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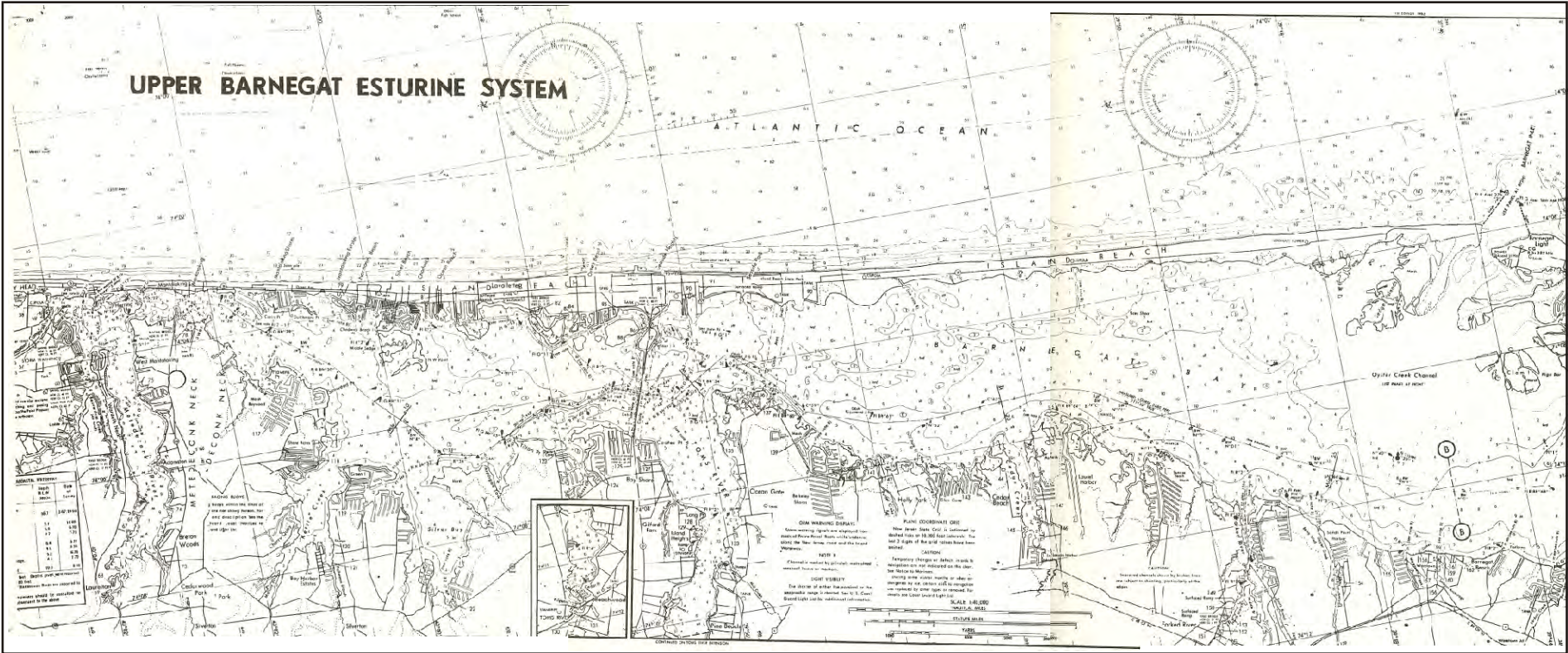


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CHART 1: Map of Survey Area with Sectors and Flight Path Delineated.

PHASE I, FISH STUDIES

John F. McClain, Jr.

ABSTRACT

The purpose of this portion of the project was to inventory the fishes inhabiting the Upper Barnegat System, including Upper Barnegat Bay, the Metedeconk, Toms and Forked Rivers, Kettle, Cedar, and Oyster Creeks, and Silver Bay.

Twelve seine, twenty trawl and a plankton station, distributed throughout the estuary, were sampled monthly from December 1971 through November 1972, conditions permitting.

Forty-nine species of fish, in various stages of their life cycles, were taken. Recorded salinities ranged from <1 ‰ to 29.4 ‰ and water temperatures from 0.0°C. to 31.0° C.

INTRODUCTION

Phase I of Project 3-137-R-2, Inventory of Major Estuarine Systems, consisted of a survey of the fishes of Upper Barnegat Bay, Oyster Creek, Forked River, Cedar Creek, Toms River, Silver Bay, Kettle Creek and the Metedeconk River. See Table 1 for species list and Figure 1 for a map of the area.

ACKNOWLEDGMENTS

Ted Metzger worked full-time on Phase I, as did Harry Bustard for five months. Greg Vennell, John Makai, Russell Tilton and Jeff Carlson assisted in the collection of data at various times. Ottawa Pullen sorted and identified some ichthyoplankton samples.

METHODS AND MATERIALS

Seining was done with a 25-foot bag seine five feet deep. The dimensions are $\frac{1}{2}$ " stretch mesh knotless nylon netting with a bag

of same mesh set in center $5^{\circ} \times 5^{\circ} \times 5^{\circ}$, hung to a single cork line of #192 soft-laid nylon seine twine on top, with a single lead line of #192 soft-laid nylon seine twine on bottom, with a $2\frac{1}{2}^{\circ}$ diameter seine cork every 12° apart on top and a number 10 bullet lead on bottom under each cork.

Trawling was done with a 12-foot semi-balloon trawl. The dimensions are as follows: 12-foot headrope, 14-foot footrope; net made of nylon netting of the following size mesh and thread: 1° stretch mesh #6 thd body, 1° stretch mesh #15 thd codend, inner liner of $\frac{1}{2}^{\circ}$ stretch mesh #63 knotless nylon netting; lead and foot ropes $\frac{3}{8}^{\circ}$ diameter Poly-dac net rope, with legs extended two feet and wire rope thimbles spliced in at each end; six $1\frac{1}{2} \times 2\frac{1}{2}^{\circ}$ Ark sponge floats on headrope, $\frac{1}{8}^{\circ}$ galvanized chain hung loop style on footrope. The doors are 2° by 1° with $2\frac{1}{2}^{\circ}$ steel runners.

The trawl was towed by a 17-foot Boston Whaler for ten minutes with a warp length of 90 feet. Two tows were made at each station under normal conditions.

Ichthyoplankton samples were collected monthly at the surface by towing a one-meter plankton net for 15 minutes.

Data was collected as follows: The catch was speciated, each species was weighed, measured and counted if numbers allowed. Aliquot samples were taken when individual numbers of any species were so great as to make processing the entire catch impractical. The subsamples were counted and weighed and the data adjusted accordingly. Air and surface water temperatures were taken at each station with a pocket thermometer. Water samples were brought back to the laboratory and salinities run on a wide range salinity hydrometer by Ted Metzger.

SEINING RESULTS BY STATION

Tables 2 through 13 show species and numbers taken at each station each month.

Station 1 is a cove on the southern shore near the mouth of Forked River (Fig. 1). The bottom is sand and mud. It was sampled nine times. Recorded water temperatures ranged from 2.0°C. to 26.0°C. and salinities from 14.9 ‰ to 26.2 ‰.

Twelve species were taken. Atlantic silversides ranked first in abundance, followed by the bay anchovy and American sand lance.

Station 2 is a cove on the southern shore near the mouth of Stouts Creek. A blacktop road runs along part of the cove, a peat bank around the rest. The bottom is sand, mud and gravel. It was sampled eleven times. Recorded water temperatures ranged from 2.0°C. to 28.5° C. and salinities from 16.2 ‰ to 23.6 ‰.

Nine species were taken. Atlantic silversides were the most abundant species, followed by tidewater silversides and mummichogs. The most species were taken in November and the most specimens (all Atlantic silversides) in September.

Station 3 is a beach on the southern shore near the mouth of Toms River. The bottom is sand. It was sampled twelve times. Recorded water temperatures ranged from 1.5° C. to 28.0° C. and salinities from 7.6 ‰ to 15.4 ‰.

Eight species were taken. Atlantic silversides again ranked first in abundance, followed by tidewater silversides, bay anchovy and winter flounder. The most species were taken in July and the most specimens in April.

Station 4 is a beach on the southern shore of Toms River at end of Lookout Drive. The bottom is sand, gravel and pieces of black

top from an old road that used to run along the shore. It was sampled twelve times. Recorded water temperatures ranged from 3.0° C. to 26.0° C. and salinities from 4.1 ‰ to 12.0 ‰.

Seven species were taken. The three most abundant species in decreasing order were: tidewater silverside, Atlantic silverside and bay anchovy. The most species were taken in July and the most specimens in October.

Station 5 is located at Shelter Cove on the western shore of the bay. The area is bathing beach during the summer months. The bottom is sand. It was sampled eleven times. Recorded water temperatures ranged from 0.0° C. to 25.0° C. and salinities from 11.7 ‰ to 16.7 ‰.

Nine species were taken at this station. The three most abundant species in decreasing order were: bay anchovy, Atlantic Silversides and tidewater silversides. The most species were taken in May and the most specimens in June.

Station 6 is near Seaweed Point on the western shore of the bay. The bottom is sand, mud and a submerged peat bank. It was sampled eleven times. Recorded water temperatures ranged from 0.0° C. to 26.0° C. and salinities from 12.5 ‰ to 19.1 ‰.

The greatest number of species (15) was taken at this station. The three most abundant species in decreasing order were: bay anchovy, Atlantic silversides and tidewater silversides. The most species were taken in July and the most specimens in June.

Station 7 is located on the southern shore of the Metedeconk River next to the Metedeconk River Yacht Club. The bottom is sand and gravel. It was sampled eleven times. Recorded water temperatures ranged from 2.0° C. to 25.0° C. and salinities from 11.8 ‰ to 19.3 ‰.

Eight species were taken. The three most abundant species in decreasing order were: bay anchovy, Atlantic silverside and tidewater silversides. The most species were taken in May and July and the most specimens in September.

Station 8 is located on the eastern shore of Herring Island. The bottom is sand and mud, usually covered with drifting Ulva. It was sampled five times. Recorded water temperatures ranged from 6.5°C. to 26.5° C. and salinities from 17.6 ‰ to 29.4 ‰.

Eleven species were taken. The three most abundant species in decreasing order were: Atlantic silversides, tidewater silversides, and northern pipefish. The most species were taken in July and the most specimens in August.

Station 9 is on the eastern shore of the bay near the public launching ramp in Lavallette. The bottom is sand with patches of widgeon grass. During the summer months, small pleasure boats are moored in the area. It was sampled twelve times. Recorded water temperatures ranged from 1.0° C. to 29.5° C. and salinities from 7.5 ‰ to 15.6 ‰.

Eleven species were taken. The three most abundant species in decreasing order were: Atlantic silversides, bay anchovy, and tidewater silversides. The most species were taken in September and the most specimens in July.

Station 10 is on the eastern shore of Barnegat Bay in Seaside Heights. The bottom is sand with patches of eel and widgeon grass. It was sampled twelve times. Recorded water temperatures ranged from 2.0° C. to 29.0° C. and salinities from 10.6 ‰ to 17.9 ‰.

Twelve species were captured at this station. Again the three most abundant species in decreasing order were: Atlantic

silversides, bay anchovy and tidewater silversides. The most species were taken in June and the most specimens in August.

Station 11 is on the eastern shore of the bay next to boat ramp in Island Beach State Park. The bottom is sand with patches of eel grass. It was sampled ten times. Recorded water temperatures ranged from 0.0° C. to 26.0° C. and salinities from 15.0 ‰ to 24.8 ‰.

Thirteen species were taken. The three most abundant species in decreasing order were: Atlantic silversides, fourspine stickleback, and mummichog. The most species and the most specimens were taken in June.

Station 12 is on the eastern bay shore about six miles from Island Beach State Park entrance. The bottom is sand with patches of eel grass. It was sampled twelve times. Recorded water temperatures ranged from 2.0° C. to 25.5° C. and salinities from 10.6 ‰ to 27.2 ‰.

Fourteen species were taken. The most abundant being the Atlantic silverside, followed by the fourspine stickleback and the mummichog. The most species were taken in August and the most specimens in June.

DISCUSSION

Twenty-seven species were taken seining during the sampling year. A list of species and the stations at which they were taken is given in Table 14. The ten most abundant species are discussed below (Table 14). They constituted 97.6% of the catch.

The most abundant species was the Atlantic silverside -- 57% of the total catch. They were taken every month and also appeared at each station sometime during the sampling year. The bay

stations accounted for 63% of the Atlantic silversides. They were most common in the summer peaking in August.

Second in abundance was the bay anchovy making up 21% of the total catch. They were taken May through September and appeared at nine of the twelve seine stations.

Tidewater silversides ranked third, constituting 14% of the catch. They were taken every month reaching a peak in October. During the year they appeared at eleven of the twelve seine stations, Station 1 being the exception. These three species constituted 92% of the total catch.

The mummichog ranked fourth. They were taken in December and again May through November, peaking in June. They appeared at all stations except Station 4.

Fifth was the winter flounder. They were taken seven of twelve months during the year and appeared at nine of twelve stations.

The northern pipefish ranked sixth in abundance. They were taken April through November and appeared at all stations except Station 4. This station is located in the upper part of Toms River and had the lowest salinities, ranging from < 1 ‰ to 12 ‰.

The sheepshead minnow was seventh in abundance. They were taken in June, July, October and November and appeared at six stations.

Bluefish ranked eighth. They were taken in June, July and August and at nine stations. All specimens taken were juveniles.

Silver perch ranked ninth. They were taken in August, September and October and at Stations 1, 6 and 12. Salinities ranged from 15.0 ‰ to 25.7 ‰.

The striped killifish ranked tenth in abundance. They were taken in January, August, September and November and appeared only

at Stations 10, 11 and 12. These three stations are located on the eastern shore of the bay. The water was very shallow with patches of eel and widgeon grass on the bottom.

TRAWLING RESULTS BY STATION

Station 1 is located off Oyster Creek between nun buoy "E1" and nun buoy "66". The depth averages eight feet at mean low water and the bottom is hard mud. It was sampled eleven times. Recorded water temperatures ranged from 4.0° C. to 26.0° C. and salinities from 12.2 ‰ to 24.8 ‰.

Ten species were taken, the most abundant being the bay anchovy. The fourspine stickleback was second, followed by the winter flounder. The most species were taken in February and November and the most specimens in October. This station accounted for 14.9% of the total catch, higher than any other.

Station 2 is located just north of the mouth of Forked River in the bay. The depth averages five feet at mean low water and the bottom is hard mud. It was sampled ten times. Recorded water temperatures ranged from 0° C. to 26.0° C. and salinities from 18.4 ‰ to 23.8 ‰.

Twelve species were taken. The bay anchovy was the most abundant, followed by the Atlantic silverside and the fourspine stickleback. The most species were taken in November and the most specimens in October. Station 2 ranked third in number of specimens accounting for 11.8% of the total catch.

Station 3 is located west of buoy "53" off Cedar Creek in the bay. The depth averages eight feet at mean low water. The bottom is firm. It was sampled eleven times. Recorded water temperatures ranged from 2.5° C. to 27.5° C. and salinities from 15.1 ‰

to 20.4 ‰.

Nine species were taken. The bay anchovy ranked first, followed by the winter flounder and northern pipefish. The most species were taken in October and the most specimens in November. Station 3 accounted for 2.2% of the catch.

Station 4 is located north of Goodluck Point parallel to the shore near Fl.G "1". Depth averages five feet at mean low water, bottom is firm. It was sampled eleven times. Recorded water temperatures ranged from 3.0° C. to 29.5° C. and salinities from 8.6 ‰ to 16.4 ‰.

Fifteen species were taken. Bay anchovy ranked first making up 94% of the catch at this station. Winter flounder ranked second. The most species were taken in May and the most specimens in September (all bay anchovy). Station 4 accounted for 9.4% of the total catch.

Station 5 is located in the bay off Green Island between the shore and BW nun buoy "B". Depth at mean low water averages six feet and the bottom is firm. It was sampled ten times. Recorded water temperatures ranged from 4.5° C. to 29.0° C. and salinities from 13.4 ‰ to 17.6 ‰.

Ten species were taken. The bay anchovy and the winter flounder ranked first and second in abundance. The most species and the most specimens were taken in August. Station 5 accounted for 2.6% of the catch.

Station 6 is located in upper Barnegat Bay off Mantoloking, near Fl. G. "25". Depth averages seven feet at mean low water and the bottom is firm. It was sampled eight times. Recorded water temperatures ranged from 6.0° C. to 24.5° C. and salinities from 13.6 ‰ to 23.4 ‰.

Fifteen species were taken. First in abundance was the bay anchovy, followed by the northern pipefish and the Atlantic silverside. The most species were taken in May and the most specimens in June. This station accounted for 3.2% of the total catch.

Station 7 is located on the eastern side of the bay off Lavallette beginning at Fl. G "13". Depth averages five feet at mean low water and the bottom is hard. It was sampled ten times. The recorded water temperatures ranged from 4.0° C. to 24.0° C. and salinities from 11.6 ‰ to 17.3 ‰.

Seventeen species were taken. The bay anchovy and winter flounder ranked first and second. The most species were taken in July and October, the most specimens in October. The station accounted for 2.7% of the total catch.

Station 8 is located on the eastern side of the bay off Seaside Park near Fl. G. "1". Depth averages six feet at mean low water and the bottom is soft. It was sampled nine times. Recorded water temperatures ranged from 4.0° C. to 29.5° C. and salinities from 11.8 ‰ to 18.5 ‰.

