/98
22	J Tirpak	Sea Isle City, NJ	10/24/98	L Bazzle	York spit in Ches. Bay, VA	23	11/29/98
24	W Perlman	Atlantic Beach, NY	11/23/98	P Hession	Atlantic Beach Brdg., NY	24	11/30/98
22	S Kellner	Mattituck, NY	06/05/98	P Regula	Seaside Heights, NJ	28	11/30/98
26	C Lienau	Montauk Pt., NY	08/30/96	J Kovacs	Barnegat Bay, NJ	30	11/30/98
19	T McCandless	Jamestown, RI	10/29/97	A Perednia	East R , NY		11/30/98
16	G Kerkhan	Raritan Bay, NJ	09/16/97	M Habel	Sea Bright, NJ	21	11/30/98
20	M Berger	Atlantic Beach Brdg., NY	06/19/97	H Leemann	Red Hook, Bklyn, NY	24	11/30/98
28	A Anderson	Montauk Pt., NY	05/31/98	B Sedel	Ches Bay Brdg Tun., VA		12/01/98
31	A LoCascio	Manhasset Bay, NY	06/18/97	S Groe	Hempstead Hbr , NY	35	12/01/98
26	F Jessup II	Moriches Inlet, NY	10/03/98	C Moore	Ches. Bay Brdg Tun., VA		12/01/98
19	R Chmiel	Stonington, CT	05/23/98	A Gennaro	Belmar, NJ		12/01/98
25	A Anderson	Block Is., RI	09/12/98	M Parson	Wilwood, NJ	26	12/02/98
20	D Zurheide	Bay Ridge, NY	06/25/98	B Crandley	S Townsend's Inlet, NJ		12/02/98
24	R Nystrom	Bridgeport, CT	06/06/98	J Redman	Ocean City Inlet, MD		12/02/98
21	T Marburger	Northport, NY	05/01/97	A Bowen	Ocean City, NJ		12/02/98
27	R Nystrom	Stratford, CT	06/23/98	P Parsons	S Townsend's Inlet, NJ	29	12/02/98
16	M Mucha	Greenwich, CT	10/08/95	T Walsh	Mantoloking, NJ	25	12/03/98
25	A Schweithelm	Northport, NY	07/24/98	L Rubin	Ventnor, NJ	28	12/03/98
28	W Perlman	Atlantic Beach, NY	11/23/98	S Christensen	Atlantic Beach Brdg., NY	28	12/03/98
24	D Hawkins	Stony Brook, NY	10/05/94	J Willis	Ches Bay Brdg. Tun., VA	31	12/03/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
31	F Neuscheler	Moriches Inlet, NY	09/16/98	D Gibboney	Ches. Bay Brdg. Tun , VA	31	12/03/98
34	B Garfield	Portland, ME	08/10/98	G Fuqua	Chesapeake Bay, VA		12/04/98
29	J Posh	Block Is., RI	09/15/97	B Kleimenhagen	Little Egg Inlet, NJ	29	12/04/98
26	A LoCascio	Throgs Neck Brdg , NY	08/06/97	J Haynes	3 mi. S VA Beach, VA		12/04/98
22	S Fries	Rockaway Inlet, NY	11/29/97	P Regula	Seaside Heights, NJ	24	12/04/98
18	T Marburger	Northport, NY	04/21/96	A Wimer	MD/VA Border, Ches. Bay	31	12/04/98
21	R Ries	Cold Spring Harbor, NY	08/16/98	A Perednia	East R., NY		12/04/98
19	A Anderson	Galilee, RI	10/31/98	J Kurdziel	Mill Basin, Bklyn, NY	19	12/04/98
18	C Fiorillo	Long Branch, NJ	12/02/98	G Horvath	Barnegat Inlet, NJ	18	12/04/98
34	W Perlman	Atlantic Beach, NY	06/22/97	J Stewart	Oregon Inlet, NC		12/04/98
31	R Leja	Bridgeport, CT	10/16/98	B Kiley	Ches. Bay Brdg. Tun., VA	32	12/04/98
18	D Sowerby	York, ME	09/19/95	W Forbes	Norwich, CT		12/05/98
30	L Quinn	Provincetown, MA	07/24/98	J Bauer	Tangier Is., VA	31	12/05/98
25	G Ciriello	Sandy Hook, NJ	10/21/96	D Barr	Island Beach St. Pk., NJ	29	12/05/98
25	R Templeton	Charlestown, RI	10/09/98	B Sharkey	Cape May, NJ	25	12/05/98
26	A Anderson	Montauk, NY	06/07/97	M Medina	Hoboken, NJ	27	12/05/98
21	R Chmiel	Watch Hill, RI	09/04/98	V Galgano	Sea Girt, NJ	22	12/05/98
25	D Brown	Spring Lake, NJ	06/25/98	R Schackelford	Jamestown, VA		12/05/98
33	R Maimone	Rye, NH	09/13/98	J Reaves	Cape Charles, VA	33	12/05/98
23	P Lowcher	Sea Bright, NJ	04/22/98	J Giordano	Townsend's Inlet, NJ		12/05/98
16	R Ferraro	Narragansett, RI	10/19/98	R Thompson	Jones Beach, NY		12/05/98
21	F Stunkel	Norwalk, CT	11/11/97	D Tapp	Ventnor, NJ		12/05/98
