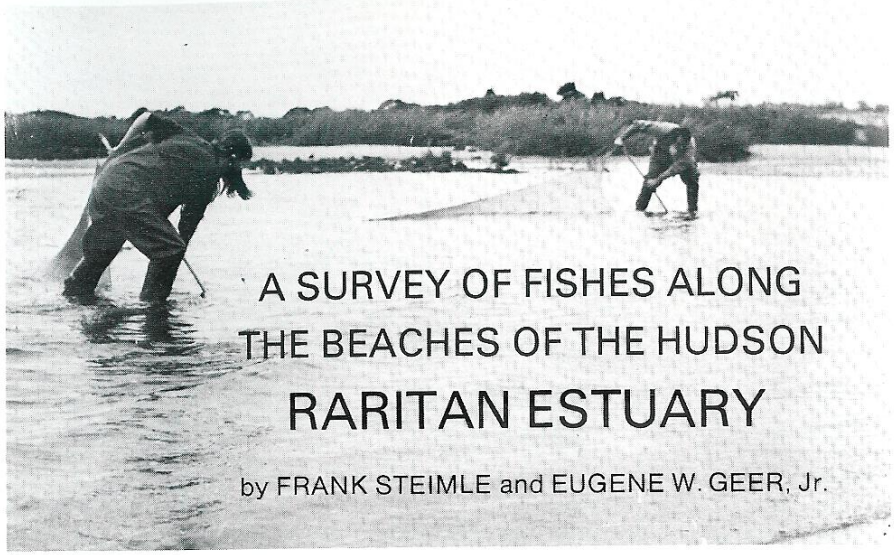


A SURVEY OF FISHES ALONG THE BEACHES OF THE HUDSON RARITAN ESTUARY

by FRANK STEIMLE and EUGENE W. GEER, Jr.

The Hudson-Raritan Estuary is a wedge-shaped body of water bordered by Brooklyn and Staten Island, N.Y., to the north and the New Jersey coast to the south. Into this estuary flow the Hudson, Raritan, Hackensack, Passaic (around Staten Island), and Shrewsbury Rivers. This estuary is adjacent to one of the largest population concentrations in the world, the New York City metropolis, which in the past looked to it as an important source of seafood, including oysters and lobsters, as well as for recreation. The bordering marshes and shallows were important feeding, spawning, and nursery grounds for many species of fish. In this century this once productive and enjoyable body of water has been severely degraded by millions of gallons of partly or entirely untreated sewage and other pollutants, and by the filling of the marshes.

This degraded state has caused some short-sighted people to think that the estuary is almost dead, in a practical sense, and projects like filling in part of it as a jetport, creating islands in it from garbage or dredging it out for super tankers have been suggested.

In 1973, some New Jersey members of the Littoral Society decided to create a Task Force to, among other projects, investigate how much fish life was still in the estuary. We thought this project worthwhile especially in light of the newly created Gateway National Recreation Area, most of which borders the estuary. We chose to make use of the many people who has expressed interest in doing something more than acknowledging the fact that the estuary was in bad shape. With these amateur naturalists we designed a survey or census, using the simple beach seine, of the small fish which occur near the shore, to provide some idea about the abundance of bait fish and juvenile or young game and food fish in the estuary.

Steimle is on the staff of the Sandy Hook Marine Laboratory. Geer is acting chairman of the Society's N.J. Chapter. Net pullers and fish identifiers were: J.W. Bengoff, D.W. Bennett, E.G. Bowen, J.L. Cerullo, G. Collabella, B. Decker, D. Dziedziak, J. Hanko, F. Klein, A. Krause, S. Nelson, John, Josie and Sue Oros, D. Radosh, F. Rubel, M. Tanzen, E. Weisgerger and others.