Eleven species were taken. The bay anchovy ranked first followed by the fourspine stickleback and the winter flounder. The most species were taken in December and October, the most specimens in July. Station 8 accounted for 1% of the catch.

Station 9 is located on the eastern side of the bay off the boat ramp at Island Beach State Park. Depth at mean low water averages three to four feet and the bottom is firm. It was sampled eleven times. Recorded water temperatures ranged from 3.5° C. to 23.0° C. and salinities from 16.4 ‰ to 21.3 ‰.

Fifteen species were taken. The top three species in order of abundance were the Atlantic silverside, the fourspine stickleback

and the winter flounder. The most species were taken in May and the most specimens in October. Four percent of the total catch was taken at this station.

Station 10 is located on the eastern side of the bay off Island Beach State Park near Fl. "2". Depth at mean low water averages four feet and the bottom is firm. It was sampled eleven times. Recorded water temperatures ranged from 3.0° C. to 24.0° C. and salinities from 16.3 ‰ to 21.9 ‰.

The greatest number of species (23) were recorded at this station. The top three species in decreasing order of abundance were the Atlantic silverside, the bay anchovy and the fourspine stickleback. Four species were taken only at this station: the Cornetfish, the rainwater fish, the sennet and the squirrel hake. The most species were taken in May and the most specimens in August. This station accounted for 4.5% of the total catch.

Station 11 is located in Oyster Creek from the mouth to the first lagoon. Depth at mean low water averages around eleven feet. The bottom is firm. It was sampled eight times. It was dropped after August because of overlap with Station 12, both in species and ground covered. Recorded water temperatures ranged from 10.0° C. to 30.0° C. and salinities from 14.6 ‰ to 22.2 ‰.

Eleven species were taken. The bay anchovy was first in abundance followed by the winter flounder and the blueback. The most species were taken in March and the most specimens in April. The station accounted for 1.2% of the total catch.

Station 12 is located in Oyster Creek and runs from the first marina below Route 9 to the lagoons. Depth at mean low water averages eight feet and the bottom is soft mud and stumps. It was sampled eleven times. Recorded water temperatures ranged from 12.0°C.

to 29.5° C. and salinities from 13.7 ‰ to 22.5 ‰.

This station ranked second in number of species taken (18). The bay anchovy was most abundant, followed by the Atlantic silver-side and the winter flounder. The most species were taken in December and November and the most specimens in July. Station 12 accounted for 1.5% of the total catch.

Jersey Central Power and Light Company operates a nuclear plant on the west side of Route 9 between the Forked River and Oyster Creek. The plant takes water from the south branch of the Forked River for cooling purposes and discharges the heated effluent into Oyster Creek. This explains the high water temperatures recorded in the Creek at Stations 11 and 12 during the winter months and is probably the reason for the presence of the northern porgy in December's catch.

Station 13 is located near the mouth of Forked River from Fl. R "12" to Fl. "19". The depth at mean low water averages five feet and the bottom is hard. It was sampled ten times. Recorded water temperatures ranged from 5.0° C. to 25.0° C. and salinities from 18.3 ‰ to 25.1 ‰.

Seventeen species were taken. Bay anchovy was the most abundant making up 90% of the catch. The winter flounder was a distant second with 3.4% of the catch. Five striped anchovies were taken in September and one windowpane flounder in November. These species were taken only at this Station during these months. The most species were taken in November and the most specimens in September. This station accounted for 3.5% of the catch.

Station 14 is located in the south branch of Forked River from Beach Boulevard bridge to Route 9 bridge. Depth at mean low water averages eight feet. The bottom is soft mud and stumps. It

was sampled ten times. Recorded water temperatures ranged from 5.0° C. to 25.0° C. and salinities from 16.7 ‰ to 24.3 ‰.

Fourteen species were taken. Winter flounder ranked first in abundance followed by the Atlantic silverside and the fourspine stickleback. The most species and the most specimens were taken in March.

Station 15 is located in Cedar Creek. Depth at mean low water averages three feet. Bottom is mud and stumps. It was sampled ten times. Recorded water temperatures ranged from 4.0° C. and 24.5° C. and salinities from 1.6 ‰ to 19.3 ‰.

Twelve species were taken. The bay anchovy ranked first making up 95% of the catch, followed by the Atlantic silverside (3%). The most species were taken in July and the most specimens in September. This station ranked fourth in number of fish taken, accounting for 11.7% of the total catch.

Station 16 is located in the upper Toms River, running east from Fl. R "4". Depth at mean low water averages six feet and the bottom is firm. It was sampled ten times. Recorded water temperatures ranged from 4.0° C. to 27.0° C. and salinities from < 1 ‰ to 14.8 ‰.

Nine species were taken. The bay anchovy made up 98% of the catch. The most species were taken in July and the most specimens in September. Station 16 ranked second with 13.8% of the total catch.

Station 17 is located in Silver Bay, running east from Silver Bay Marina. Depth averages three feet at mean low water. Bottom soft with stumps, branches and leaves. It was sampled ten times. Recorded water temperatures ranged from 6.0° C. to 25.0° C. and salinities from 10.3 ‰ to 17.0 ‰.

Seventeen species were taken. The bay anchovy ranked first followed by the winter flounder and the tidewater silverside. The most species were taken in October and the most specimens in September. This station accounted for 8.1% of the catch.

Station 18 is located in Kettle Creek running east. Depth at mean low water averages three feet. Bottom is soft and covered with detritus. It was sampled ten times. Recorded water temperatures ranged from 7.0° C. to 31.0° C. and salinities 4.4 ‰ to 19.1 ‰.

Sixteen species were taken. Again the bay anchovy ranked first in abundance followed by the tidewater silverside and the winter flounder. Two species, the banded killifish and the pumpkinseed, appeared only at this station and only in November. The salinity was 9.4 ‰ and the tide was extremely low due to a strong northwest wind. The most species were taken in October and the most specimens in August. This station accounted for 2.2% of the catch.

Station 19 is located in the lower Metedeconk River off West Mantoloking near Fl. G "2". Depth at mean low water averages six feet and the bottom is firm. This station was difficult to sample due to the great amount of Ulva usually present. It was sampled eight times. Recorded water temperatures ranged from 6.0° C. to 25.0° C. and salinities from 6.2 ‰ to 26.8 ‰.

Twelve species were taken. The bay anchovy ranked first followed by the silver perch and the winter flounder. The most species and specimens were taken in May.

Station 20 is located in the upper Metedeconk River off Breton Woods. Depth averages six feet at mean low water and the bottom is soft with a lot of detritus. It was sampled seven times. Recorded water temperatures ranged from 6.0° C. to 25.5° C. and

salinities from 10.0 ‰ to 17.9 ‰.

Seven species were taken. The Atlantic silverside ranked first, followed by the winter flounder and the American eel. The most species and specimens were taken in November.

DISCUSSION

Forty-six species were taken in the trawl during the sampling year (Table 49). Thirty-nine of these were taken at the ten bay stations (1 to 10). These stations also accounted for 56.3% of the total catch. The other ten stations (11 to 20) made up 43.7% of the catch. Thirty-four species were taken at these stations.

A list of the ten most abundant species is given in Table 65. They made up 98.5 % of the total catch. Following is a short discussion of each of these species.

The bay anchovy ranked first in abundance, making up 81% of the total catch. They were taken March through November in increasing numbers, peaking in September and then dropping off. The species was taken at all 20 trawl stations. The non-bay stations accounted for 47% of the anchovies taken. In the bay itself, 47% were taken at the five stations on the western side and 6% at the five stations on the eastern side.

The Atlantic silverside ranked second. They were taken in all sampling months, being most abundant May through October. The species appeared at all trawl stations. The bay stations accounted for 79% of all silversides, 15% of these were taken at the five western stations and 64% at the five eastern stations.

Third ranked was the winter flounder. They were taken in all sampling months. The most specimens were taken in April. The species was taken at all stations. The bay stations accounted for

64% of the catch, 32% from each side. Of the non-bay stations, Kettle Creek and Silver Bay accounted for 17% of the flounders taken.

The fourspine stickleback ranked fourth. They were taken every month. They appeared at 16 stations overall and at nine of the bay stations. Seventy-eight percent were taken at the five eastern bay stations. No sticklebacks were taken at bay Station 5 nor at Stations 11, 17 and 18.

The northern pipefish ranked fifth. They were taken every sampling month except February. They were most abundant May through August. Pipefish appeared at 14 stations. Stations 6 through 10 (east side of the bay) accounted for 85% of the pipefish taken and Stations 1 through 4 (west side of the bay) for only 10%.

Silver perch ranked sixth. Most fish taken were juveniles. They appeared August through November, the greatest number being taken in October. The species was taken at ten stations, seven bay and three non-bay. Sixty-four percent were taken in the bay, 56% on the eastern side and 8% on the west.

The American eel ranked seventh. It was taken May through November, peaking in July. Eels appeared at 18 stations, they were absent from Stations 2 and 13. The bay stations accounted for 55% of the catch, 48% on the eastern side and 8% on the western. Seventeen percent of the total catch was taken at Station 18 in Kettle Creek.

Tidewater silversides ranked eighth. They were taken only in October at Stations 17 and 18. This species is common near shore and in shallow flats; it ranked third in abundance in seining. Its

presence in the trawl at these stations may be due to their shallowness, about three feet.

The blueback ranked ninth. They were taken February through July and again in November, reaching a peak in April. The species appeared at seven of 20 trawl stations. The non-bay stations accounted for 66% of the catch.

The oyster toadfish ranked tenth in abundance. They were taken March through November, peaking in May. It appeared at five bay (51%) and six non-bay (49%) stations. Of the 51% taken in the bay, all but one specimen were taken at the five eastern stations. Thirty percent of those taken at non-bay stations were taken at Station 14.

COMBINED RESULTS

Forty-nine species were taken in the system; 22 species trawling, 4 species seining and 23 species common to both (Table 1). A list of the ten most abundant species overall, the number of stations at which they appeared and the months they were taken will be found in Table 63.

Plankton samples were collected at a station in the bay across from the inlet monthly for seven months. Sorting and identification of the samples has not been completed.

SUMMARY

The finfish population of the Upper Barnegat System was sampled from December 1971 through November 1972, utilizing a 25' x 5' bag seine, a 12' semi-balloon trawl and one-meter plankton nets. Seine and trawl stations were located in the Upper Barnegat Bay and its associated rivers and creeks. Plankton sampling was done in the

bay.

Seven seine and ten trawl stations were sampled in Upper Barnegat Bay. Twenty-four species and 5000+ specimens were taken seining. Thirty-nine species totalling 11,000+ specimens were taken in the trawl. Recorded salinities ranged from 7.5 ‰ to 29.4 ‰ and water temperatures from 0.0° C. to 29.5° C.

Two trawl stations were sampled in Oyster Creek. Eighteen species numbering 540+ specimens were taken. Recorded salinities ranged from 13.7 ‰ to 22.5 ‰ and water temperatures from 10.0°C. to 30.0° C.

One seine and two trawl stations were sampled in Forked River. Twelve species and 310+ specimens were taken seining. Twenty-two species totalling 840+ specimens were taken in the trawl. Recorded salinities ranged from 14.9 ‰ to 26.2 ‰ and water temperatures from 2.0° C. to 26.0° C.

One seine station was located at the mouth of Stout's Creek. Nine species totalling 905 specimens were taken. Recorded salinities ranged from 16.2 ‰ to 23.6 ‰ and water temperatures from 2.0° C. to 28.5° C.

A trawl station was located in Cedar Creek. Twelve species totalling 2200+ specimens were taken. Recorded salinities ranged from 2.9 ‰ to 19.3 ‰ and water temperatures from 4.0° C. to 25.5° C.

One trawl and two seine stations were sampled in the Toms River. Nine species totalling 2700+ specimens were taken trawling. Ten species numbering 1150+ specimens were taken seining. Recorded salinities ranged from < 1 ‰ to 15.4 ‰ and water temperatures from 1.5° C. to 28.0° C.

One trawl station was sampled in Silver Bay. Seventeen species totalling 1600+ specimens were taken. Recorded salinities

ranged from < 1 ‰ to 14.8 ‰ and water temperatures from 6.0° C. to 25.0° C.

One trawl station was located in Kettle Creek. Sixteen species totalling 446 specimens were taken. Recorded salinities ranged from 4.4 ‰ to 19.1 ‰ and water temperatures from 7.0° C. to 31.0° C.

One seine and two trawl stations were sampled in the Metedeconk River. Eight species totalling 1350 specimens were taken seining and thirteen species numbering 191 specimens were taken trawling. Recorded salinities ranged from 6.2 ‰ to 26.8 ‰ and temperatures from 2.0° C. to 25.5° C.

Altogether 49 species numbering 28,900+ specimens were taken during the sampling year. Recorded salinities ranged from < 1 ‰ to 29.4 ‰ and water temperatures from 0.0° C. to 31.0° C.

References

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- Bigelow, H. B. and Schroeder, W. C. 1953. Fishes of The Gulf of Maine. Fishery Bulletin of The Fish and Wildlife Service Volume 53. 577 pp.
- Breder, C. M. 1948. Field Book of Marine Fishes of The Atlantic Coast. G. P. Putnam's Sons. New York and London. 332 pp.

TABLE 1. List of species taken in the upper Barnegat system from December 1971 through November 1972.

	Seine	Trawl	Both
Alewife, <u>Alosa pseudoharengus</u>		X	
American eel, <u>Anguilla rostrata</u>			X
American sand lance, <u>Ammodytes americanus</u>			X
Atlantic herring, <u>Clupea harengus harengus</u>		X	
Atlantic menhaden, <u>Brevoortia tyrannus</u>			X
Atlantic needlefish, <u>Strongyliura marina</u>			X
Atlantic silverside, <u>Menidia menidia</u>			X
Banded killifish, <u>Fundulus diaphanus</u>		X	
Bay anchovy, <u>Anchoa mitchilli</u>			X
Blueback, <u>Alosa aestivalis</u>			X
Bluefish, <u>Pomatomus saltatrix</u>			X
Butterfish, <u>Poronotus triacanthus</u>		X	
Cornetfish, <u>Fistularia tabacaria</u>		X	
Crevalle jack, <u>Caranx hippos</u>		X	
Cunner, <u>Tautoglabrus adspersus</u>		X	
Fourspine stickleback, <u>Apeltus quadracus</u>			X
Grubby, <u>Myoxocephalus aeneus</u>		X	
Hogchoker, <u>Trineotes maculatus</u>		X	
Mummichog, <u>Fundulus heteroclitus</u>			X
Naked goby, <u>Gobiosoma boscii</u>			X
Northern kingfish, <u>Menticirrhus saxatilis</u>	X		
Northern pipefish, <u>Syngnathus fuscus</u>			X
Northern puffer, <u>Sphaeroides maculatus</u>		X	
Northern Sennet, <u>Sphyraena borealis</u>		X	
Oyster toadfish, <u>Opsanus tau</u>			X
Pollock, <u>Pollochiu virens</u>			X
Pumpkinseed, <u>Lepomis gibbosus</u>		X	
Scup, <u>Stenotomus chrysops</u>		X	
Sheepshead minnow, <u>Cyprinodon variegatus</u>			X
Silver hake, <u>Merluccius bilinearis</u>		X	
Silver perch, <u>Bairdiella chrysura</u>			X
Smallmouth flounder, <u>Etropus microstomus</u>		X	
Spotfin butterfly fish, <u>Chaetodon ocellatus</u>	X		
Spotted hake, <u>Urophycis rostratus</u>		X	
Spotted seahorse, <u>Hippocampus erectus</u>			X
Squirrel hake, <u>Urophycis chuss</u>		X	
Striped anchovy, <u>Anchoa hepsetus</u>		X	
Striped bass, <u>Morone morone</u>		X	
Striped blenny, <u>Chasmodes bosquianus</u>		X	
Striped killifish, <u>Fundulus majalis</u>	X		
Summer flounder, <u>Paralichthys dentatus</u>			X
Tautog, <u>Tautoga onitis</u>		X	
Threespine stickleback, <u>Gasterosteus aculeatus</u>			X
Tidewater silverside, <u>Menidia beryllina</u>			X
Weakfish, <u>Cynoscion regalis</u>			X
White mullet, <u>Mugil curema</u>	X		
White perch, <u>Morone americana</u>			X
Windowpane, <u>Scophthalmus aquosus</u>		X	
Winter flounder, <u>Pseudopleuronectes americanus</u>			X

TABLE 2. Number of fishes taken by seine at Station 1 in Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day		20	7		5	5	13		24	27	3	13	
Hour		1430- 1500	1015- 1040		1000- 1020	1100- 1120	1015- 1040		0845- 0910	1145- 1220	1240- 1305	1025- 1045	
Sal.(‰)		14.9	20.4		21.8	20.7	23.7		24.3	26.2	22.0	17.3	
Temp.(°C) H ₂ O		2.0	2.0		9.0	13.8	18.0		16.0	14.0	14.0	10.0	
Temp.(°C) Air		5.0	0.0		11.0	11.6	19.0		23.5	26.0	10.0	14.5	
American eel		-	-		-	-	-		1	-	-	1	2
American sand lance		-	-		-	8	-		-	-	-	-	8
Atlantic silversides		1	19		-	44	4		11	100	4	90	273
Atlantic needlefish		-	-		-	-	-		1	-	-	-	1
Bay anchovy		-	-		-	-	6		9	-	-	-	15
Common butterfly fish		-	-		-	-	-		-	-	-	1	1
Fourspine stickleback		-	-		-	-	-		-	-	1	4	5
Mummichog		-	-		-	-	-		1	1	1	-	3
Northern kingfish		-	-		-	-	-		1	-	-	-	1
Northern pipefish		-	-		-	-	-		-	-	2	3	5
Oyster toadfish		-	-		-	-	-		1	-	-	-	1
Silver perch		-	-		-	-	-		-	-	4	-	4
Station total		1	19		0	52	10		25	101	12	99	319