21	T Shaheen	Navesink R., NJ	05/30/97	R Schackelford	Jamestown, VA		12/05/98
19	T Shaheen	Navesink R., NJ	06/08/97	J Slim	E Brigantine Inlet, NJ	25	12/05/98
20	R Chmiel	Fisher's Island, NY	08/13/97	G Evans	Hereford Inlet, NJ	26	12/05/98
22	R Kyker	Westport, CT	08/27/98	S Cecere	Mantoloking, NJ	24	12/06/98
23	A Anderson	Matunuck, RI	10/28/98	R Mastrosimone	Fire Is., NY		12/06/98
26	G Ciriello	Sandy Hook, NJ	06/16/96	B Graham	ESE Little Egg Inlet, NJ	29	12/06/98
21	T Shaheen	Navesink R , NJ	05/30/97	F Garneski	Indian R. Inlet, DE	26	12/06/98
31	R Chmiel	Stonington, CT	09/10/98	L Smith	Delaware Bay, NJ		12/07/98
15	R Grobarz	Union Beach, NJ	03/26/95	P Regula	Mantoloking, NJ	24	12/08/98
19	G Blank	NY Harbor	05/24/98	J Culleton	Rockaway Beach, NY	22	12/08/98
36	B White	Old Orchard Lt , NY	05/12/98	R Baber	Cape Charles, VA	39	12/08/98
21	G Ottavio	Cape May Pt , NJ	11/13/98	J Bosna	Cape May, NJ		12/09/98
31	D Kelly	Orient Pt., NY	09/22/97	G Ertle	Pt. Pleasant, NJ	32	12/09/98
24	D Kelly	Orient Pt., NY	09/25/98	M Pagliughi Jr.	Avalon, NJ	27	12/10/98
27	A Anderson	Block Is., RI	11/09/98	M Czeslowski	Bay Head, NJ	27	12/10/98
24	P Lowcher	Sea Bright, NJ	07/01/98	W Poulin	Bowers Beach, DE	24	12/10/98
33	A D'Amato	Cape May, NJ	11/13/98	E Peterson	Atlantic City, NJ	35	12/10/98
18	H Sweet	Warren, RI	08/23/98	F Kertesz	Beach Haven, NJ	21	12/10/98
26	L Gonnello	Sandy Hook, NJ	10/19/98	G O'Driscoll	Avalon, NJ	26	12/10/98
24	R Nystrom	Stratford, CT	10/26/98	C Harer	Delaware Bay, DE	25	12/11/98
35	A LoCascio	Hewlitt Pt., NY	05/19/98	A Eberhard	Chesapeake Bay, VA		12/11/98
24	J Krauss	Monmouth Beach, NJ	11/29/98	M Verastegui	East R., NYC		12/11/98
20	P Hierholzer	Sea Isle, NJ	11/28/96	J Craner	Ocean City, NJ		12/11/98
26	J Foti	Staten Is., NY	07/19/97	T McKinney	Swinburne Is., NY	30	12/12/98
33	A Anderson	Montauk Pt., NY	10/19/97	K McCabe	Cape Hatteras, NC	38	12/12/98
28	A Anderson	Block Is., RI	09/16/96	L Foster	Beach Haven, NJ		12/12/98
25	T Marburger	Shinnecock Inlet, NY	08/19/97	G Ottavio	Cape May, NJ	27	12/12/98
25	A D'Amato	Cape May, NJ	11/18/98	H Brandenstein	Great Egg Inlet, NJ	26	12/12/98
32	F Casey	Boston, MA	08/08/98	R Saunders	6 mi. S Reedville, VA	32	12/12/98
24	C Kennedy	Hereford Inlet, NJ	11/24/98	B Mateer	Ocean City, NJ	24	12/12/98
27	W Perlman	Atlantic Beach, NY	07/16/98	J Fabryka	Fenwick Is., DE	28	12/13/98
25	A Anderson	Block Is , RI	06/07/98	M Tabasso	Longport, NJ		12/14/98
25	A Schweithelm	Northport, NY	09/28/97	F Phillips	Ocean City, NJ	29	12/15/98
24	R Chmiel	Fishers Is., NY	07/21/98	D Perry	Chesapeake Bay, VA	28	12/15/98
33	G Ministeri	Cape Cod Bay. MA	07/07/98	B Milhorn	Tangier Is., VA	35	12/15/98
24	T Rinaldi	Mattituck, NY	10/24/98	J Laverty	Ocean City, NJ	26	12/16/98
33	D Kelly	Orient Pt., NY	08/29/96	E Varga	Island Beach St. Pk., NJ	37	12/16/98
18	D Sowerby	Cape Neddick, ME	07/06/98	J Meacham	Ambrose Chan. buoy #1		12/16/98
23	R Conklin	Moriches Inlet, NY	11/11/98	J Bradley	Margate, NJ		12/17/98
18	W Anderson	Provincetown, MA	05/08/98	P Rodefeld Jr.	Island Beach St. Pk., NJ	18	12/18/98
32	W Brett	Provincetown, MA	09/15/97	C Sullivan	Tangier Sound, VA	34	12/18/98
21	C Tomkins	Milford, CT	09/27/95	J Bowman	VA Beach, VA	28	12/19/98
39	A LoCascio	Execution Lt., NY	06/06/97	J Berry	Cape Charles, VA		12/20/98
23	T Shaheen	Sandy Hook, NJ	06/21/97	J Fabryka	Slaughter Beach, DE	20	12/20/98