	Total Caught	Total hauls Coll.	Months Caught: Apr	May	Jun	Jul	Aug	Sept.	Oct	Sections Caught: A	B	C	D	E	F	G*
Bay Anchovy	186	6		X	X	X			X	X	X		X			
American eel	7	4		X			X	X					X			
Atlantic needlefish	2	2					X	X					X			
Mummichog	144	13	X	X	X	X	X	X	X			X	X		X	X
Striped killifish	57	4				X	X	X		X			X			
N. pipefish	62	11		X	X	X	X	X	X	X	X	X	X		X	
Bluefish	62	8				X(SA)	X(SA)			X	X		X	X	X	
Spot	17	4				X(SA)	X	X					X		X	
N. kingfish	35	9				X	X	X		X	X	X	X	X	X	
Silversides	3047	23		X	X	X	X	X	X			X	X			
Tomcod	2	2		X		X							X			
Menhaden	2	1						X(J)					X			
Alewife	1	1		X(SA)						X	X	X	X	X	X	X
Winter flounder	30	12	X		X	X	X	X	X	X			X			
Sand lance	14	2		X		X							X		X	
Mullet	37	3					X	X	X						X	
Tautog	4	2					X(SA)	X(SA)		X	X					
Jack	2	2				X(SA)	X(SA)					X				
Windowpane	1	1				X										X
3-spined stickleback	1	1	X												X	
Majorra	1	1						X(J)							X	
Jack crevalle	1	1							X(J)		X					
Squirrel hake	2	2			X(J)						X					
Pompano	1	1						X(J)			X					
Pollock	1	1			X(SA)										X	
Toadfish	2	1							X(SA)							

(J) Juvenile (SA) Sub Adult
*Conaskonk Point

List of species collected, total numbers of each species caught, the number of times (hauls) the species was collected and the distribution of the species by month and by section.

John and Sue Oros sorting fishes at their seining station in Raritan Bay.

Our survey plan was simple: we divided the estuary into six arbitrary sections and asked our volunteers to choose a beach within the estuary that was convenient to them which also distributed the seining so that there was at least one pair of seiners in each section. A special area was also chosen near a proposed power plant site at Conaskonk Point in New Jersey. Eight seining sites were thus established from Coney Island to the bay side of Sandy Hook.

We seined twice a month from May through October, using an inexpensive 40 x 4 , 3/16" mesh seine. We hauled the seine for about 100 ft. parallel along the beach, then dragged it up on the beach where we identified and counted the catch. This was done as quickly as possible so the catch could be returned to the water, for the most part, unharmed. We held seminars throughout the season to aid seiners in identifying the many different fish they collected.

The first census produced excellent results. Twenty-seven species of fish were collected, including young of important food or game fish like bluefish, winter flounder, tautog, pollock, spot, hake, and eels. Of equal importance were the numbers of "bait fish," food of many adult food and game fish, that were also collected. These bait fish included bay anchovies, killifish, silversides, menhaden, alewives, mullet, and sand lances.

Perhaps the most important finding of this initial census, which will be continued, is that there are still fish using the estuary for nursery grounds and for feeding and there is a good chance, with the cleaning up of these waters with new and better treatment plants, these fish may increase in the estuary, providing more seafood and recreation for the metropolitan area.

The task force, which is now the New Jersey Chapter of the American Littoral Society, is planning to continue the census and, if enough people are willing to help, expand it to other areas along the New Jersey coast. We would urge that the Society encourage this kind of estuarine "coverage" all along the coast as a worthwhile membership activity.

COASTWATCH

CALIFORNIA

Reported by M. ERIC ANDERSON and GREGOR M. CAILLIET

On December 19, 1973, a team of graduate students under the direction of Professor G. Victor Morejohn of the Moss Landing Marine Laboratories was conducting the lab's monthly Monterey Submarine Canyon Trawls. After a 15 minute bottom trawl along the canyon's north wall at a depth of 241 meters, the trawl was found to contain among myriads of marine organisms, a large California King Crab, *Paralithodes californiensis.* Since this species is rarely caught in Monterey Bay, the specimen, a male, was separated from the catch to be placed later in the invertebrate collection at Moss Landing.