No Sample

No Sample

No Sample

22

TABLE 3. Number of fishes taken by seine at Station 2 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Speci Total
Day		6	7	10	5	5	13	21	21	13	17	13	
Hour		1415- 1445	1115- 1135	1230- 1250	1040- 1110	1140- 1205	1100- 1120		1015- 1040	1030- 1055	1015- 1045	1025- 1045	
Sal. (‰)		20.4	-	16.2	21.1	20.4	22.2	19.8	21.7	23.6	20.9	17.3	
Temp. (°C) H ₂ O		3.0	2.0	2.0	9.0	14.4	18.5	28.5	24.5	20.5	13.0	10.0	
Temp. (°C) Air		-2.0	0.0	-1.0	10.0	12.2	18.0	30.0	26.0	22.0	20.0	14.5	
Atlantic silverside		-	-	-	-	5	2	75	40	290	170	8	590
Bluefish		-	-	-	-	-	-	-	3	-	-	-	3
Fourspine stickleback		-	1	-	-	-	-	-	-	-	-	1	2
Mummichog		-	-	-	-	-	-	-	-	-	-	16	16
Northern pipefish		-	-	-	1	1	-	-	-	-	-	3	5
Sheepshead		-	-	-	-	-	-	-	-	-	-	2	2
minnow		-	-	-	-	-	-	-	-	-	-	-	-
Threespine stickleback		1	-	-	-	-	-	-	-	-	-	-	1
Tidewater silversides		-	2	2	2	-	2	-	-	-	52	220	280
Winter flounder		-	-	-	2	-	4	-	-	-	-	-	6
Total		1	3	2	5	5	8	75	43	290	222	250	905

TABLE 4. Number of fishes taken by seine at Station 3 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Speci. Total
Day	16	6	17	2	5	5	13	21	21	12	17	13	
Hour	1130-1200	1245-1315	1130-1200	1430-1500	1200-1225	1330-1355	1245-1310		1210-1235	1115-1135	1115-1145	1140-1205	
Sal. (‰)	9.2	7.6	10.6	14.4	12.2	9.9	11.2	8.4	12.0	15.4	15.0	5.2	
Temp. (°C.) H ₂ O	8.0	1.5	3.0	7.0	9.0	14.5	19.0	28.0	24.0	20.5	13.0	10.0	
Temp. (°C.) Air	17.0	-2.0	3.0	16.0	11.0	14.5	22.0	28.0	25.0	25.0	21.0	12.5	
Atlantic silverside	1	-	-	2	140	28	-	5	13	115	3	1	308
Bay anchovy	-	-	-	-	-	-	10	-	-	2	-	-	12
Blueback	-	-	-	-	1	-	-	-	-	-	-	-	1
Bluefish	-	-	-	-	-	-	-	6	-	-	-	-	6
Mummichog	3	-	-	-	-	-	-	4	-	-	-	-	7
Northern pipefish	-	-	-	-	-	-	-	-	-	-	1	-	1
Tidewater silverside	-	-	-	1	24	8	-	6	-	-	7	28	74
Winter flounder	-	-	-	-	-	-	1	11	-	-	-	-	12
Total	4	0	0	3	165	36	11	32	13	117	11	29	421

TABLE 5. Number of fishes taken by seine at Station 4 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	13	6	7	1	5	5	13	21	21	12	17	13	
Hour	1145-1215	1130-1205	1300-1320	1330-1400	1130-1155	1300-1325	1200-1220		1130-1155	1150-1210	1200-1225	1230-1300	
Sal. (‰)	7.8	5.8	<1.	8.8	4.8	6.0	6.8	41.	3.2	7.5	12.0	2.4	
Temp. (°C.) H ₂ O	8.0	3.0	3.0	7.0	10.0	14.5	20.0	26.0	24.5	23.0	16.0	10.5	
Temp. (°C.) Air	13.0	-3.0	-1.0	24.0	15.0	15.0	19.0	28.0	26.0	25.5	23.0	13.0	
American eel	1	-	-	-	-	-	-	1	-	-	-	1	3
Atlantic silversides	-	-	-	-	-	-	-	-	1	-	120	-	121
Bay anchovy	-	-	-	-	-	-	20	-	-	-	-	-	20
Bluefish	-	-	-	-	-	-	-	1	1	-	-	-	2
Mummichog	1	-	-	-	-	-	-	5	-	-	1	-	7
Tidewater silverside	2	-	-	-	-	-	8	16	-	-	550	-	576
White perch	-	-	-	-	-	-	2	5	-	-	-	-	7
Total	4	0	0	0	0	0	30	28	2	0	671	1	736

TABLE 6. Number of fishes taken by seine at Station 5 in the Upper Barnegat Bay System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day		11	22	2	5	8	15	12	29	13	18	16	
Hour		1100- 1130	1100- 1125	1330- 1400	1245- 1315	1045- 1110	1045- 1115	0910- 0935	0915- 0940	1115- 1140	1020- 1045	1025- 1055	
Sal. (‰)		13.8	16.2	15.3	14.3	12.8	13.6	11.7	13.6	16.7	16.2	15.4	
Temp.(°C.) H ₂ O		4.0	0.0	7.0	9.0	14.5	20.0	15.0	14.5	10.0	12.0	8.0	
Temp.(°C.) Air		11.0	5.0	15.0	9.0	11.7	19.0	28.0	24.5	22.0	9.0	4.0	
Atlantic menhaden		-	-	-	-	-	1	-	-	-	-	-	1
Atlantic silverside		-	1	-	1	4	4	14	45	9	2	12	92
Bay anchovy		-	-	-	-	-	80	65	-	8	-	-	153
Bluefish		-	-	-	-	-	-	1	-	-	-	-	1
Fourspine stickleback		-	-	-	-	1	-	-	-	-	-	-	1
Northern pipefish		-	-	-	-	1	-	-	-	-	-	-	1
Sheepshead		-	-	-	-	-	-	-	-	-	-	-	1
minnow		-	-	-	-	-	-	-	-	-	-	1	1
Tidewater silverside		-	-	-	3	4	-	-	-	-	27	28	62
White mullet		-	-	-	-	-	-	-	4	-	-	-	4
Total		0	1	0	4	10	85	80	49	17	29	41	316

TABLE 7. Number of fishes taken by seine at Station 6 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day		22	22	1	20	8	1	12	29	13	18	16	
Hour		1210- 1230	1210- 1230	1030- 1055	1200- 1225	1145- 1210	1200- 1230	1000- 1025	1000- 1025	1200- 1220	1110- 1135	1125- 1145	
Sal. (‰)		19.1	19.1	16.6	14.8	12.9	13.0	12.5	15.0	17.4	17.8	18.4	
Temp. (°C) H ₂ O		0.0	0.0	5.0	10.0	14.5	22.0	26.0	25.0	20.0	12.0	8.5	
Temp. (°C.) Air		1.0	1.0	16.0	13.0	13.0	20.0	28.0	28.0	22.0	12.5	4.0	
American eel	No Sample	-	-	-	-	-	-	1	-	-	-	-	1
Atlantic needlefish		-	-	-	-	-	-	1	1	-	-	-	2
Atlantic silverside		-	-	-	3	2	4	8	50	50	20	-	137
Bay anchovy		-	-	-	-	33	105	50	7	-	-	-	195
Blueback		-	-	-	-	-	1	-	-	-	-	-	1
Bluefish		-	-	-	-	-	2	1	1	-	-	-	4
Fourspine stickleback		-	-	-	-	1	1	2	-	-	-	-	4
Mummichog		-	-	-	-	3	3	1	-	-	-	-	7
No. pipefish		-	-	-	-	2	-	10	-	-	1	-	13
Pollock		-	-	-	-	1	-	-	-	-	-	-	1
Sheepshead minnow		-	-	-	-	-	-	-	-	-	1	-	1
Silver perch		-	-	-	-	-	-	-	11	5	-	-	16
Tidewater silverside		1	-	-	3	-	7	-	-	-	30	-	41
Weakfish		-	-	-	-	-	-	-	-	-	-	-	0
Winter flounder		-	-	-	-	-	1	9	1	-	-	-	11
Total		1	0	0	6	42	124	83	71	55	52	0	434

TABLE 8. Number of fishes taken by seine at Station 7 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	23	7		1	6	8	15	12	29	15	18	16	
Hour	1200- 1230	1010- 1035		1115- 1145	1230- 1300	1220- 1245	1145- 1210	1035- 1100	1030- 1055	1030- 1050	1140- 1205	1155- 1215	
Sal. (‰)	16.6	16.2		16.1	19.3	12.4	17.5	13.0	17.3	20.9	17.2	11.8	
Temp. (°C.) H ₂ O	2.0	2.0		6.0	8.5	15.0	19.0	25.0	24.5	21.0	18.0	8.0	
Temp. (°C.) Air	3.0	1.0		16.0	14.0	11.0	20.5	28.0	25.0	22.0	9.0	6.0	
Atlantic silverside	-	-	No Sample	79	-	18	75	8	2	12	-	-	194
Bay anchovy	-	-		-	-	-	65	65	4	1000*	-	-	1134
Mummichog	-	-		-	-	3	-	1	-	-	-	-	4
Northern pipefish	-	-		-	-	1	-	-	-	-	-	-	1
Threespine stickleback	-	-		1	-	-	-	-	-	-	-	-	1
Tidewater silverside	-	-	No Sample	2	-	1	-	-	-	-	6	2	11
White mullet	-	-		-	-	-	-	-	-	1	-	-	1
Winter flounder	-	-		-	-	-	-	4	-	-	-	-	4
Total	0	0		82	0	23	140	78	6	1013	6	2	1350

* Estimated

TABLE 9. Number of fishes taken by seine at Station 8 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day				29			28	27	30	29			
Hour				1215-			1130-		1010-	1400-			
				1245			1200		1055	1430			
Sal. (‰)				20.6			22.4	17.6	18.1	29.4			
Temp. (°C.) H ₂ O				6.5			23.0	26.5	25.0	19.0			
Temp. (°C.) Air				6.0			21.5	21.0	25.0	21.0			
Atlantic silversides				1			-	10	200	2			213
Bay anchovy				-			5	-	-	-			5
Bluefish				-			-	6	-	-			6
Mummichog				-			-	1	-	-			1
Northern kingfish	Sample	Sample		-	Sample		-	-	6	-			6
Northern pipefish			Sample	-		Sample	-	-	6	1	Sample		18
Spotted seahorse				-			-	1	-	-			1
Summer flounder				-			1	-	-	-			1
Threespine stickleback	No	No	No	-	No	No	-	3	-	-	No	No	3
Tidewater silverside				-			-	-	-	23			23
Winter flounder				-			4	-	-	-			4
Total				1			10	32	212	26			281

TABLE 10. Number of fishes taken by seine at Station 9 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	23	7	14	1	6	8	15	27	30	15	18	16	
Hour	1100- 1130	1100- 1130	1110- 1130	1200- 1230	1200- 1230	1300- 1320	1230- 1300		0920- 0950	1130- 1150	1215- 1245	1230- 1255	
Sal. (‰)	12.6	12.4	7.5	14.2	13.7	12.6	12.9	10.6	13.9	15.4	15.6	15.1	
Temp. (°C.) H ₂ O	1.0	2.0	1.0	7.0	11.5	21.0	21.0	29.5	25.0	21.0	12.0	8.0	
Temp. (°C.) Air	2.0	1.0	-	15.0	10.0	11.5	23.0	30.0	25.0	22.0	14.0	11.0	
Atlantic needlefish	-	-	-	-	-	-	1	1	-	-	-	-	2
Atlantic silverside	-	1	-	-	1	4	40	230	180	85	-	-	541
Bay anchovy	-	-	-	-	-	-	60	5	1	2	-	-	68
Bluefish	-	-	-	-	-	-	1	-	-	-	-	-	1
Fourspine stickleback	-	-	-	-	-	1	-	-	-	5	-	-	6
Mummichog	1	-	-	-	-	2	-	-	-	1	9	-	13
Naked goby	-	-	-	-	-	-	-	-	-	2	-	-	2
Northern pipefish	-	-	-	-	-	1	-	-	-	1	-	-	2
Rainwater fish	-	-	-	-	-	-	-	-	-	-	-	1	1
Tidewater silverside	-	-	-	-	-	4	8	-	-	-	22	2	36
Winter flounder	-	-	-	-	-	-	-	2	-	-	-	-	2
Total	1	1	0	0	1	12	110	238	181	96	31	3	674

TABLE 11. Number of fishes taken by seine at Station 10 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	15	10	14	1	6	8	30	27	30	15	18	16	
Hour	1245-1315	1400-1430	1215-1240	1230-1300	1040-1105	1335-1355			1130-1200	1200-1220	1255-1320	1300-1325	
Sal. (‰)	12.3	14.2	10.6	14.0	14.0	14.4	11.6	12.8	17.5	17.9	15.0	13.9	
Temp. (°C.) H ₂ O	7.0	5.0	2.0	7.0	10.0	15.0	21.0	29.0	26.0	23.5	12.5	8.0	
Temp. (°C.) Air	10.0	9.0	7.0	14.0	10.0	11.5	21.0	31.0	24.5	25.0	13.0	10.0	
Atlantic needlefish	-	-	-	-	-	-	4	-	1	-	-	-	5
Atlantic silverside	-	2	-	1	29	100	6	100	540	260	120	-	1158
Bay anchovy	-	-	-	-	-	-	95	12	-	-	-	-	107
Bluefish	-	-	-	-	-	-	2	-	-	-	-	-	2
Fourspine stickleback	1	-	-	-	-	-	-	-	-	-	-	-	1
Mummichog	4	-	-	-	-	-	-	-	-	-	22	1	27
Naked goby	-	-	-	-	-	-	-	-	-	-	1	-	1
Northern pipefish	-	-	-	-	-	-	1	-	3	-	1	-	5
Sheepshead minnow	-	-	-	-	-	-	-	-	-	-	4	-	4
Striped killifish	-	-	-	-	-	-	-	-	-	-	-	2	2
Tidewater silverside	3	1	-	-	2	6	7	-	-	-	58	-	77
Winter flounder	1	-	-	-	-	-	1	-	-	-	-	-	2
Total	9	3	0	1	31	106	116	112	544	260	206	3	1391

TABLE 12. Number of fishes taken by seine at Station 11 in Upper Barnegat System from December 1971 through November 1972

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Species Total
Day	14	10		10	6		20	14	24	27	30		5	
Hour	1130- 1200	1300- 1330		1120- 1140	1115- 1140		1310- 1345		1015- 1050	1010- 1045	1100- 1130		1155- 1220	
Sal. (‰)	15.0	15.8		24.8	22.9		21.8	21.0	22.8	23.2	20.5			
Temp. (°C.) H ₂ O	4.5	5.0		0.0	10.5		24.0	26.0	24.0	22.0	11.5		7.0	
Temp. (°C.) Air	4.0	9.0		-1.0	10.0		21.0	25.0	25.0	23.0	9.0		12.0	
American eel	-	-		-	-		4	-	-	-	-		-	4
Atlantic needlefish	-	-		-	-		8	-	-	-	-		-	8
Atlantic silverside	18	3		-	23		300*	-	400	90	3		-	837
Fourspine stickleback	-	8	Sample	-	-	Sample	128*	-	2	1	28		3	175
Mummichog	2	-		-	-		150	6	1	2	4		7	172
Northern pipefish	-	-	Sample	-	-	Sample	-	1	1	-	-		-	2
Oyster toadfish	-	-		-	-		1	-	-	-	-		-	1
Rainwater fish	-	-	No	-	-	No	-	-	2	-	2		-	4
Sheepshead	-	-		-	-		-	-	-	-	-		-	-
minnow	-	-		-	-		4	4	-	-	13		3	24
Striped killifish	-	-		-	-		-	-	3	13	-		1	17
Summer flounder	-	-		-	-		1	-	-	-	-		-	1
Tidewater silverside	-	2		-	5		17	55	50	-	-		4	133
Winter flounder	-	-		-	-		45	-	-	-	-		-	45
Total	20	13		0	28		658	66	459	106	50		23	1423

* Estimate

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TABLE 13. Number of fishes taken by seine at Station 12 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Species Total
Day	14	12	14	16	19	23	20	14	24	27	30		5	
Hour	1230- 1300		1215- 1240	1115- 1140		1200- 1225	1135- 1210		0920- 0950	1100- 1130	1200- 1230		1240- 1310	
Sal. (‰)	19.7	21.2	10.6	23.0	23.2	20.3	22.8	21.6	27.2	25.7	18.7			
Temp. (°C.) H ₂ O	4.0	8.0	2.0	5.0	18.0	19.0	22.5	25.5	24.0	22.0	11.5		8.0	
Temp. (°C.) Air	4.0	12.0	7.0	9.0	17.0	16.0	23.0	26.0	24.0	23.0	7.5		12.5	
Atlantic needlefish	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Atlantic silverside	-	1	-	3	7	70	307*	73	230	1	10	-	-	751
Bluefish	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Fourspine stickleback	1	-	-	1	-	6	27	3	2	46	28	-	6	120
Mummichog	1	-	-	-	-	4	1	-	1	1	7	-	1	16
No. pipefish	-	-	-	-	-	1	3	3	4	1	-	-	-	12
Oyster toadfish	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Rainwater fish	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Sheepshead	-	-	-	-	-	-	-	-	-	-	-	-	-	-
minnow	-	-	-	-	-	-	-	-	-	-	6	-	-	6
Silver perch	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Striped killifish	-	1	-	-	-	-	-	-	1	-	-	-	-	2
Summer flounder	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Tidewater silverside	-	-	-	-	-	6	-	-	-	-	-	-	2	8
Winter flounder	-	-	-	-	-	-	11	2	-	1	1	-	-	15
Total	2	2	0	4	7	87	349	82	390	51	52		10	936

* Estimate

TABLE 14. Fishes taken in seine and stations at which they appeared.