Species Length	Tagger	Place Tagged	Date	Recapturer	Location	Length	Date
24	G White	Piscataqua R , NH	06/26/98	B Lastor	Ches. Bay Brdg Tun , VA	25	12/21/98
13	J Beck	Cape May Pt., NJ	05/05/96	T deSatnick	Overfalls Shoal, NJ	22	12/21/98
29	S Jakubowski	Sandy Hook, NJ	06/09/98	S Ozmore	York spit, Ches Bay, VA	31	12/26/98
36	R Kalenka	Montauk Pt., NY	11/12/96	L Higgs	Breton Bay, MD		12/26/98
26	R Stasinos	Stamford, CT	09/13/98	F Drewry	VA Beach, VA	27	12/27/98
28	S Giaccone	Montauk Pt., NY	08/18/98	W Ansell	Ches. Bay Brdg. Tun., VA		12/28/98
21	A Schweithelm	Northport, NY	07/04/98	F Mace	Monmouth Beach, NJ		12/28/98
27	A Anderson	Block Is., RI	08/20/98	M Wawner	Ches. Bay Brdg. Tun., VA		12/29/98
39	F Coronato	Old Orchard Lt., NY	04/28/98	R Falls	Cape Charles, VA	41	12/30/98
Tautog							
10	L Gonnello	Monmouth Beach, NJ	10/07/96	A DuJat	Highlands, NJ	13	10/12/98
12	J Weber Jr.	Kismet Beach, NY	10/24/98	J Fereshetian	Fire Is. Reef, NY	12	11/07/98
13	R Stasinos	Todd's Pt., Stamford, CT	10/18/98	L Brown	Greenwich, CT		11/23/98
12	R Stasinos	Stamford, CT	11/01/98	D McDonald	Stamford, CT		11/25/98
Weakfish							
19	B Shillingford	Strathmere, NJ	07/01/98	C Stocking	Margate, NJ		09/11/98
17	G Horvath	Barnegat Inlet, NJ	09/14/98	F Moellers	Barnegat Bay, NJ		09/30/98
22	G Horvath	Barnegat Inlet, NJ	09/15/98	R Cloupe	Barnegat Inlet, NJ	23	10/01/98
27	J Foti	Staten Is., NY	07/12/98	T Arcabascio	Great Kills, NY	28	10/01/98
20	G Ottavio	Cape May Pt., NJ	10/04/98	C Smith	Cape May Pt., NJ	20	10/30/98
15	D Taft	Fire Island, NY	10/07/98	NMFS, NE Fish. Ctr.	Long Beach Is., NJ	16	12/03/98