While the remainder of the sample was being sorted, Dr. Morejohn placed the crab in the large holding tank at the lab and suddenly noticed several small dark tadpole-like fish swimming from the gill cavity of the crab. Several students and the authors began netting these fish out of the tank while the crab was removed to a smaller bucket and was photographed. A mass of about 100 dark eggs measuring 3,0 to 3.5 mm in diameter, freshly hatching from the crab's right gill cavity were removed and placed in a five gallon bucket containing aerated seawater. Twelve fish and two eggs were preserved immediately for reference, and by the following morning all but six of the fish in the bucket had hatched.

Some of the fish placed in the bucket with aerated seawater survived almost a month and were fed dried flake food and brine shrimp nauplii. The bucket temperatures fluctuated between 46°and 57° F throughout the period of captivity. Mortality was heavy during the first week, with about six to eight fish found dead every day, then mortality dropped until during the third week when only three deaths were recorded. The last fish died January 19, 1974. Growth was apparently slow, the first array of fish removed measured 11-12 mm TL (total length) and the last specimens removed were 13-15 mm TL.

The fish belong to the snailfish family Liparidae and they were tentatively identified as the Black-tailed Snailfish, *Careproctus melanurus,* the most common of three known species of *Careproctus* in California waters. Upon detailed examination, however, they were found to have dorsal and anal fin ray counts too low to be *C. melanurus.* That is, our counts were dorsal, 49, and anal, 39; while for *C. melanurus* the counts should have been dorsal 54-58, and anal, 47-50. Hence, our snailfish are either the rare *Careproctus osborni,* or a species of *Careproctus* not heretofore recorded in Monterey Bay waters. The answer awaits a careful taxonomic analysis.

This is the second recorded case of symbiosis, or cooperative living relationship, between a lithodid crab and snailfish offspring from Monterey Bay. Parrish (1972) recorded *C. melanurus* from the gill chamber of another species of crab but did not cite the criteria for specific identification of his fish.

Occurrences of snailfish eggs and larvae found in crab peribranchial chambers have been cited four other times for North Pacific waters (Rass, 1950; Vinogradov, 1950). Hunter

Field Note

A Startling Fish

by ED MALISZEWSKI

While deep-water (800 feet) trawling in the Hudson Canyon, (New York Bight) late last winter for ling cod and whiting, our hauls brought up some strange and curious fish that I have never seen in years of fishing the mudhole (180 feet) region.

This one has been identified as the armored sea robin, *Peristedion miniatum*. Its pectoral fins are not as large as the common sea robin found inshore, but its bright red appearance in the catch was startling enough that we put it aside for a closer look when the deck work was done.

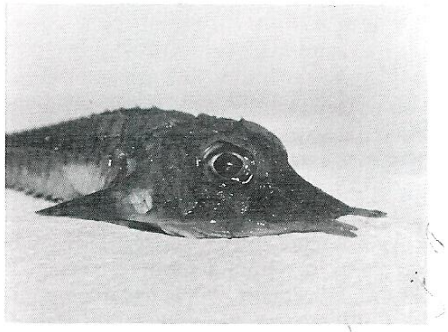


Photo by R. Prall.

Maliszewski is captain of the dragger "Faye Joan" which fishes out of Belford, NJ.

Field Note

Winter Visitor

by SCOTTIE FRANKLIN

The daily visits of this harbor seal, *Phoca vitulina*, at my marina at Avon, NJ, this winter created a local sensation. It sunned itself for several hours nearly every day for three weeks in January, 1989, before moving on. Once common around here, so old-timers tell me, the appearance of one now rates a news item.

Harbor seals feed mainly on fish but will occasionally eat clams and crabs. Although they can dive to 300 feet and stay down 30 minutes, they also will spend spring, summer, and fall in rivers and estuaries. Perhaps the mildness of this winter and the reduced boat traffic of the off-season attracted this one to Shark River Inlet.