	1	2	3	4	5	6	7	8	9	10	11	12	Total Stations
American eel	X			X		X					X		4
American sand lance	X												1
Atlantic menhaden					X								1
Atlantic needlefish	X					X			X	X	X	X	6
Atlantic silverside	X	X	X	X	X	X	X	X	X	X	X	X	12
Bay anchovy	X		X	X	X	X	X	X	X	X			9
Blueback			X			X				X			2
Bluefish		X	X	X	X	X		X	X	X			9
Common butterfly fish	X											X	2
Fourspine stickleback	X	X			X	X			X	X	X	X	8
Mummichog	X	X	X	X			X	X	X	X	X	X	11
Naked goby								X	X	X	X	X	5
Northern kingfish	X					X		X	X	X			5
Northern pipefish	X	X	X		X		X	X	X	X			9
Oyster toadfish	X						X	X	X	X	X	X	10
Pollock											X	X	2
Rainwater fish						X							1
Sheepshead minnow		X			X	X			X		X	X	5
Silver perch	X					X				X	X	X	5
Spotted seahorse						X						X	2
Striped killifish								X					1
Summer flounder										X	X	X	3
Threespine stickleback		X					X	X			X	X	4
Tidewater silverside		X	X	X	X	X	X	X	X	X	X	X	11
White mullet					X		X						2
White perch				X									1
Winter flounder		X	X			X	X	X	X	X	X	X	9
Total species	12	9	8	7	9	14	8	11	11	12	13	14	

TABLE 15. Number of fishes taken at each seine station in December 1971.

Station Number	1	2	3	4	5	6	7	8	9	10	11	12	Total
American eel	Sample	Sample	-	1	Sample	Sample	-	-	-	-	-	-	1
Atlantic silverside	-	-	1	-	-	-	-	Sample	-	-	18	-	19
Fourspine stickleback	Sample	Sample	-	-	-	-	-	Sample	-	1	-	1	2
Mummichog	-	-	3	1	Sample	Sample	-	-	1	4	2	1	12
Tidewater silverside	No	No	-	2	No	No	-	Sample	-	3	-	-	5
Winter flounder	-	-	-	-	-	-	-	No	-	1	-	-	1
Total			4	4			0		1	9	20	2	40

TABLE 16. Number of fishes taken at each seine station in January 1972.

Atlantic silverside	1	-	-	-	-	-	-	Sample	1	2	3	1	8
Fourspine stickleback	-	-	-	-	-	-	-	Sample	-	-	8	-	8
Striped killifish	-	-	-	-	-	-	-	-	-	-	-	1	1
Threespine stickleback	-	1	-	-	-	-	-	Sample	-	-	-	-	1
Tidewater silverside	-	-	-	-	-	1	-	No	-	1	2	-	4
Total	1	1	0	0	0	1	0		1	3	13	2	22

TABLE 17. Number of fishes taken at each seine station in February 1972.

Atlantic silverside	19	-	-	-	1	-	Sample	Sample	-	-	Sample	-	20
Fourspine stickleback	-	1	-	-	-	-	Sample	Sample	-	-	Sample	-	1
Tidewater silverside	-	2	-	-	-	-	Sample	Sample	-	-	Sample	-	2
Total	19	3	0	0	1	0	No	No	0	0	No	0	23

TABLE 18. Number of fishes taken at each seine station in March 1972.

Station Number	1	2	3	4	5	6	7	8	9	10	11	12	Total
Atlantic silverside	Sample	-	2	-	-	-	79	1	-	1	-	3	86
Fourspine stickleback		-	-	-	-	-	-	-	-	-	-	1	1
Threespine stickleback		-	-	-	-	-	1	-	-	-	-	-	1
Tidewater silverside		2	1	-	-	-	2	-	-	-	-	-	5
Total	No	2	3	0	0	0	82	1	0	1	0	4	93

TABLE 19. Number of fishes taken at each seine station in April 1972.

Atlantic silverside	-	-	140	-	1	3	-	-	1	29	23	7	204
Blueback	-	-	1	-	-	-	-	-	-	-	-	-	1
Northern pipefish	-	1	-	-	-	-	-	Sample	-	-	-	-	1
Tidewater silverside	-	2	24	-	3	3	-		-	2	5	-	39
Winter flounder	-	2	-	-	-	-	-		-	-	-	-	2
Total	0	5	165	0	4	6	0	No	1	31	28	7	247

TABLE 20. Number of fishes taken at each station in May 1972.

American sand lance	8	-	-	-	-	-	-	-	-	-	-	-	8
Atlantic silverside	44	5	28	-	4	2	18	-	4	100	-	70	175
Bay Anchovy	-	-	-	-	-	33	-	-	-	-	-	-	33
Fourspine stickleback	-	-	-	-	1	1	-	Sample	1	-	Sample	6	9
Mummichog	-	-	-	-	-	3	3		2	-		4	12
Northern pipefish	-	1	-	-	1	2	1		1	-		1	7
Pollock	-	-	-	-	-	1	-	-	-	-	-	-	1
Tidewater silverside	-	-	8	-	4	-	1	No	4	6	No	6	29
Total	52	6	36	0	10	42	23		12	106		87	374

TABLE 21.

Number of fishes taken at each seine station in June 1972.

Station Number	1	2	3	4	5	6	7	8	9	10	11	12	Total
American eel	-	-	-	-	-	-	-	-	-	-	4	-	4
Atlantic menhaden	-	-	-	-	1	-	-	-	-	-	-	-	1
Atlantic needlefish	-	-	-	-	-	-	-	-	1	4	8	-	13
Atlantic silverside	4	2	-	-	4	4	75	-	40	6	300	307	742
Bay anchovy	6	-	10	20	80	105	65	5	60	95	128	-	574
Blueback	-	-	-	-	-	1	-	-	-	-	-	-	1
Bluefish	-	-	-	-	-	2	-	-	1	2	-	-	5
Fourspine stickleback	-	-	-	-	-	1	-	-	-	-	-	27	28
Mummichog	-	-	-	-	-	3	-	-	-	-	150	1	154
Northern pipefish	-	-	-	-	-	-	-	-	-	1	-	3	4
Oyster toadfish	-	-	-	-	-	-	-	-	-	-	1	-	1
Sheepshead minnow	-	-	-	-	-	-	-	-	-	-	4	-	4
Summer flounder	-	-	-	-	-	-	-	1	-	-	1	-	2
Tidewater silverside	-	2	-	8	-	7	-	-	8	7	17	-	49
White perch	-	-	-	2	-	-	-	-	-	-	-	-	2
Winter flounder	-	4	1	-	-	1	-	4	-	1	45	11	67
Total	10	8	11	30	85	124	140	10	110	116	658	349	1651

Table 22.

Number of fishes taken at each seine station in July 1972.

	Sample												No	Total
	1	2	3	4	5	6	7	8	9	10	11	12		
American eel	-	-	1	-	1	-	-	-	-	-	-	-	2	2
Atlantic needlefish	-	-	-	-	1	-	-	-	1	-	-	1	3	3
Atlantic silverside	75	5	-	14	8	8	10	230	100	-	72	-	522	522
Bay anchovy	-	-	-	65	50	65	-	5	12	-	-	-	197	197
Bluefish	-	6	1	1	1	-	6	-	-	-	1	-	16	16
Fourspine stickleback	-	-	-	-	2	-	-	-	-	-	3	-	5	5
Mummichog	-	4	5	-	1	1	1	-	-	6	-	-	18	18
Northern pipefish	-	-	-	-	10	-	11	-	-	1	3	-	25	25
Sheepshead minnow	-	-	-	-	-	-	-	-	-	4	-	-	4	4
Spotted seahorse	-	-	-	-	-	-	1	-	-	-	-	-	1	1
Threespine stickleback	-	-	-	-	-	-	3	-	-	-	-	-	3	3
Tidewater silversides	-	6	16	-	-	-	-	-	-	55	-	-	77	77
White perch	-	-	5	-	-	-	-	-	-	-	-	-	5	5
Winter flounder	-	11	-	-	9	4	-	2	-	-	2	-	28	28
Total	75	32	28	80	83	78	32	238	112	66	82	-	906	906

TABLE 23. Number of fishes taken at each seine station in August 1972.

Station Number	1	2	3	4	5	6	7	8	9	10	11	12	Total
American eel	1	-	-	-	-	-	-	-	-	-	-	-	1
Atlantic needlefish	1	-	-	-	-	1	-	-	-	1	-	-	3
Atlantic silverside	11	40	13	1	45	50	2	200	180	540	400	280	1762
Bay anchovy	9	-	-	-	-	7	4	-	1	-	-	-	21
Bluefish	-	3	-	1	-	1	-	-	-	-	-	-	5
Fourspine stickleback	-	-	-	-	-	-	-	-	-	-	2	2	4
Mummichog	1	-	-	-	-	-	-	-	-	-	1	1	3
Oyster toadfish	1	-	-	-	-	-	-	-	-	-	-	1	2
Northern kingfish	1	-	-	-	-	-	-	6	-	-	-	-	7
Northern pipefish	-	-	-	-	-	-	-	6	-	3	1	4	14
Rainwater fish	-	-	-	-	-	-	-	-	-	-	2	-	2
Silver perch	-	-	-	-	-	11	-	-	-	-	-	-	11
Striped killifish	-	-	-	-	-	-	-	-	-	-	3	1	4
Summer flounder	-	-	-	-	-	-	-	-	-	-	-	1	1
Tidewater silverside	-	-	-	-	-	-	-	-	-	-	50	-	50
White mullet	-	-	-	-	4	-	-	-	-	-	-	-	4
Winter flounder	-	-	-	-	-	1	-	-	-	-	-	-	1
Total	25	43	13	2	49	71	6	212	181	544	459	290	1895

TABLE 24. Number of fishes taken at each seine station in September 1972.

Atlantic silverside	100	290	115	-	9	50	12	2	85	260	90	1	1014
Bay anchovy	-	-	2	-	8	-	*1000	-	2	-	-	-	1112
Fourspine stickleback	-	-	-	-	-	-	-	-	5	-	1	46	52
Mummichog	1	-	-	-	-	-	-	-	1	-	2	1	5
Naked goby	-	-	-	-	-	-	-	-	2	-	-	-	2
Northern pipefish	-	-	-	-	-	-	-	1	1	-	-	1	3
Silver perch	-	-	-	-	-	5	-	-	-	-	-	1	6
Striped killifish	-	-	-	-	-	-	-	-	-	-	13	-	13
Tidewater silverside	-	-	-	-	-	-	-	23	-	-	-	-	23
White mullet	-	-	-	-	-	-	1	-	-	-	-	-	1
Winter flounder	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	101	290	117	0	17	55	1113	26	96	260	106	51	2232

* Estimate

TABLE 25. Number of fishes taken at each seine station in October 1972.

Station Number	1	2	3	4	5	6	7	8	9	10	11	12	Total
Atlantic silverside	4	170	3	120	2	20	-	-	-	120	3	10	452
Fourspine stickleback	1	-	-	-	-	-	-	-	-	-	28	28	57
Mummichog	1	-	-	1	-	-	-	-	9	22	4	7	44
Naked goby	-	-	-	-	-	-	-	-	-	1	-	-	1
Northern pipefish	2	-	1	-	-	1	-	-	-	1	-	-	5
Rainwater fish	-	-	-	-	-	-	-	-	-	-	2	-	2
Sheepshead minnow	-	-	-	-	-	1	-	-	-	4	13	6	24
Silver perch	4	-	-	-	-	-	-	-	-	-	-	-	4
Tidewater silverside	-	52	7	550	27	30	6	-	22	58	-	-	752
Winter flounder	-	-	-	-	-	-	-	-	-	-	-	1	1
Total	12	222	11	671	29	52	6	-	31	206	50	52	1342

TABLE 26. Number of fishes taken at each seine station in November 1972.

American eel	1	-	-	1	-	-	-	-	-	-	-	-	2
Atlantic silverside	90	3	1	-	12	-	-	-	-	-	-	-	111
Common butterfly fish	1	-	-	-	-	-	-	-	-	-	-	-	1
Fourspine stickleback	4	1	-	-	-	-	-	-	-	-	-	-	5
Mummichog	-	16	-	-	-	-	-	-	-	1	-	-	17
Northern pipefish	3	3	-	-	-	-	-	-	-	-	-	-	6
Rainwater fish	-	-	-	-	-	-	-	-	1	-	-	-	1
Sheepshead minnow	-	2	-	-	1	-	-	-	-	-	-	-	3
Striped killifish	-	-	-	-	-	-	-	-	-	2	-	-	2
Tidewater silverside	-	220	28	-	28	-	2	-	2	-	-	-	280
Total	99	250	29	1	41	0	2	-	3	3	-	-	428

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	-	14.9	20.4	-	21.8	20.7	23.7	-	24.3	26.2	22.0	17.3
2	-	20.4	-	16.2	21.1	20.4	22.2	19.8	21.7	23.6	20.9	17.3
3	9.2	7.6	10.6	14.4	12.2	9.9	11.2	8.4	12.0	15.4	15.0	5.2
4	7.8	5.8	4.1	8.8	4.8	6.0	6.8	4.1	3.2	7.5	12.0	2.4
5	-	13.8	16.2	15.3	14.3	12.8	13.6	11.7	13.6	16.7	16.2	15.4
6	-	19.1	19.1	16.6	14.8	12.9	13.0	12.5	15.0	17.4	17.8	18.4
7	16.6	16.2	-	16.1	19.3	12.4	17.5	13.0	17.3	20.9	17.2	11.8
8	-	-	-	20.6	-	-	22.4	17.6	18.1	29.4	-	-
9	12.6	12.4	7.5	14.2	13.7	12.6	12.9	10.6	13.9	15.4	15.6	15.1
10	12.3	14.2	10.6	14.0	14.0	14.4	11.6	12.8	17.5	17.9	15.0	13.9
11	15.0	15.8	-	24.8	22.9	-	21.8	21.0	22.8	23.2	20.5	-
12	19.7	21.2	10.6	23.0	23.2	20.3	22.8	21.6	27.2	25.7	18.7	-

TABLE 28. Water temperatures recorded monthly at each seine station in the Upper Barnegat System from December 1971 through November 1972. (°C.)