GUIDELINES FOR SUBMISSION

UNDERWATER NATURALIST is the Society's journal. We encourage members to submit articles, pictures, observations, comments, compliments or criticisms. Please follow these guidelines.

SUBJECT MATTER: Feature articles run 1,500-3,500 words (4-10 double-spaced, typed pages); please refer to back issues for guidance. For **Field Notes and Coast Issues**, submit no more than three pages of direct observations of interesting natural history found while walking, diving, or fishing in a coastal area. Topics can be of current interest, 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 regarding a particular area. **Letters to the Editor** expressing thoughts on the magazine and its contents or general food for thought 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. For Cover Photos, we need clear, sharp 35mm color slides or color prints, either horizontal or vertical, of littoral subjects above or below the water. Horizontals can wrap around from front to back. Action is not necessary. (Note: Unless otherwise requested, we keep all accepted art work until it is published).

HOW TO SUBMIT: Typed, double-spaced manuscripts, please. If possible, please send a disk with your manuscript. Use common, not Latin, species names. We do not carry footnotes; incorporate sources in your article. We edit for clarity using Strunk and White's Elements of Style as our guide and favor clear wording over specialized terminology. Send your work with a stamped, self-addressed envelope; we will acknowledge its receipt.

☐ We do not pay for articles or illustrations, but we do send five authors' copies when published. Thank you for your interest. We look forward to receiving your submission.

Book Reviews

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Houghton Mifflin, Boston, MA
337 pp. $26.00 (cloth)

Dawkins, the acclaimed author of *The Selfish Gene*, takes as his theme the loss of romance that science evokes by demystifying what it touches upon. He sees poetry in science but it is more a construct of the mind than the artful turn of phrase in the written line.

The book is subtitled "Science, delusion and the appetite for wonder." Frankly, "an appetite for wandering" might be more apropos. It is more a hodgepodge of ideas among and within chapters held loosely together by a thin thread of genetic evolutionary theory. Early on, he tackles the delusions of poetry (isn't much of poetry the expression of wishful thinking?) and those of everyday life, astrology, and such. At the halfway mark he returns to the selfish gene.

As one might expect he creates an opportunity to take a poke at Stephen Jay Gould on the way. Both Gould's and Eldridge's punctuated equilibrium hypothesis and Gould's interpretation of the fossils of the Burgess shale (*Wonderful Life*) come in for much negative comment.

He expands upon the selfish gene and its role in a hard look at the Gaia hypothesis which claims the global living world can be looked upon as a single organism and in which every species does its bit for the whole. This romanticized notion has taken hold among the deep ecologists who have carried the concept well beyond the metaphor that Lovelock originally postulated.

Dawkins reminds us that natural selection satisfies the demands only of the here and now, operating without foresight. Environmental conditions steer genetic drift. Changes in genes can lead to a more competitive organism or to a more cooperative one. At the bacterial level, mutualism has proved to be the better bet. Over time, co-adaptation among many species in the same environment has led to what appears to be a fully integrated system.

Basically, it's a matter of what worked well for an ancestor will work well today. That assumes a static or very slowly changing environment in which all who live within it can evolve apace.

He closes with a look at the human mind; why is not easy to say except that it seems to be the fashionable thing to do these days. Patterns of recognition, comparisons with computers, and infusions of examples from the animal world all prove interesting, but the thread has gone very slack by the time the last page is turned.
DKB

ESTUARINE SCIENCE
Edited by John E. Hobbie

Island Press, Washington, DC
526 pp. $30.00 (paper)

Compilation of papers and discussions at a 1995 conference in Irvine, California, bringing together 40 marine scientists to tackle ways to study the complicated physical and biological dynamics of those places where freshwater meets the sea. It is a plea for better coordination among scattered institutions (and scientists within institutions) working on estuaries.

Early on, Hobbie acknowledges difficulty: "Despite the extent of research on estuaries, our ability to generalize and predict the consequence of change is primitive." Consider some of the influences on estuary behavior: urban runoff, sewage discharge, toxic pollutants, navigation dredging, wetlands filling, rainfall and drought extremes, tides, wind, and sea level rise. Add to that the fact that in this country more than half the population lives in coastal counties with all the land and water modifications they bring with them.

In his introduction, Hobbie spells out four reasons to strive for better synthesis of estuarine research.

- Estuarine research suffers from a lack of integration of knowledge that can be applied across sites.
- The results of most estuarine studies are not published in review journals.
- Understanding the complex interactions of physical, chemical, and biological factors is essential to answering many questions about estuarine systems.
- Estuarine research must be able to predict the consequences of future changes in climate or land use in watershed.

The book poses an important question: To manage estuaries for sustainable use in the future, is it better to "perform intense, detailed research on the basic ecological conditions of (estuarine) systems" or does such traditional research fail to "provide the relevant information necessary for better management and that research should be targeted to specific problems...?" This is an age-old struggle: basic or applied research. The answer has been and will probably remain some of each.