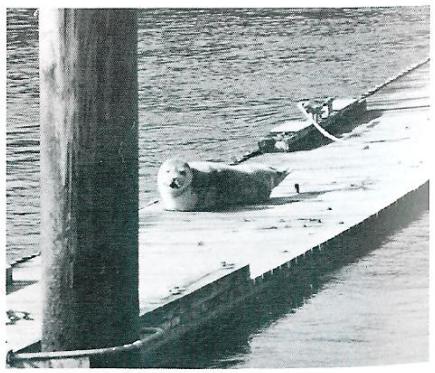


Photo by N. Prall.

An ALS member, Franklin runs a marina in Avon, NJ, and is an active SCUBA diver.

Attitudes

by DAVE GRANT

Coast Issues

Our attitudes about the shore has changed with time. Beaches, especially the barrier islands, were considered worthless stretches of sand by colonial farmers, limited in resources by woodcutters, and too hot or too distant for anyone but fishermen.

Treacherous to live on because of their ever-shifting sands, property lines here usually stretched across barrier islands from ocean to bay. This accommodated the landward push of the sea as it eroded the ocean beach and permitted the usual accretion on the bayside as the barrier islands migrated inland. This process also caused human retreat. When the shoreline shifted and threatened to destroy structures, they were often moved back from the water. There wasn't the will or the means to fight the sea in those days, just the common sense to give the ocean enough of a buffer.

Beginning in the middle 1800's, visiting the shore became fashionable for an increasingly mobile and affluent population. Beachgoers bound for the New Jersey coast crossed the Pine Barrens in trains from Philadelphia. Just as farther north, trains traveled from Boston to Cape Cod. For a dollar, New Yorkers escaped the city heat on steamboats to the shore.

The rich established opulent summer "cottages" in enclaves at some of the most picturesque and geologically stable points along the coast. The middle classes stayed in hotels. And the poor did what they could, living in boarding houses or even as squatters on the shifting sands with the least value. Few stayed past September, and there was little incentive to linger at the shore other than to escape the heat of summer in some civilized manner.

Shrewsbury River house barge. Drawing by S. Draxler.

As Thoreau wrote of Cape Cod in the 1800's, the truly wild beach is a "place unknown to the fashionable world and probably never agreeable to them." It was inevitable, perhaps, that with changes in our view of how the beach was to serve our needs, it had to be tamed.

In the 1950's coastal development accelerated dramatically for several reasons: population growth, transportation improvements, government subsidies to encourage development, and "shore protection" strategies. Even the ocean itself encouraged it.

During the last 40 years most of our population has concentrated within a few hours drive of the shore, and the sea has been unusually kind to the coast, especially in the Mid-Atlantic where the "Great Atlantic Hurricanes" of the 1800's and early 1900's raged. It's not clear why most of the storm tracks have shifted to the Gulf of Mexico, but it is thought they will return to the Atlantic shores someday soon. When that happens, it will bring devastation to people and property unprepared for a hit by a major storm.

The coast is where people now choose

A naturalist and frequent Society field trip leader, Grant teaches natural sciences at Brookdale Community College, Sandy Hook, NJ, campus.