1	-	2.0	2.0	-	9.0	13.8	18.0	-	26.0	24.0	14.0	10.0
2	-	3.0	2.0	2.0	9.0	14.4	18.5	28.5	24.5	20.5	13.0	10.0
3	8.0	1.5	3.0	7.0	9.0	14.5	19.0	28.0	24.5	20.5	13.0	10.0
4	8.0	3.0	3.0	7.0	10.0	14.5	20.0	26.0	24.5	23.0	16.0	10.5
5	-	4.0	0.0	7.0	9.0	14.5	20.0	25.0	24.5	20.0	12.0	8.0
6	-	0.0	0.0	5.0	10.0	14.5	22.0	26.0	25.0	20.0	12.0	8.5
7	2.0	2.0	-	6.0	8.5	15.0	19.0	25.0	24.5	21.0	18.0	8.0
8	-	-	-	6.5	-	-	23.0	26.5	25.0	19.0	-	-
9	1.0	2.0	1.0	7.0	11.5	21.0	21.0	29.5	25.0	21.0	12.0	8.0
10	7.0	5.0	2.0	7.0	10.0	15.0	21.0	29.0	26.0	23.5	12.5	8.0
11	4.5	5.0	-	0.0	10.5	-	24.0	26.0	24.0	22.0	11.5	-
12	4.0	8.0	2.0	5.0	18.0	19.0	22.5	25.5	24.0	22.0	11.5	-

Number of fishes taken in two ten-minute bottom hauls or a 12-foot semi-balloon trawl at Station 1 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	8		15	20	11	11	7	27	1	6	20	22	
Hour	1130- 1200		1030- 1110	1045- 1115	1200- 1230	1145- 1215		1205- 1235	915- 950	1020- 1055	1200- 1230	1100- 1130	
Sal. (‰)	18.3		19.7	21.3	20.3	20.5	22.05	12.2	17.9	24.8	-	20.3	
Temp. (°C.) H ₂ O	6.0		4.0	6.0	11.0	-	19.5	25.5	25.0	24.0	11.0	5.0	
Temp. (°C.) Air	5		7	4	11	-	20.0	21.0	23.0	23.0	5.0	-1.0	
American eel	-		-	-	-	-	-	3	-	-	-	-	3
American sand lance	-		-	-	3	-	-	-	-	-	-	-	3
Atlantic silverside	11	Sample	2	1	-	-	-	-	-	-	1	-	18
Bay anchovy	-		-	-	-	-	-	2	-	-	2850	-	2852
Butterfish	-		-	-	-	-	-	-	-	-	1	-	1
Fourspine stickleback	30		15	-	-	-	-	-	-	-	-	1	46
Northern pipefish	-	No	-	-	-	1	-	-	-	-	-	3	4
Smallmouth flounder	-		-	-	-	-	-	-	-	-	-	1	1
Threespine stickleback	-		1	-	-	-	-	-	-	-	-	-	1
Winter flounder	18		1	-	2	5	1	-	3	-	1	-	21
Total	59		19	1	5	6	1	5	3	0	2853	8	2960

Station 2
 Record of Fishes Taken in Two Ten-Minute Bottom Tows of a 12-Foot
 semi-balloon trawl at Station 2 in the Upper Barnegat System from
 December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	8		24	27	11	11	25		8	6	3	27	
Hour	1215- 1245		1050- 1120	145- 230	100- 130	1100- 1130	115- 145		1130- 1200	1225- 105	105- 140	1020- 1055	
Sal. (‰)	18.5		20.2	23.6	21.4	18.4	19.6		23.8	23.2	-	22.8	
Temp. (°C.) H ₂ O	5.0		0.0	5.5	12.0	17.0	21.5		25.0	21.5	18.0	7.0	
Temp. (°C.) Air	5.0		5.0	5.0	10.0	12.0	22.0		26.0	24.0	19.0	4.5	
Atlantic menhaden	2		1	-	-	-	-		-	-	-	-	3
Atlantic needlefish	-		-	-	-	-	1		-	-	-	-	1
Atlantic silverside	1	Sample	1	-	-	10	138		-	-	-	3	153
Bay anchovy	-		-	-	-	4	-	Sample	4	10	1800*	300*	2118
Blueback herring	-		-	-	-	-	-		-	-	-	2	2
Bluefish	-		-	-	-	-	5		-	1	-	-	6
Fourspine stickleback	35		1	1	1	-	-		-	-	-	-	38
Mummichog	1	No	-	-	-	-	-	No	-	-	-	-	1
Northern pipefish	-		-	-	-	-	-		-	1	1	1	3
Silver perch	-		-	-	-	-	-		-	-	-	2	2
Spotted seahorse	-		-	-	-	-	-		-	-	-	-	0
Winter flounder	7		1	-	6	1	2		-	1	1	6	25
Total	46		4	1	7	15	146		4	13	1802	314	2352

* Estimated Amount

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TABLE 1. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 3 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	8		18	13	18	18	12	18	8	8	24	27	
Hour	1215- 1245		1245- 115	1250- 130	1145- 1215	1245- 115	1200- 1230	1100- 1130	1045- 1115	1130- 1200	1230- 100	1200- 1230	
Sal. (‰)	18.5		20.2	18.8	18.15	15.1	18.3	15.35	18.8	20.0	20.4	16.9	
Temp. (°C.) H ₂ O	5.0		2.5	4.5	12.0	17.0	19.0	27.5	25.0	22.0	12.0	6.0	
Temp. (°C.) Air	5.0		8.0	4.0	11.0	14.0	20.5	28.0	26.0	23.0	11.0	5.0	
American eel	-		-	-	-	1	-	-	-	-	-	-	1
Atlantic silverside	-		-	4	-	4	-	-	-	-	1	-	9
Bay anchovy	-		-	-	-	6	4	2	10	35	100	200*	357
Fourspine stickleback	-		-	8	1	-	-	-	-	-	-	-	9
Northern pipefish	-		-	-	-	-	-	-	-	-	1	21	22
Oyster toadfish	-		-	-	-	-	-	1	-	-	-	-	1
Summer flounder	-		-	-	-	-	-	-	-	-	1	-	1
Tautog	-		-	-	-	-	-	-	-	-	1	-	1
Winter flounder	-		-	3	13	1	-	-	-	-	13	4	34
Total	0		0	15	14	12	4	3	10	35	117	225	435

* Estimated amount

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Station 4. Number of fish taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 4 in the Upper Earnegst System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	16			15	26	22	8	19	16	18	25	23	
Hour	1210- 1240			105- 135	1230- 100	1200- 1230	1245- 115	1025- 1100	950- 1030	1150- 1220	1240- 110	1200- 1230	
Sal. (‰)	10.7			15.0	11.8	10.1	11.7	8.6	13.0	16.4	16.4	13.7	
Temp. (°C.) H ₂ O	7.0			3.0	9.0	17.0	21.0	29.5	21.0	23.5	11.5	6.5	
Temp. (°C.) Air	16.0			3.0	6.5	16.0	23.0	30.0	22.0	25.5	13.5	8.0	
American eel	-			-	-	1	1	-	-	-	-	1	3
Atlantic menhaden	1			-	-	-	-	-	-	-	-	-	1
Atlantic Silverside	-			-	-	3	1	-	1	-	2	-	7
Bay anchovy	-			-	-	20	23	486	350	880	10	-	1763
Blueback herring	-			-	-	4	-	-	-	-	-	-	4
Bluefish	-			-	-	-	-	-	3	-	-	-	3
Fourspine stickleback	3			1	-	-	-	-	-	-	-	1	3
No. pipefish	1			-	-	-	-	-	-	-	-	-	1
Silver perch	-			-	-	-	-	-	-	-	15	-	15
Striped blenny	-			-	-	-	-	-	-	-	1	-	1
Summer flounder	-			-	-	-	-	-	-	-	1	-	1
Threespine stickleback	-			-	-	1	-	-	-	-	-	-	1
White perch	-			-	1	-	-	-	-	-	-	-	1
Winter flounder	40			-	3	7	-	3	-	-	-	8	61
Totals	45			1	4	36	25	483	354	880	29	10	1867

TAB~~LE~~ 53. Number of fishes taken in two ten-minute bottom hauls or a 12-foot semi-balloon trawl at Station 5 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			16	28	28	24	26	20	17	26	27	29	
Hour			1130-	1245-	155-	1125-	1130-	1045-	1020-	1135-	930-	1140-	
			1200	0115	225	1215	1200	1120	1055	1210	1000	1210	
Sal. (‰)			14.4	13.9	15.3	13.4	12.55	10.45	12.6	17.6	17.6	13.9	
Temp.(°C.) H ₂ O			-	4.5	10.0	18.5	18.5	29.0	21.5	10.0	11.0	6.0	
Temp.(°C.) Air			-	2.0	9.5	19.0	19.5	27.0	21.0	24.0	20.0	4.0	
American eel			-	-	-	-	1	-	2	-	-	-	3
Atlantic silversides			-	-	-	-	-	-	-	-	1	1	2
Bay anchovy			-	-	-	50	30	115	180	37	-	-	412
Blueback herring			1	-	-	-	-	-	-	-	-	-	1
Bluefish			-	-	-	-	-	2	-	-	-	-	2
Crevalle jack			-	-	-	-	-	-	1	-	-	-	1
Pollock			-	-	-	1	-	-	-	-	-	-	1
Silver perch			-	-	-	-	-	-	-	-	1	-	1
Weakfish			-	-	-	-	-	-	1	-	-	-	1
Winter flounder			-	3	6	85	3	35	-	-	6	7	85
Total			1	3	6	76	34	152	184	37	8	8	509

TABLE 34. Number of species and total catch in 12-foot hauls or a 12-foot semi-balloon trawl at Station 6 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day				29	29	30	27	27	22	29	31		
Hour				1200- 1230	1230- 1300	1145- 1210	1045- 1115	1115- 1145	1000- 1040	1140- 1210	0950- 1025		
Sal. (‰)				17.3	16.7	15.75	13.65	14.4	14.9	23.35	20.2		
Temp. (°C.) H ₂ O				6.0	9.5	18.5	19.5	24.5	24.5	19.0	10.5		
Temp. (°C.) Air				8.0	8.5	19.0	21.5	21.0	23.5	19.0	4.5		
American eel				-	-	1	7	7	1	-	-		16
Atlantic silverside				-	-	11	12	3	48	-	2		73
Bay anchovy				-	-	65	4	128	9	24	1		231
Blueback herring				-	-	1	-	-	-	-	-		1
Bluefish				-	-	-	-	1	-	1	-		2
Fourspine stickleback				-	-	11	30	2	16	-	16		75
No. pipefish				-	-	12	60	3	21	-	4		100
Oyster toadfish				-	-	1	6	-	2	-	-		9
Pollock				-	-	3	-	-	-	-	-		3
Scup				-	-	-	1	-	-	-	-		1
Silver perch				-	-	-	-	-	51	8	16		75
Spotted seahorse				-	-	1	-	1	-	-	-		2
Summer flounder				-	-	-	1	-	-	-	-		1
Weakfish				-	-	-	-	1	-	1	-		2
Winter flounder				-	-	5	31	-	-	1	1		38
Totals				0	0	111	152	146	148	35	40		632

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TABLE 55. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 7 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			16	8	29	24	26	20	22	26	27	29	
Hour			1045-	1120-	1145-	1050-	1045-	0940-	0915-	1330-	1210-	1100-	
			1115	1155	1215	1120	1115	1040	0955	1410	1245	1130	
Sal. (‰)			14.4	13.4	13.4	13.8	12.8	11.6	13.9	17.3	16.3	14.0	
Temp. (°C.) H ₂ O			-	4.0	9.0	17.5	18.0	-	24.0	20.0	10.5	6.0	
Temp. (°C.) Air			-	2.0	6.0	17.0	18.0	24.5	23.0	25.0	12.0	3.0	
Alewife			-	-	-	-	-	-	-	-	1	-	1
American eel			-	-	-	-	-	-	-	1	-	-	1
Atlantic herring			-	-	-	1	-	-	-	-	-	-	1
At. Silverside			-	1	-	2	-	2	-	-	-	-	3
Bay anchovy			-	-	-	8	20	65	72	31	200*	-	396
Bluefish			-	-	-	-	1	-	-	1	-	-	2
Cunner			-	-	-	-	1	-	-	-	-	-	1
Fourspine stickleback			-	-	-	-	-	-	-	-	-	-	-
Mummichog			-	-	-	-	-	2	-	-	-	-	2
Naked goby			-	-	-	-	-	-	-	-	1	-	1
Northern pipefish			-	-	-	-	-	-	-	1	1	5	7
Oyster toadfish			-	-	1	1	-	7	-	1	-	2	11
Sheepshead			-	-	-	1	-	3	-	-	-	-	4
Minnow			-	-	-	-	-	-	-	-	2	-	2
Silver perch			-	-	-	-	-	-	-	-	8	-	8
Summer flounder			-	-	-	-	-	-	-	2	-	-	2
Tautog			-	-	-	-	-	1	-	-	-	-	1
Winter flounder			2	1	4	5	10	65	1	-	1	1	90
Total			2	2	5	17	32	145	73	37	214	8	535

* Estimate

TABLE 36. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 8 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	16			28	26	22		19	16	18	27	28	
Hour	1200- 1230			1045- 1115	1300- 1330	1250- 1320		1140- 1210	1040- 1115	1240- 1320	1255- 1325	1240- 1310	
Sal. (‰)	12.1			13.6	13.5	12.7		11.75	15.3	18.5	15.7	11.9	
Temp. (°C.) H ₂ O	7.0			4.0	9.0	17.0		29.5	22.0	24.0	10.5	6.0	
Temp. (°C.) Air	10.0			3.0	6.5	16.0		29.0	21.0	25.5	13.0	7.0	
American eel	-			-	-	-		1	-	-	-	-	1
Atlantic menhaden	1			-	-	-		-	-	-	-	-	1
Atlantic silverside	1	Sample	Sample	-	-	9		-	-	-	6	-	16
Bay anchovy	-			-	-	-		50	9	48	-	-	107
Blueback herring	-			-	-	4		-	-	-	-	-	4
Fourspine stickleback	4			-	-	-		-	-	-	-	30	34
Naked goby	-	No	No	-	-	-		-	-	-	1	-	1
Northern pipefish	-			-	1	-		-	-	-	2	-	3
Summer flounder	-			-	-	-		-	1	-	-	-	1
White perch	-			-	-	-		-	-	-	-	1	1
Winter flounder	21			2	1	4		-	-	-	1	2	31
Totals	27			2	2	17		51	10	48	10	33	200

TABLE 37. - Number of hauls of a 12-foot semi-balloon trawl at Station 9 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	14		18	13	18	23	12	11	16	6	3	27	
Hour	1415- 1445		1225- 1255	1120- 1150	1215- 1345	1245- 1315	1115- 1145	0930- 1000	1120- 1155	1155- 1220	1120- 1205	1250- 1325	
Sal. (‰)	16.9		-	19.6	17.95	19.7	18.2	16.4	20.9	17.9	-	21.3	
Temp. (°C.) H ₂ O	6.0		3.5	4.0	12.0	16.0	18.0	23.0	21.0	21.0	16.0	6.5	
Temp. (°C.) Air	5.0		3.0	6.0	11.0	13.0	21.0	23.0	20.5	23.0	19.0	5.0	
American eel	-		-	-	-	-	-	45	-	-	2	-	47
Atlantic silverside	3	No sample	1	29	-	60	8	-	85	115	55	7	363
Bay anchovy	-		-	-	-	9	-	-	2	7	-	-	18
Blueback herring	-		-	-	-	-	-	-	-	-	-	1	1
Bluefish	-		-	-	-	-	-	-	2	-	-	-	2
Fourspine stickleback	7		-	1	2	11	-	4	6	1	200*	16	248
Mummichog	-		-	-	-	-	-	-	-	-	3	1	4
No. pipefish	-		-	-	1	9	1	5	5	4	14	1	40
No. puffer	1		-	-	-	4	-	-	-	-	-	-	5
Oyster toadfish	-		-	-	-	2	-	4	-	-	2	-	8
Silver hake	1		-	-	-	-	-	-	-	-	-	-	1
Silver perch	-		-	-	-	-	-	-	1	1	4	-	6
Spotted hake	-		-	-	-	1	-	-	-	-	-	-	1
Winter flounder	34		2	-	2	11	1	6	-	-	-	-	56
Totals	46		3	30	7	107	10	64	101	128	280	26	802

* Estimate

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TABLE 38. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 10 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	14		11	20	11	23	12	11	1	6	3	22	
Hour	1320- 1350		1330- 1400	1130- 1200	1245- 1315	1045- 1115	1030- 1100	1045- 1115	1000- 1030	1155- 1220	1215- 1245	1020- 1040	
Sal. (‰)	19.6		-	19.6	19.8	21.9	21.5	18.9	16.3	17.9	-	17.7	
Temp. (°C.) H ₂ O	6		3	6	8	15	18	22	24	21	16.5	4.5	
Temp. (°C.) Air	6		4	1	14	13	21.5	22.5	24	23	18	-2	
Alewife	-		-	-	4	-	-	-	-	-	-	-	4
American eel	-		-	-	-	-	-	-	-	-	1	-	1
At. silverside	1		4	2	9	26	-	-	220	-	55	3	320
Bay anchovy	-		-	-	-	1	2	-	-	230	6	-	232
Blueback herring	-		-	-	8	-	-	-	-	-	-	-	8
Cornetfish	-		-	-	-	-	-	-	-	-	1	-	1
Cunner	-		-	-	-	1	-	-	-	-	-	-	1
Fourspine stickleback	76	S a m p l e N o	1	-	-	49	1	-	1	-	-	7	135
Grubby	-		-	-	-	1	-	-	-	-	-	-	1
Mummichog	-		-	-	-	1	-	-	-	-	-	-	1
No. pipefish	-		-	-	2	41	1	-	50	-	15	-	109
Oyster toadfish	-		-	-	-	6	-	1	-	-	-	-	7
Pollock	-		-	-	1	-	-	-	-	-	-	-	1
Rainwater fish	-		1	-	-	-	-	-	-	-	-	-	1
Sennet	-		-	-	-	-	-	-	2	-	-	-	2
Silver perch	-		-	-	-	-	-	-	-	-	30	4	34
Sp. seahorse	-		-	-	-	-	-	-	-	2	-	-	2
Squirrel hake	-		-	-	-	1	-	-	-	-	-	-	1
Summer flounder	-		-	-	-	-	-	-	1	-	-	-	1
Tautog	-		-	-	-	3	-	-	2	-	-	-	5
3-spine stickleback	-		-	-	-	1	-	-	-	-	-	-	1
White perch	-		-	-	-	8	-	-	-	-	-	-	8
Winter flounder	-		-	1	2	12	-	2	-	-	-	1	18
Totals	77		6	3	26	151	4	3	276	232	108	15	901