This is a technical book, but there is plenty of information for the layman. And it's good to see Island Press continuing to publish such solid work.

AGAINST THE TIDE: THE BATTLE FOR AMERICA'S BEACHES

by Cornelia Dean

Columbia Univ. Press, New York, NY
279 pp. $24.95 (cloth)

A journalist's view of our unwise decisions to build right up against the ocean's door come hurricane or high water. From the disaster at Galveston at the turn of the century to the relentless pounding of the five day Ash Wednesday northeaster of 1962, Dean makes the case for keeping your distance from the water's edge.

The folly of armoring and the havoc of inlets through built-up barrier islands get their just desserts. The major examples are familiar; the wall along Monmouth Beach in New Jersey, the meandering of Oregon Inlet in North Carolina, the devastation created on the north end of Assateague Island by the hardening of the Ocean City inlet and more.

The laws, regulations, court cases, and federal insurance policies, most of which have undermined the stabilization of the shore, are all given their due. If you want more, the end notes and bibliography will keep you busy for some time. Worth having on your shelf.
DKB

PREZ HOPEFULS SPILL ENVIRONMENTAL BEANS

In late summer, we sent out the Society's best investigative reporter, I.C. Cream (we call her "Scoop") to dig into presidential trash bins in search of their environmental platforms. The job took longer than expected and these summaries are too late to help you choose, but we believe it is important to be able to match the successful candidate with his promises. Here they are, in alphabetical order.

Buchanan: There are no environmental problems in this country, except those caused by immigrants or people without guns. If elected I will make sure that all real Americans are armed to the teeth. To get the government off our backs, I plan to dissolve the Department of Interior, EPA, and National Marine Fisheries Service. National parks will be returned to their rightful owners -- private neighbors. If I can do all these things I'll know I'm right.

Bush: When I was at Yale, I and the rest of the guys at the eating club (Pork 'n' Beans) one time we got together and went downtown in limos and cleaned up a vacant lot. Then we went back to the campus and grabbed some suds. From then on I have been environmentalistic. In Texas we rank first in clean air, clean water, clean beaches, oil wells, and cowboy boots. You can look it up in the World Book of Knowledgeable.

Gore: I invented ecology one day while I was picking tobacco on my father's farm in Tennessee. Ecology comes from the Buddhist word, *eco*, which means, as I'm sure you know, money. *Logy* means lots of. Put them together and you get lots of money which is what it will cost to save the world from the ozone layer and rising sea level (which, by the way, I knew about 15 years ago). When elected, I will write another book about ecology -- by the way I invented paper and books when I discovered I could write on tobacco leaves. But, that's another story, not, by the way, a Love Story (joke). Seriously, I want to be the president of all the people, from Joe Six Pack to all the other hard working families who want education, social security, cheap medicine, and email. And you can put that in your lockbox.

Nader: Environmental degradation is caused by NAFTA, the World Bank, big business, and shoddy campaign financing. If elected I will ban all four. While crawling to work recently -- I don't have a car and I don't wear shoes because they are made by over-exploited third world children -- I framed the following environmental planks: a windmill in every backyard, no genetic popcorn, free gas masks for pre-schoolers, and a tax on all sorts of combustion. And, finally, if elected, I will not live in the White House because it's energy inefficient. Instead, I will live in a storage locker at Union Station and crawl to work from there.

Scoop found lots of other stuff in the trash -- forged passports from South American countries, a rapper CD with dirty lyrics, cloth samples in earth tones, defunct oil leases, an empty can of green paint, several folders of compromised principles, and wads of mislaid soft money, "but nothing definitive," she concluded.

D.W. Bennett

THE AMERICAN LITTORAL SOCIETY'S OSPREY CLUB

What is the Osprey Club? The Osprey Club is the kids-only chapter of the American Littoral Society. Osprey Club members will receive a membership card and special mailings throughout the year (posters, stickers, newsletter).

Who can join? For the $5 membership fee, any kid (we suggest ages 5-12) can join, as long as a member signs them up.

Why join? As members, kids will receive interesting and fun information on the littoral zone that is created for them, so their appreciation of our coastal environment will grow.

How do you join? If you are already a member, send in the following information: your name, the child's name, address, age, and any special interests they might have. If you are not a member send in the membership form from page 39 with the above information. Send along with $5 per child to:

American Littoral Society
Sandy Hook
Highlands, NJ 07732
Attention: Osprey Club

AMERICAN LITTORAL SOCIETY
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HIGHLANDS, NEW JERSEY 07732

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