FIELD NOTE

Fishes of the Hudson-Raritan Estuary

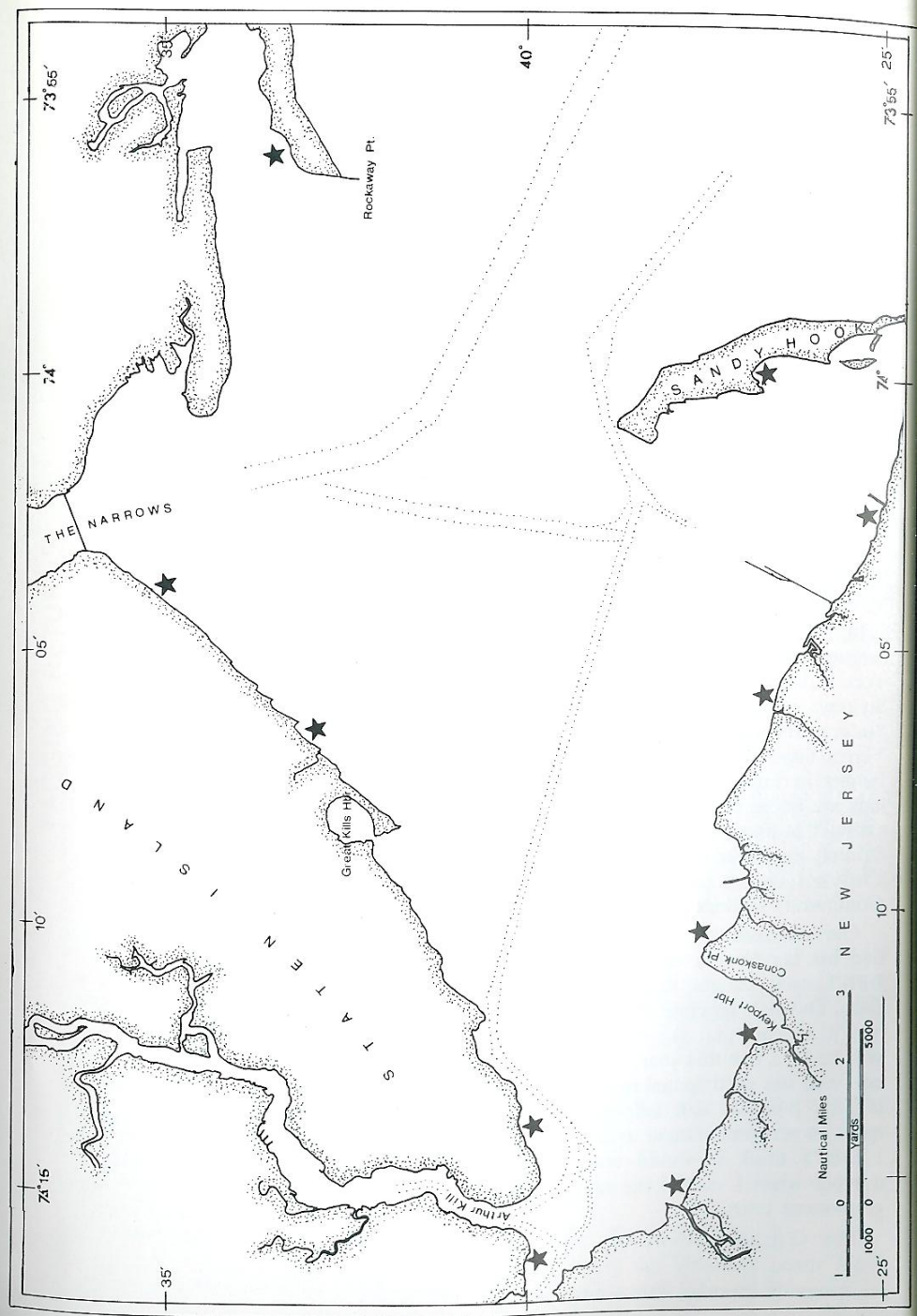
by FRANK STEIMLE

In 1973 volunteer members of the Littoral Society's newly formed New Jersey Chapter initiated a beach seining survey of the littoral fish fauna of the Hudson-Raritan Bay estuary. They sampled various stations around the bay's shore with 40-foot beach seines at bi-weekly intervals from May through October and identified and counted all fish and invertebrates caught. That year's results were published in the UNDERWATER NATURALIST, Vol. 8, No. 3, including more detail about reasons and methods. The results were so encouraging and the participants so enthusiastic that the survey continued in 1974 and 1975.