TABLE 39. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 11 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	9		15	20	10	11	6	10	14				
Hour	1115- 1145		1045- 1115	1220- 1320	1320- 1350	1305- 1335	1215- 1245	1145- 1215	0930- 1000				
Sal. (‰)	17.1		16.9	21.0	16.65	14.6	17.65	18.3	22.2				
Temp. (°C.) H ₂ O	12		10	12	17	-	21	30.2	23				
Temp. (°C.) Air	13		8	1	16	-	18	25	26				
Alewife	-		-	2	-	-	-	-	-				2
American eel	-		-	-	-	-	-	-	1				1
Atlantic menhaden	1	Sample	-	4	-	-	-	-	-				5
Atlantic silverside	2		6	1	-	-	-	-	-	Sample	Sample	Sample	9
Bay anchovy	-		-	1	145	3	25	7	4				185
Blueback	-		-	4	7	-	-	-	-				11
Northern pipefish	-		-	-	-	1	-	-	-				1
Northern porgy	1		-	-	-	-	-	-	-				1
Summer flounder	-	No	-	-	-	3	1	-	-	No	No	No	4
Tautog	2		-	2	-	-	-	-	-				4
Winter flounder	4		-	4	-	8	1	-	-				17
Totals	10		6	18	152	15	27	7	5				240

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TABLE 40. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 12 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	9		15	20	11	11	6	10	14	8	10	21	
Hour	1215- 1245		1130- 1200	1215- 1245	1330- 1400	1230- 1300	1125- 1155	1145- 1215	0845- 0915	1230- 1300	1135- 1235	1300- 1330	
Sal. (‰)	17.2		17.5	20.6	18.8	14.0	17.05	17.4	21.9	22.5	-	13.7	
Temp. (°C.) H ₂ O	12		12	13	14	-	21	29.5	22.5	29	21	14	
Temp. (°C.) Air	10		8	3	13	-	19	25.5	24	24.5	12	5	
Alewife	-		-	-	-	-	-	1	-	-	-	-	1
American eel	-		-	-	-	-	-	-	1	-	-	-	1
At. menhaden	-		1	-	-	-	-	-	-	-	-	-	1
At. silverside	2	No sample	36	1	38	-	-	-	-	-	-	-	77
Bay anchovy	-		-	-	1	-	-	90	75	-	-	2	168
Blueback	-		-	1	-	-	-	-	-	-	-	-	1
Cunner	-		-	-	1	-	-	-	-	-	-	1	2
4-spine stickle- back	-		1	1	1	-	-	-	-	-	-	-	3
Mummichog	-		3	-	-	-	-	-	-	-	-	-	3
Naked goby	-		-	-	-	-	-	-	-	-	-	1	1
No. pipefish	1		-	-	-	1	1	-	-	-	-	1	4
No. porgy	9		-	-	-	-	-	-	-	-	-	-	9
Oyster toadfish	-		-	-	-	-	1	-	-	-	-	-	1
Striped bass	-		-	-	-	1	-	-	-	-	-	-	1
Summer flounder	-		-	-	-	2	1	-	-	-	-	1	4
Tautog	1		-	-	1	-	-	-	-	-	-	-	2
White perch	2		-	-	-	1	1	-	-	-	-	-	4
Winter flounder	1		1	4	-	5	5	-	-	-	-	3	19
Totals	16		42	7	42	10	9	91	76	0	0	9	302

TABLE 41. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 13 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			15	27	17	17	7	11	14	12	10	21	
Hour			1245-	1315-	1245-	1200-	1100-	1130-	0930-	1110-	1245-	1155-	
Sal. (‰)			1315	1400	1315	1230	1130	1200	1000	1140	1315	1220	
Temp. (°C) H ₂ O			18.3	23.3	20.85	19.4	22.05	20.2	23.8	25.1	-	20.2	
Temp. (°C) Air			5	5.5	10.5	17.5	21	-	23	25	14.5	6	
			8	2	13	13.5	21	-	27	23	12	3.5	
Alewife			-	-	1	-	-	-	-	-	-	1	2
At. menhaden			-	-	-	-	-	-	-	-	-	5	5
At. silverside			1	-	-	3	-	1	-	-	-	2	7
Bay anchovy			-	-	89	35	13	13	1	440	25	-	616
Blueback			-	-	1	-	-	-	-	-	-	2	3
Bluefish			-	-	-	-	-	-	-	-	1	-	1
Fourspine													
stickleback			-	1	2	-	-	-	-	-	-	-	3
Mummichog			-	-	-	-	-	-	1	-	-	-	1
No. pipefish			-	-	-	-	-	-	6	-	-	3	9
Oyster toadfish			-	-	-	2	1	-	2	1	-	-	6
Pollock			-	-	1	-	-	-	-	-	-	-	1
Smallmouth													
flounder			-	-	-	-	-	-	-	-	-	1	1
Striped anchovy			-	-	-	-	-	-	-	5	-	-	5
Striped bass			-	-	-	-	2	-	-	-	-	-	2
Tautog			-	-	-	-	-	-	1	-	1	-	2
Windowpane			-	-	-	-	-	-	-	-	-	1	1
Winter													
flounder			-	8	1	-	-	-	-	-	-	14	23
Totals			1	9	95	40	16	14	11	446	27	29	686

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TABLE 42. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 14 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			15	27	17	17	7	10	14	19	20	21	
Hour			1345- 1415	1200- 1250	1130- 1200	1255- 1320	1245- 1315	1300- 1330	1055- 1130	1205- 1235	1050- 1120	1110- 1140	
Sal. (‰)			-	22.4	18.35	18.5	19.65	18.5	23.2	24.3	-	16.7	
Temp. (°C.) H ₂ O			5.0	6.0	10.0	18.0	21.0	24.5	23.5	25.0	10.0	6.0	
Temp. (°C.) Air			12.0	5.0	14.0	15.5	21.5	25.0	24.0	25.0	7.0	4.0	
American eel			-	-	-	-	-	2	-	-	-	-	2
Atlantic silverside	e	e	-	17	-	-	-	-	1	-	-	11	29
Bay anchovy	l	l	-	-	-	-	5	-	-	-	-	-	5
Blueback	r	p	-	1	-	-	-	-	-	-	-	-	1
Fourspine stickleback	m	m	-	22	-	-	-	-	-	-	-	-	22
Grubby	a	a	-	3	-	-	-	-	-	-	-	-	3
Naked goby	s	s	-	-	2	8	2	-	-	2	2	-	16
Northern pipefish			-	-	-	-	-	-	-	-	-	1	1
Oyster toadfish	o	o	-	2	1	1	3	1	2	4	2	1	17
Spotted hake	N	N	-	-	-	-	1	-	-	-	-	-	1
Striped blenny			-	-	-	-	-	-	-	-	2	-	2
Tautog			-	2	1	-	-	-	-	1	2	-	6
Winter flounder			-	11	8	13	1	1	-	-	5	17	56
Totals			0	58	12	22	12	4	3	7	13	30	161

TABLE 43. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 15 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			28	13	18	18	8	18	8	8	25	27	
Hour			1210- 1240	1215- 1245	1115- 1145	1140- 1210	1045- 1130	1150- 1220	0945- 1015	1045- 1115	1115- 1145	1120- 1155	
Sal. (‰)			14.9	2.9	4.2	1.6	12.6	2.65	15.5	15.2	19.3	13.3	
Temp. (°C.) H ₂ O			5.0	4.0	17.0	17.0	21.0	25.5	24.0	24.0	13.0	6.0	
Temp. (°C.) Air			8.0	4.0	14.0	13.0	25.0	29.0	26.0	23.0	13.5	5.5	
Alewife			-	-	-	-	-	1	-	-	-	-	1
American eel			-	-	-	4	-	-	-	-	-	-	4
Atlantic silverside			1	1	-	55	1	2	-	-	18	-	78
Bay anchovy			-	-	-	1	3	260	125	1725	6	-	2120
Blueback			-	-	-	-	-	1	-	-	-	-	1
Fourspine stickleback			-	-	2	-	-	-	-	-	-	-	2
Mummichog			-	-	-	-	1	-	-	-	-	-	1
Naked goby			-	-	-	1	-	-	-	-	-	-	1
Oyster toadfish			-	-	-	-	1	-	-	1	-	-	2
Silver perch			-	-	-	-	-	-	-	-	2	-	2
White perch			-	-	-	1	2	1	-	-	-	-	4
Winter flounder			-	-	9	-	-	4	-	-	-	1	14
Totals			1	1	11	62	8	269	125	1726	26	1	2230

TABLE 44. Number of fish taken in a 12-foot semi-balloon trawl at Station 16 in the Upper Barnegat System from December 1972 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day	16			15	18	22	8	19	16	17	25	28	
Hour	1045- 1115			1235- 1305	1115- 1145	1120- 1145	1200- 1230	0920- 1000	0900- 0930	1100- 1130	1050- 1125	1101- 1130	
Sal. (‰)	5.3			2.6	4.2	2.4	7.5	0.0	5.8	7.15	14.8	0.0	
Temp. (°C.) H ₂ O	9.0			4.0	17.0	16.0	21.0	27.0	22.0	23.0	11.0	7.5	
Temp. (°C.) AIR	18.0			3.0	14.0	17.0	25.0	31.5	20.5	25.0	13.0	10.0	
American eel	-	c l	c l	-	-	-	8	2	-	-	-	-	10
Atlantic menhaden	-	p m	p m	-	-	-	-	3	-	-	-	-	3
Atlantic silverside	-	a s	a s	-	-	-	-	-	-	-	1	-	1
Bay anchovy	-			-	-	-	3	150	175	2340*	23	-	2691
Blueback	-			-	-	1	-	-	-	-	-	-	1
Bluefish	-			-	-	-	-	2	1	2	-	-	5
Fourspine stickleback	-	o N	o N	-	2	-	-	-	-	-	-	-	2
White perch	1			-	-	7	2	-	-	-	-	1	11
Winter flounder	-			-	7	-	-	1	-	-	-	1	9
Totals	1			0	9	8	13	158	176	2342	24	2	2733

* Estimated

TABLE 45. Number of fishes taken in two ten-minute bottom hauls or a 12-foot semi-balloon trawl at Station 17 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day			16	28	28	24	26	27	17	26	27	29	
Hour			1320- 1350	1315- 1345	1430- 1500	1250- 1320	1310- 1340	1030- 1100	0924- 0955	1045- 1115	1110- 1145	1330- 1400	
Sal. (‰)			12.2	12.3	13.7	11.6	11.05	10.3	10.8	16.9	17.0	12.9	
Temp. (°C) H ₂ O			-	6.0	11.5	20.0	20.5	25	22.0	25.0	11.5	6.5	
Temp. (°C) Air			-	4.0	10.5	20.0	23.0	20	20.5	25.0	12.0	4.0	
Alewife			-	-	-	-	-	-	1	-	1	-	2
America eel			-	-	-	1	1	-	-	-	-	-	2
Atlantic menhaden			-	-	-	-	-	-	3	-	-	-	3
Atlantic silverside			-	-	1	-	-	-	-	-	24	-	25
Bay anchovy			-	-	-	35	65	7	560	675	4	-	1346
Blueback			-	-	2	-	-	-	-	-	-	-	2
Bluefish			-	-	-	-	-	1	-	-	-	-	1
Creville jack			-	-	-	-	-	-	1	5	-	-	6
Hogchoker			-	-	1	3	-	-	2	-	-	-	7
Mummichog			-	-	-	1	-	-	-	-	-	-	1
Oyster toadfish			-	-	-	1	-	-	-	-	-	-	1
Sheepshead minnow			-	-	-	-	-	-	-	-	-	2	2
Silver perch			-	-	-	-	-	-	-	6	56	-	62
Tidewater silverside			-	-	-	-	-	-	-	-	72	-	72
Weakfish			-	-	-	-	-	-	-	5	-	-	5
White perch			-	-	-	-	-	-	-	-	1	-	1
Winter flounder			-	8	39	6	-	-	-	-	4	19	76
Totals			0	8	43	47	66	8	567	691	162	22	1513

TABLE 46. Number of fish collected in a semi-balloon trawl at Station 18 in the Upper Barnegat System from December 1971 through November 1972.

		Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day				16	28	28	24	26	20	17	26	27	29	
Hour				1245-	1215-	1030-	1205-	1215-	1140-	1110-	1225-	1015-	1230-	
Sal. (‰)				1315	1245	1100	1235	1245	1220	1145	1300	1055	1300	
Temp. (°C.) H ₂ O				11.6	8.8	11.0	8.5	6.25	7.7	4.4	19.1	15.3	9.4	
Temp. (°C.) Air				-	7.0	11.5	22.0	21.0	31	22.0	22.0	12.5	7.0	
				-	5.0	10.0	21.0	21.0	26.5	22.0	26.0	11.0	4.0	
Alewife				-	-	1	-	-	-	-	-	-	-	1
American eel				-	-	-	-	8	8	-	4	1	2	23
Atlantic menhaden				-	-	-	-	2	1	2	-	4	-	9
Atlantic silverside				1	-	-	-	-	-	-	-	20	-	21
Banded killifish				-	-	-	-	-	-	-	-	-	1	1
Bay anchovy				-	-	2	1	8	2	190	41	-	-	244
Blueback				-	-	10	-	-	-	-	-	-	-	10
Hogchoker				-	-	-	3	-	-	-	-	-	-	3
Mummichog				-	-	-	-	-	1	-	-	-	1	2
Naked goby				-	-	-	-	-	-	-	2	7	-	9
Oyster toadfish				-	-	-	-	-	-	-	-	1	-	1
Pumpkinseed				-	-	-	-	-	-	-	-	-	1	1
Summer flounder				-	-	-	-	-	-	-	1	-	-	1
Tidewater silverside				-	-	-	-	-	-	-	-	60	-	60
Weakfish				-	-	-	-	-	-	-	3	-	-	3
White perch				1	-	-	1	-	-	-	-	2	1	5
Winter flounder				-	19	28	2	1	-	-	-	-	3	53
Totals				2	19	41	7	19	12	192	51	95	8	447

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TABLE 47. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 19 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day				29		30	29	27	23	29	30	30	
Hour				1355- 1430		1330- 1400	1215- 1245	1300- 1330	1345- 1420	1225- 1310	1050- 1125	1240- 1310	
Sal. (‰)				19.0		15.05	6.25	15.1	17.7	26.85	18.3	14.3	
Temp. (°C.) H ₂ O				6.0		19.5	21.0	25	24.5	19.0	10.5	6.0	
Temp. (°C.) Air				6.0		22.0	21.0	22	25.5	19.0	6.5	6.5	
Alewife	e	e	e	-	e	1	-	-	-	-	-	-	1
American eel	l	l	l	-	l	2	3	-	2	-	1	-	8
Atlantic menhaden	m	m	m	-	m	-	-	-	-	-	-	-	0
Atlantic silverside	s	s	s	-	s	2	-	-	-	-	-	-	2
Bay anchovy	a	a	a	-	a	75	6	-	-	4	-	-	85
Blueback				-		9	-	-	-	-	-	-	9
Bluefish				-		-	-	1	2	-	-	-	3
Fourspine stickleback	n	n	n	1	n	-	-	-	-	-	3	-	4
Northern pipefish				1		-	-	-	-	-	1	-	2
Silver perch				-		-	-	-	-	2	14	-	16
Weakfish				-		-	-	-	-	2	-	-	2
Winter flounder				1		-	5	-	-	4	-	-	10
Totals				3		89	14	1	4	12	19	0	142

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TABLE 48. Number of fishes taken in two ten-minute bottom hauls of a 12-foot semi-balloon trawl at Station 20 in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Species Total
Day				29		30	27	27	22		31	30	
Hour				1430- 1500		1245- 1315	1200- 1230	1205- 1235	1105- 1135		1130- 1200	1315- 1345	
Sal. (‰)	o	e	e	17.9	e	13.85	10.0	12.2	11.9	e	-	10.3	
Temp. (°C.) H ₂ O	p	p	p	7.0	p	20.5	22.0	25.5	25.5	p	11.0	6.0	
Temp. (°C.) Air	p	p	p	8.5	p	23.0	22.0	21.0	25.0	p	7.0	5.0	
American eel	s	s	s	-	s	2	4	3	2	s	-	-	11
Atlantic silverside				-		-	-	-	-		-	19	19
Bay anchovy				-		-	-	2	-		-	-	2
Blueback				-		-	1	-	-		-	-	1
Fourspine stickleback	o	o	o	1	o	-	-	-	-	o	-	-	1
White perch	N	N	N	-	N	-	-	-	-	N	-	2	2
Winter flounder				1		-	-	-	-		-	12	13
Totals				2		2	5	5	2		0	33	49

TABLE 49. Fishes taken in the trawl and stations at which they appeared.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Alewife							X			X	X	X	X		X		X	X	X		9
American eel	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	18
American sand lance	X																				1
Atlantic herring							X														1
Atlantic menhaden		X		X				X			X	X	X			X	X	X	X		10
Atlantic needlefish		X																			1
Atlantic silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
Banded killifish																		X			1
Bay anchovy	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
Blueback		X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	17
Bluefish		X			X	X	X		X				X			X	X		X		9
Butterfish	X																				1
Cornet fish										X											1
Crevalle jack					X												X				2
Cunner							X			X		X									3
Fourspine stickleback	X	X	X	X		X	X	X	X	X		X	X	X	X	X			X	X	16
Grubby										X				X							2
Hogchoker																	X	X			2
Mummichog		X					X		X	X		X	X		X		X	X			9
Naked goby							X	X				X		X	X			X			6
Northern pipefish	X	X	X	X		X	X	X	X	X	X	X	X	X					X		14
Northern puffer									X												1
Oyster toadfish			X			X	X		X	X		X	X	X	X		X	X			11
Pollock					X	X			X	X			X								5
Pumpkinseed																		X			1
Rainwater fish										X											1
Scup						X					X	X									3
Sennet										X											1
Sheepshead minnow							X										X				2
Silver hake									X												1
Silver perch		X		X	X	X	X		X	X					X		X		X		10
Smallmouth flounder	X												X								2
Spotted hake									X					X							2
Spotted seahorse		X				X				X											3
Squirrel hake										X											1
Striped anchovy													X								1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Striped bass												X	X								2
Striped blehny				X										X							3
Summer flounder			X	X		X	X	X		X	X	X						X			9
Tautog			X				X			X	X	X	X	X							7
Threespine stickleback	X			X						X											3
Tidewater silverside																	X	X			2
Weakfish					X	X											X	X	X		5
White perch				X				X		X		X			X	X	X	X		X	9
Windowpane													X								1
Winter flounder	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
Total	10	12	9	14	10	15	17	11	15	23	11	18	17	13	12	9	17	16	12	7	

TABLE 50. [You are Viewing an Archived Copy from the New Jersey State Library](#)
Number of fishes taken at each trawl station in December 1971.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Atlantic menhaden	-	2	-	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	5
Atlantic silverside	11	1	-	-	-	-	-	1	3	1	2	2	-	-	-	-	-	-	-	-	24
Fourspine stickleback	30	35	-	3	-	-	-	4	7	76	1	-	-	-	-	-	-	-	-	-	155
Mummichog	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	4
Northern pipefish	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
Scup	-	-	-	-	-	-	-	-	-	-	1	9	-	-	-	-	-	-	-	-	10
Northern puffer	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Silver hake	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Tautog	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	3
White perch	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3
Winter flounder	18	7	-	40	-	-	-	21	34	-	4	1	-	-	-	1	-	-	-	-	123
Total	59	46	0	45	0	-	0	27	46	77	10	16	0	0	0	1	-	-	-	-	327

TABLE 51. Number of fishes taken at each trawl station in February 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Atlantic menhaden	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2
Atlantic silverside	2	1	-	-	-	-	-	-	1	4	6	36	1	-	1	-	-	1	-	-	53
Blueback	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Fourspine stickleback	15	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	18
Mummichog	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3
Rainwater fish	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Threespine stickleback	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
White perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Winter flounder	1	1	-	-	-	-	2	-	2	-	-	1	-	-	-	-	-	-	-	-	7
Total	19	4	0	-	1	-	2	-	3	6	6	42	1	0	1	-	0	2	-	-	87

TABLE 52. Number of fishes taken at each trawl station in March 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	2
Atlantic menhaden	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	4
Atlantic silverside	1	-	4	-	-	-	1	-	29	2	1	1	-	17	1	-	-	-	-	-	57
Bay anchovy	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Blueback	-	-	-	-	-	-	-	-	-	-	4	1	1	1	-	-	-	-	-	-	7
Fourspine Stickleback	-	1	8	1	-	-	-	-	1	-	-	1	-	22	-	-	-	-	1	1	36
Grubby	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	3
Northern pipefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Oyster toadfish	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
Tautog	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	4
Winter flounder	-	-	3	-	3	-	1	2	-	1	4	4	8	11	-	-	8	19	1	1	66
Totals	1	1	15	1	3	0	2	2	30	3	18	7	9	58	1	0	8	19	3	2	183

TABLE 53. Number of fishes taken at each trawl station in April 1972.

Alewife	-	-	-	-	-	-	-	-	-	4	-	-	1	-	-	-	-	1			6
American sand lance	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			3
Atlantic silverside	-	-	-	-	-	-	-	-	-	9	-	38	-	-	-	-	1	-			48
Bay anchovy	-	-	-	-	-	-	-	-	-	-	145	1	89	-	-	-	-	2			237
Blueback	-	-	-	-	-	-	-	-	-	8	7	-	1	-	-	-	2	10			28
Cunner	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-			1
Hogchoker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-			1
Fourspine stickleback	-	1	1	-	-	-	-	-	2	-	-	1	2	-	2	2	-	-			11
Naked goby	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-			2
Northern pipefish	-	-	-	-	-	-	1	1	1	2	-	-	-	-	-	-	-	-			5
Oyster toadfish	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-			1
Pollock	-	-	-	-	-	-	-	-	2	1	-	-	1	-	-	-	-	-			4
Tautog	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-			2
White perch	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-			1
Winter flounder	2	6	13	3	6	-	4	1	2	2	-	-	1	8	7	7	39	28			129
Totals	5	7	14	4	6	0	5	2	7	26	152	42	95	12	9	9	43	41			479

TABLE 54. Number of fishes taken at each trawl station in May 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
American eel	-	-	1	1	-	1	-	-	-	-	-	-	-	-	4	-	1	-	2	2	12
Atlantic herring	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Atlantic silverside	-	10	4	3	-	11	2	-	60	26	-	-	3	-	55	-	-	-	2	-	176
Bay anchovy	-	4	6	20	50	65	8	9	9	1	3	-	35	-	1	-	35	1	75	-	322
Blueback	-	-	-	4	-	1	-	4	-	-	-	-	-	-	-	1	-	-	9	-	19
Cunner	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Fourspine stickleback	-	-	-	-	-	11	-	-	11	49	-	-	-	-	-	-	-	-	-	-	71
Grubby	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Hogchoker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-	6
Mummichog	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	2
Naked goby	-	-	-	-	-	-	-	-	-	-	-	-	-	8	1	-	-	-	-	-	9
Northern pipefish	-	-	-	-	-	12	-	-	9	41	1	1	-	-	-	-	-	-	-	-	64
Northern puffer	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	4
Oyster toadfish	-	-	-	-	-	1	1	-	2	6	-	-	2	1	-	-	1	-	-	-	14
Pollock	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Spotted hake	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Spotted seahorse	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Squirrel hake	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Striped bass	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Summer flounder	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-	5
Tautog	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3
Threespine stickleback	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
White perch	-	-	-	-	-	-	-	-	-	8	-	1	-	-	1	7	-	1	-	-	18
Winter flounder	5	-	1	7	25	5	5	4	11	12	8	5	-	13	-	5	6	2	-	-	109
Total	5	14	12	36	76	111	17	17	107	151	15	10	40	22	62	8	47	7	69	2	848

TABLE 55. Number of fishes taken at each trawl station in June 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
American eel	-	-	-	1	1	7	-	-	-	-	-	-	-	-	-	8	1	8	3	4	33
Atlantic menhaden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Atlantic needlefish	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Atlantic silverside	-	138	-	1	-	12	-	-	8	-	-	-	-	-	-	-	-	-	-	-	160
Bay anchovy	-	-	4	23	30	4	20	-	-	2	25	-	13	5	3	3	65	8	6	-	211
Blueback	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Bluefish	-	5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	6
Cunner	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Fourspine stickleback	-	-	-	-	-	30	-	-	-	1	-	-	-	-	-	-	-	-	-	-	31
Mummichog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Naked goby	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
Northern pipefish	-	-	-	-	-	60	-	-	1	1	-	1	-	-	-	-	-	-	-	-	63
Oyster toadfish	-	-	-	-	-	6	-	-	-	-	-	1	1	3	1	-	-	-	-	-	12
Scup	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Spotted hake	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Striped bass	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2
Summer flounder	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	3
White perch	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	2	2	-	-	-	5
Winter flounder	1	2	-	-	3	31	10	-	1	-	1	5	-	1	-	-	-	1	5	-	61
Totals	1	146	4	25	34	152	32		10	4	27	9	16	12	8	13	66	19	14	5	597

TABLE 56. Number of fishes taken at each trawl station in July 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-		-	-	-	7	-	-	-	-	-	1	-	-	1	-	-	-	-	-	9
American eel	3		-	-	-	-	-	1	45	-	-	-	-	2	-	2	-	8	-	3	64
Atlantic menhaden	-		-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	4
Atlantic silverside	-		-	-	-	3	2	-	-	-	-	-	1	-	2	-	-	-	-	-	8
Bay anchovy	2		2	480	115	128	65	50	-	-	7	90	13	-	260	150	7	2	-	2	1373
Blueback	-		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Bluefish	-		-	-	2	1	-	-	-	-	-	-	-	-	-	2	1	-	1	-	7
Fourspine stickleback	-		-	-	-	2	2	-	4	-	-	-	-	-	-	-	-	-	-	-	8
Mummichog	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Northern pipefish	-		-	-	-	3	7	-	5	-	-	-	-	-	-	-	-	-	-	-	15
Oyster toadfish	-		1	-	-	-	3	-	4	1	-	-	-	1	-	-	-	-	-	-	10
Spotted seahorse	-		-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Tautog	-		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Weakfish	-		-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
White perch	-		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Winter flounder	-		-	3	35	-	65	-	6	2	-	-	-	1	4	1	-	-	-	-	117
Totals	5		3	483	132	146	145	51	64	3	7	91	14	4	269	153	8	12	1	5	1621

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TABLE 57. Number of fishes taken at each trawl station in August 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
American eel	-	-	-	-	2	1	-	-	-	-	1	1	-	-	-	-	-	-	2	2	9
Atlantic menhaden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-	5
Atlantic silverside	-	-	-	1	-	48	-	-	85	220	-	-	-	1	-	-	-	-	-	-	355
Bay anchovy	-	4	10	350	180	9	72	9	2	-	1	75	1	-	125	175	560	190	-	-	1769
Bluefish	-	-	-	3	-	-	-	-	2	-	-	-	-	-	-	1	-	-	2	-	8
Creville jack	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2
Fourspine stickleback	-	-	-	-	-	16	-	-	6	1	-	-	-	-	-	-	-	-	-	-	23
Hogchoker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
No. pipefish	-	-	-	-	-	21	-	-	5	50	-	-	6	-	-	-	-	-	-	-	82
Mummichog	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Oyster toadfish	-	-	-	-	-	2	-	-	-	-	-	-	2	2	-	-	-	-	-	-	6
Sennet	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2
Silver perch	-	-	-	-	-	51	-	-	1	-	-	-	-	-	-	-	-	-	-	-	52
Summer flounder	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	2
Tautog	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Weakfish	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3
Winter flounder	3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Totals	3	4	10	354	184	148	79	10	101	276	2	76	11	3	185	176	567	192	4	2	2321

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TABLE 58. Number of fishes taken at each trawl station in September 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
American eel	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	5
Atlantic silverside	-	-	-	-	-	-	-	-	115	-	-	-	-	-	-	-	-	-	-	-	115
Bay anchovy	-	10	35	880	37	24	31	48	7	230	-	-	440	-	1735	2340	675	41	4	-	6527
Bluefish	-	1	-	-	-	1	1	-	-	-	-	-	-	-	1735	2340	675	41	4	-	6527
Crevalle jack	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	5
Fourspine stickleback	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	5
Naked goby	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
No. pipefish	-	1	-	-	-	-	1	-	4	-	-	-	-	2	-	-	-	2	-	1	3
Oyster toadfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Silver perch	-	-	-	-	-	8	-	-	1	-	-	-	1	4	1	-	-	-	-	-	6
Spotted seahorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	2	-	17
Striped anchovy	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2
Summer flounder	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	5
Tautog	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	3
Weakfish	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1
Winter flounder	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	5	3	2	-	11
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	6
Total	0	13	35	880	37	35	37	48	123	232	0	446	7	2726	2340	675	51	12			6720

TABLE 59. Number of fishes taken at each trawl station in October 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
American eel	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	1	1	-	5
Atlantic menhaden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	4
Atlantic silverside	1	-	1	2	1	2	-	6	55	55	-	-	-	-	18	1	24	20	-	-	186
Bay anchovy	2850	1800	100	10	-	1	200	-	-	6	-	-	25	-	6	23	4	-	-	-	5025
Bluefish	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Butterfish	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Cornet fish	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Fourspine stickleback	-	-	-	-	-	16	-	-	200	-	-	-	-	-	-	-	-	-	3	-	219
Mummichog	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	4
Naked goby	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	7	-	-	11
No. pipefish	-	1	1	-	-	4	-	2	14	15	-	-	-	-	-	-	-	-	1	-	38
Oyster toadfish	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	1	-	-	5
Sheepshead minnow	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
Silver perch	-	-	-	15	1	16	3	-	4	30	-	-	-	-	2	-	56	-	14	-	146
Striped blenny	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	3
Summer flounder	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Tautog	-	-	1	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	4
Tidewater silverside	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	60	-	-	132
White perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	3
Winter flounder	1	1	13	-	6	1	1	1	-	-	-	-	-	5	-	-	4	-	-	-	30
Total	2853	3502	117	29	8	40	214	10	280	108		0	27	13	26	24	162	95	19	0	5827

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TABLE 60. Number of fishes taken at each trawl station in November 1972.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Alewife	-	-	-	-	-		-	-	-	-		-	1	-	-	-	-	-	-	-	1
American eel	-	-	-	1	-		-	-	-	-		-	-	-	-	-	-	2	-	-	3
Atlantic menhaden	-	-	-	-	-		-	-	-	-		-	5	-	-	-	-	-	-	-	5
Atlantic silverside	3	3	-	-	1		-	-	7	3		-	2	11	-	-	-	-	-	19	48
Banded killifish	-	-	-	-	-		-	-	-	-		-	-	-	-	-	1	1	-	-	2
Bay anchovy	-	300	200	-	-		-	-	-	-		2	-	-	-	-	-	-	-	-	502
Blueback	-	2	-	-	-		-	-	1	-		-	2	-	-	-	-	-	-	-	5
Cunner	-	-	-	-	-		-	-	-	-		1	-	-	-	-	-	-	-	-	1
Fourspine stickleback	1	-	-	1	-		-	30	16	7		-	-	-	-	-	-	-	-	-	55
Mummichog	-	-	-	-	-		-	-	1	-		-	-	-	-	-	-	1	-	-	2
Naked goby	-	-	-	-	-		5	-	-	-		1	-	-	-	-	-	-	-	-	6
No. pipefish	3	1	21	-	-		2	-	1	-		-	3	1	-	-	-	-	-	-	32
Oyster toadfish	-	-	-	-	-		-	-	-	-		-	-	1	-	-	-	-	-	-	1
Pumpkinseed	-	-	-	-	-		-	-	-	-		-	-	-	-	-	-	1	-	-	1
Sheepshead minnow	-	-	-	-	-		-	-	-	-		-	-	-	-	-	2	-	-	-	2
Silver perch	-	2	-	-	-		-	-	-	4		-	-	-	-	-	-	-	-	-	6
Smallmouth flounder	1	-	-	-	-		-	-	-	-		-	1	-	-	-	-	-	-	-	2
Summer flounder	-	-	-	-	-		-	-	-	-		1	-	-	-	-	-	-	-	-	1
White perch	-	-	-	-	-		-	1	-	-		-	-	-	-	1	-	1	-	2	5
Windowpane	-	-	-	-	-		-	-	-	-		-	1	-	-	-	-	-	-	-	1
Winter flounder	-	6	4	8	7		1	2	-	1		3	14	17	1	1	19	3	-	12	99
Total	8	314	225	10	8		8	33	26	15		8	29	30	1	2	22	9	0	33	782

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TABLE 61. Salinity recorded monthly at each trawl station in the Upper Barnegat System from December 1971 through November 1972.

	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1	18.3		19.7	21.3	20.3	20.5	22.05	12.2	17.9	24.8	-	20.3
2	18.5		20.2	23.6	21.45	18.4	19.6	-	23.8	23.2	-	22.8
3	18.5		20.2	18.8	18.15	15.1	18.3	15.35	18.8	20.0	20.4	16.9
4	10.7		-	15.0	11.8	10.1	11.7	8.65	13.0	16.4	16.4	13.7
5	-		14.4	13.9	15.3	13.35	12.55	10.45	12.6	17.6	17.6	13.9
6	-		-	17.3	16.7	15.75	13.65	14.4	14.9	23.4	20.2	-
7	-		14.4	13.4	13.4	13.75	12.85	11.55	13.9	17.3	16.3	14.0
8	12.1		-	13.6	13.5	12.7	-	11.75	15.3	18.5	15.7	11.9
9	16.9		-	19.6	17.95	19.7	18.2	16.4	20.9	17.9	-	21.3
10	19.6		-	19.6	19.8	21.9	21.5	18.9	16.3	17.9	-	17.7
11	17.1		16.9	21.0	16.65	14.6	17.65	18.3	22.2	-	-	-
12	17.2		17.5	20.6	18.8	14.0	17.05	17.4	21.9	22.5	-	13.7
13	-		18.3	23.3	20.85	19.4	22.05	20.2	23.8	25.1	-	20.2
14	-		-	22.4	18.35	18.5	19.65	18.5	23.2	24.3	-	16.7
15	-		14.9	2.9	4.2	1.6	12.6	2.65	15.5	15.2	19.3	13.3
16	9.0		-	2.6	4.2	2.4	7.5	0.0	5.8	7.15	14.8	0.0
17	-		12.2	12.3	13.7	11.6	11.05	10.3	10.8	16.9	17.0	12.9
18	-		11.6	8.8	11.0	8.5	6.25	7.7	4.4	19.1	15.3	9.4
19	-		-	19.0	-	15.05	6.2	15.1	17.7	26.8	18.3	14.3
20	-		-	17.9	-	20.5	9.95	12.2	11.9	-	-	10.3

TABLE 62. Water temperatures recorded monthly at each trawl station in the Upper Barnegat System from December 1971 through November 1972. (°C.)