In 1974, ten teams of seiners were in action, collecting a total of 49 seine hauls. They found 21 species of fish, mostly "bait fish" or juveniles, in their catches. An important bait fish, the Atlantic silverside, was the most abundant and had the widest distribution of the species collected. Other bait fish commonly collected were the bay anchovy, the common killifish, young menhaden, striped killifish, and sand eels. The juvenile food or game fish were snapper bluefish, winter flounder, striped bass, Atlantic tomcod, northern kingfish, common eel, spot, weakfish, and silver perch. Other species collected were northern pipefish, sea herring, three-spine stickleback, Atlantic needlefish, windowpane flounder, and a species of the jack family. The sea herring, striped bass, weakfish, and silver perch were new to our lists.

Last year, seven teams seined the beaches of the Bay, and one team looked at Barnegat Bay (these results are not included in this report) for a total of 52 seine hauls. They found 24 species, most of which were reported in previous years and in approximately the same levels of abundance. Again baitfish dominated the catches, including the Atlantic silverside, bay anchovy, common killifish, striped killifish, juvenile menhaden, sand eels and striped mullet. The juvenile food or game fish included snapper bluefish, winter flounder, common eel, spot, northern kingfish, tautog, northern puffer and jacks. The remaining species were Atlantic needlefish, northern pipefish, three-spine stickleback, toadfish, striped sea robin, northern stargazer, northern barracuda, banded rudderfish and lookdown. The sea robin, stargazer, puffer, barracuda, rudderfish and lookdown were new additions to our list for this year. The complete results of this survey and the previous year's are available for examination at the Littoral Society headquarters at Sandy Hook.

Again these results are encouraging; the Bay is still productive as a juvenile fish nursery ground and as a producer of food — baitfish — for larger fish. Society teams will continue to survey and monitor the Bay again this year as well as expand to look at other estuaries where information on the littoral fish fauna is little known and there is a need to monitor changes in existing fauna. The chapter is ready to welcome new participants; meeting dates have been listed in the chapter's newsletter, and training is available if necessary.



The Hudson-Raritan Bay estuary beach seining locations, 1974 and 1975.

Equipment Needed:

1 - Seine 4' x 40' with bagged center + 2 seine poles 6-7'

1 - Set of keys for identification

1 - Meter stick to measure fish

1 - thermometer

1 - hydrometer to measure water density (salinity)

1 - D. O. kit (Dissolved Oxygen)

1 - tide chart

- Some jars and preservative to fix fish that are difficult to identify in the field
- Pair of deck shoes to protect feet from sharp objects on bottom
- Forms to fill in the data collected

Results:

A survey of a body of water [redacted] will indicate how many fish are present, what kinds, their age, how they are distributed, changes during the season. This can be used as a base line study to be followed up after an environment altering factor is introduced (power plant, sewer, etc.) or to compare with other bodies of water to create an abundance-diversity index of water quality.

12/7/72

A Proposed Survey, by Seining, of the Relative Abundance and Distribution of Estuarine Fish

(to be used as index of pollution or?)

Seining surveys are a good way of estimating the relative abundance and distribution of fish and larger invertebrate (crabs, shrimp, etc.) in shallow estuaries. They are particularly useful in studying juvenile and smaller (bait) fish. These types of surveys can be used as "base-line" studies for a body of water or as a means of monitoring water quality.

Methods:

Delineate specific areas that can be surveyed effectively with available man-power; such as bays, rivers, etc. Sample bi-weekly from May through October. Locate permanent stations where a 50-100 ft. stretch of beach is available. Initiate a program of seminars or workshops for the participants to learn proper methods and to identify the animals collected, using a reference library of fish keys and preserved specimens.

The seining survey will include identifying all species collected, counting them (by portions if large numbers are involved), measuring the size range and determining age (size) groups of each species if possible. It is recommended that a 40-100 ft. seine with a bag in center be used with no larger than 1/4 inch mesh. Chemical and physical data should be collected also: temperature, tide level and direction, salinity, Dissolved Oxygen (if possible) as well as any other information that may be pertinent to the collection such as weather or condition of the fish.