	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.
1	6		4	6	11	-	19.5	25.5	26	24	11	5
2	5		0	5.5	12	17	21.5	-	26	21.5	18	7
3	5		2.5	4.5	12	17	19	27.5	25	22	12	6
4	7		-	3	9	17	21	29.5	21	23.5	11.5	6.5
5	-		-	4.5	10	18.5	18.5	29	21.5	20	11	6
6	-		-	6	9.5	18.5	19.5	24.5	24.5	19	10.5	-
7	-		-	4	9	17.5	18	-	24	20	10.5	6
8	7		-	4	9	17	-	29.5	22	24	10.5	6
9	6		3.5	4	12	16	18	23	21	21	16	6.5
10	6		3	6	8	15	18	22	24	21	16.5	4.5
11	12		10	12	17	-	21	30.0	23	-	-	-
12	12		12	13	14	-	21	29.5	22.5	29	21	14
13	-		5	5.5	10.5	17.5	21	-	23	25	14.5	6
14	-		5	6	10	18	21	24.5	23.5	25	10	6
15	-		5	4	17	17	21	25.5	24	24	13	6
16	9		-	4	17	16	21	27	22	23	11	7.5
17	-		-	6	11.5	20	20.5	25	22	25	11.5	6.5
18	-		-	7	11.5	22	21	31	22	22	12.5	7.0
19	-		-	6	-	19.5	21	25	24.5	19.0	10.5	6.0
20	-		-	7	-	20.5	22	25.5	25.5	-	11	6

No Sample

TABLE 63. Ten most abundant species (seine and trawl) taken in the Upper Barnegat System, the number of stations and the months in which they appeared.

Species	Stations		Months
	Seine	Trawl	Seine & Trawl Combined
Bay anchovy	9	20	9
Atlantic silversides	12	20	12
Tidewater silversides	11	2	12
Winter flounder	9	20	11
Fourspine stickleback	8	16	12
Northern pipefish	10	14	10
Mummichog	11	9	8
Silver perch	3	10	4
American eel	4	18	8
Blueback	2	17	7

TABLE 64. Ten most abundant species taken by seine in the Upper Barnegat System, the number of stations and the months in which they appeared.

Species	Stations	Months
Atlantic silversides	12	12
Bay anchovy	9	5
Tidewater silverside	11	12
Mummichog	11	8
Winter flounder	9	7
Northern pipefish	10	8
Sheepshead minnow	6	4
Bluefish	9	3
Silver perch	3	3
Striped killifish	3	4

TABLE 65. Ten most abundant species taken trawling in the Upper Barnegat System, the number of stations and the months in which they appeared.

Species	Stations	Months*
Bay anchovy	20	9
Atlantic silverside	20	11
Winter flounder	20	11
Fourspine stickleback	16	11
Northern pipefish	14	10
Silver perch	10	4
American eel	18	7
Tidewater silverside	2	1
Blueback	17	7
Oyster toadfish	11	9

* No trawling in January

PHASE II. CHEMICAL-PHYSICAL STUDIES

JOHN F. MAKAI

ABSTRACT

The purpose of this portion of the study was to map and/or describe the physical and chemical attributes of the Upper Barnegat System.

Fifty water quality and twenty-one nutrient water quality stations were sampled monthly from December 1971 until November 1972. Data was collected on the following: dissolved oxygen, salinity, pH, turbidity, "free" carbon dioxide, dissolved solids, ammonia, nitrite-nitrate, detergents, ortho and total phosphate along with air and water temperatures.

Water temperatures ranged from -1.0° to 37.2° C. during the study period with the warmest area situated in the lower bay region, Oyster Creek (discharge canal for the Oyster Creek Nuclear Generating Station).

Dissolved oxygen ranged from 0.0 to 14.8 ppm. pH ranged from 4.5 to 8.7. Salinity ranged from .21 to 31.5 ‰. "Free" carbon dioxide ranged from 0.0 to 18.7 ppm. Turbidity values ranged from < 25 to 130 J.T.U. (Jackson Turbidity Units). Dissolved solids ranged from 45 to 29,800 ppm. Only slight traces of nitrite were recorded ranging from 0.0 to .46 ppm. Nitrate values ranged from 0.0 to 3.6 ppm. Ammonia readings ranged from .12 to 2.6 ppm. Ortho ranged from 0.0 to .50 ppm. and total phosphate from .02 to 3.5 ppm. Detergent concentrations ranged from 0.0 to .30 ppm.

DDT and its metabolites were found in 64% of the sediment samples with values ranging up to 2,234 ppb and 91% of the fish samples with values ranging to 300 ppb. Other insecticides detected in

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the fish samples were BHC, aldrin and heptachlor. Heptachlor was found to be the next highest level to DDT occurring in 22% of the samples.

A revaluation survey was undertaken on nineteen reported dredge holes to determine their suitability for finfish habitat. Data collected included temperature, dissolved oxygen, hydrogen sulfide, pH, depth and bottom invertebrates.

Of the holes examined, only the bottom waters of eight holes were found to have oxygen levels of 5 ppm. or more. This was found to be an 11% increase over the total number of holes from the 1963 - 1966 survey. Hydrogen sulfide concentrations were detected in 50% of the holes with levels greater than 5 ppm. Bottom invertebrate were present in only six holes.

A deep gratitude is extended to the people and various agencies that made it possible to present pertinent maps and data available for this report. Senior Fisheries Worker Jeffrey Carlson and summer worker Frederick Bubeck aided in the collection of water samples and analyses.

METHODS AND MATERIALS

From December 1971 through November 1972, water quality and nutrient water quality analysis were conducted either from shore or by boat.

Water Quality:

Monthly collections of surface and bottom waters were made at 50 stations (see Figure 1 for exact locations). From this total, 15 peripheral and 13 channel stations were located in Barnegat Bay. Peripheral sampling was conducted in areas with a depth ≤ 4 feet at mean low water. The other 22 stations were sampled either from shore or in the channel depending on weather.

Most of the 50 stations corresponded to the seining and trawling stations, Fish Studies. However, they were not sampled on the same days. Analysis of water samples usually were completed within five hours after collection.

Nutrient Water Quality:

Surface water samples were collected monthly at 21 stations (see Figure 1 for exact locations). Nitrite and nitrate tests were conducted in the field and water samples were brought back to the laboratory to be analyzed for phosphate and ammonium nitrate. Water samples were collected in 8 oz. dark prescription bottles chemically cleaned. Each sample was preserved with 1 ml. of chloroform and stored with ice packs until time of analysis. All ammonium nitrogen

(NH₄) samples were allowed to return to 20° C. before testing. Surface water temperatures, salinities, pH, detergents and dissolved solids were also recorded during the sampling. Analyses of samples usually were completed within two to three hours after collection.

Pesticide, Heavy Metals, and Radiation Levels:

Selected fish and sediment samples were analyzed for both pesticide (chlorinated hydrocarbons) and heavy metal (mercury, cadmium, lead, chromium and zinc) concentrations. Species of fish such as silversides, bay anchovy, winter flounder and perch were collected monthly whenever quantity permitted by estuarine personnel. All samples were placed in plastic bags and kept frozen until time of analysis.

Sediment samples were collected during the summer months at 31 stations with a 6-inch Eckman bottom dredge. All samples were stored in plastic pint containers and kept frozen until time of analysis.

For radiation analysis, only species of fish that were in sufficient quantities (1 gallon) were collected, stored in plastic bags and kept frozen until time of analysis.

Isohaline and Isotherm Distribution:

Surface water temperatures and salinity data were collected bi-monthly on selected transects situated throughout the system. Within the bay, each transect was located approximately one nautical mile apart and in the river system approximately 1500 yards apart. Each transect had a selected number of stations.

Water temperatures were recorded with a FT3 Marine Hydrographic Thermometer, and salinity levels were measured with a Beckman Portable Conductivity Meter (0 to 40 ‰ direct readout).

Both probes were dropped to a depth of one foot during each recording.

This survey was conducted during the months of July and August when weather permitted and was not designed to be executed during any particular tidal flow. Results will provide a summer mean isohaline and isotherm distribution pattern for the Barnegat Bay System.

Dredge Hole Survey:

This survey was a revaluation of the dredge holes (borrow pits) originally located and analyzed in the Barnegat Bay System by Mr. Walter S. Murawski, Bureau of Fisheries, New Jersey Division of Fish, Game & Shell Fisheries, 1969. It was the objective of this investigation to determine what change in conditions, if any, has transpired over the last nine years and what type of habitat has evolved for finfish populations.

Eighteen out of the original nineteen holes situated within the study area were located and evaluated according to the methods and procedures of Walter Murawski. The survey was conducted during the late summer and early fall months.

Laboratory Equipment:

Most of the equipment and procedures used in both water quality and nutrient water quality are described in Studies of The Great Egg Harbor Bay and River 1971. However, there were some changes and they were as follows:

pH Determinations were made with a Big Scale pH Meter.

Dissolved Solids (ppm). Levels were measured with a Beckman Portable Conductivity Meter with a range of 0 to 60,000 microhoms/cm.

Temperature °C. A FT3 Marine Hydrographic Thermometer

with a 50-foot probe was used in all field work to record water temperatures. This instrument has an accuracy of $\pm 0.56^{\circ}$ C. All air temperatures were recorded with pocket thermometers in 1° Centigrade (C) gradations, range -30° to $+50^{\circ}$ C. with a $\pm .5$ deviation.

Eight Model D Waterproof Ryan Thermographs were used to record year 'round water temperature data. This instrument has a recording time span of 45 days and two centigrade ranges: -5° to 25° C. and $+10^{\circ}$ to $+40^{\circ}$ C. In order to change temperature ranges, the recorder had to be sent back to the company for calibration.

All recorders were housed in a protective pipe assembly (for details see Studies of Great Egg Harbor Bay and River, 1971), and placed in selected areas (see Figure 1). Location and depth were as follows: Barnegat Inlet (20 ft.), Waretown (4 ft.), Goodluck Point (4 ft.), Havens Point (4 ft.), Metedeconk River (5 ft.), Toms River (6 ft.), and Oyster Creek (4 ft.).

Tidal data was obtained from the Coast and Geodetic Survey Tide Tables Atlantic Coast of North America. Coast and Geodetic Survey Charts with a scale of 1:24,000 were used for all bay and major tributary morphometric measurements and Nautical Chart 824-SC, scale 1:40,000 for Forket River and major creeks morphometric measurements. Linear measurements were obtained with the use of a map rotometer. All area measurements were computed with a Keuffel and Esser Compensating Polar Planimeter. Profiles were mapped with a Beckman Fathometer.

Fish and sediment samples were analyzed for chlorinated

hydrocarbons and heavy metal levels by gas chromatography and atomic absorption at the Lebanon Laboratory. Radiation levels were provided through the cooperation of the State of New Jersey, Bureau of Radiation Protection.

Description of Area.

The Upper Barnegat Watershed Study Area consisted of Barnegat Bay and major tributaries such as the Metedeconk, Toms and Forked Rivers. Also included were major creeks such as Oyster, Cedar Silver Bay, Kettle and Beaverdam.

The total acreage within this estuarine system was 68,196 acres, including Island Beach State Park (State owned land). From this total, water acreage surveyed was 35,468 acres. Barnegat Bay had 30,284 acres, or 85%, of this acreage. The water acreage for the tributaries affecting the study area were the Metedeconk (1,023 acres), Toms (1,798 acres), and Forked Rivers (207 acres) (see Table IV).

Barnegat Bay is separated from the Atlantic Ocean by the land barrier Island Beach. The only access to the ocean would be through Manasquan Inlet via Point Pleasant Canal (upper boundary) or Barnegat Inlet, via Oyster Creek Channel (lower boundary).

The bay system is very shallow. From the 30,284 water acres, 75% or 22,599 acres are six feet or less in depth at mean low water (see Figure 3). Flats and shoal area make up the eastern portion of the bay extending from Barnegat Inlet northward to Mantoloking.

At mean low water, the bay area ranges in depth from $\frac{1}{2}$ to 11 feet. Access through the 22-mile (statute) study area is provided by the Intracoastal Waterway situated near the western bay

shore. A smaller waterway located near the eastern bay shore (extending northward from the State Highway Route 37 Seaside Heights Bridge to Mantoloking Estates) allows boater access to the heavily developed area.

The tide is of the semi-diurnal type: there are two flood tides and two ebb tides in a normal day. Tidal range is very small: 0.6-0.8 feet. Barnegat Inlet being shallow and narrow allows only small volumes of tidal water to enter or leave the bay. Currents within this inlet are found to be very rapid.

Located within the Barnegat System is New Jersey's first Nuclear Power Generating Station. The plant is situated in Lacey Township, just west of State Highway Route 9, between Forked River and Oyster Creek. In 1969, the Jersey Central Power and Light Company put Unit #1, a 1930 megawatt (thermal) power facility into commercial operation. According to Dr. McCurdy, the reactor is a single-cycle, forced circulation boiling water reactor producing steam for direct use in the steam turbine. The fuel consists of uranium dioxide pellets contained in sealed zircology - 2 rods.^{13/}

The land between as well as portions of Oyster Creek and the South Branch of Forked River have been dredged and modified in order to establish a "horseshoe" shaped canal system. The plant is located at the end of the "horseshoe" and is able to draw large volumes of water from Barnegat Bay through Forked River. It is in the South Branch that the intake pipes are located. Water drawn through the plant cool the condensor and then is discharged into the canal of Oyster Creek.

The AT across the condensor normally is 21° to 22° F. By means of a dilution pumping system, water taken from Forked River

bypasses the plant and is mixed with the heated effluent. The discharge empties back into Barnegat Bay at a velocity of 460,000 gpm. (capacity of 4 circulating pumps only).^{18/}

The plume area was defined by Carpenter through his dye study in 1963. The distribution of rhodamine B fluorescent dye illustrated bay currents flowing from the Oyster Creek area south, adjacent to the Waretown Fishing Station, and then swinging out to the Barnegat Inlet to the ocean via the Oyster Creek navigation channel.^{1/}

Some of the effects that have resulted since the Nuclear Plant has gone into operation are as follows:

1. The tidal flow in both Oyster Creek and the South Branch of Forked River have become unidirectional. As a result, only the saline water from the bay is continuously flowing through both canal systems and upland influence has been greatly reduced.

2. Water temperatures in Oyster Creek are increased 5 to 20° F. over ambient temperatures. This temperature difference has prevented the canal from icing during the colder months and permitted boats to remain in the water year 'round.

3. The area (Oyster Creek canal) has become a popular fishing spot during the colder months (see Use Studies for details). However, it is also during the winter months (January and February) that has become a critical period for the species Brevortia tyrannus, Atlantic menhaden. The menhaden appear to have remained in this canal system, attracted by the warmer water, when they would normally migrate from the area during the late fall or early winter months. However, it has been found that Barnegat Bay may have a wintering population (see Fish Studies). It has been found that if

the plant shuts down or goes off the line and stops the heated effluent but continues to introduce water (at ambient temperature) into the canal, the sudden decrease in water temperature has resulted in menhaden mortality.

Vegetation:

According to Loveland 1969, most of the algae in Barnegat Bay appear to be unattached and great masses of the dominant species drift with the currents along the bottom. The greatest number of species occurring in June. From the total of 119 benthic algae species he identified, only 16 occurred over 50% of the time. The more dominant species included Ceramium fastigiatum, Gracilaria verrucosa, Ulva lactuca, Agardhiella temera, and Codium fragile.^{11/}

In 1967, Wildlife Biologist William Shoemaker conducted an eel grass, Zostera marina, survey in Barnegat Bay. Other plants included were the widgeon grass, Ruppia maritima, sea lettuce, Ulva lactuca, and Irish moss, Chondrus crispus. As a result of this survey, he mapped concentrations of Zostera marina growing along the eastern (extending from Hedge Islands to Seaside Park) and western (extending from the mouth of Forked River to Goodluck Point) shoal areas in the lower section of the bay. The greatest concentrations were found along the eastern bay side (Island Beach State Park) and extended out into the bay just south of Seaside Park. South of Forked River, the seaweed Ulva lactuca was observed along the peripheral.

Just south of Seaside Park, both Zostera and Ruppia were observed along the shoreline. Both grasses continued along the peripheral and the southern shoal area of Pelican Island. Along the western bay shore, mixtures extended from Coates Point to the

mouth of Silver Bay.

Beyond the Thomas Mathis Bridge (Rte. #37), only Ruppia was observed in the eastern (extends from Pelican Island to Curtis Point) and western (Andrew Point and Seaweed Point) portions of the bay. The greatest concentration within this area also was situated in the eastern shoal area and extended out into mid-bay.

In the upper northern region of the bay, mixtures of Chondria and Ulva were observed northwest of Herring Island. Heavy patches of Ulva were located at the mouth of the Metedeconk River (Flashing Red Light #2).

The importance of Zostera and Ruppia being present within an estuary as noted by Odum 1961, that they are the primary producers providing food for aquatic organisms and waterfowl.^{12/}

Shellfish:

Shellfish found in this estuary are the oyster, Crassostrea virginica, hard clam, Mercenaria mercenaria, soft-shelled clam, Mya arenaria, and bay scallops, Aequipectera irradians. Figure 2 shows the distribution pattern of shellfish within the Barnegat Bay System according to commercial value prepared by the U. S. Department of the Interior, Fish and Wildlife Service, 1963.

Marshland Development:

A great deal of marshland within the upper Barnegat Bay System has been or is being destroyed for housing development. It is the filling in or dredging out of marshland that results in the direct loss of good habitat. According to Ferrigno 1972, within the last nineteen years, 10,521 acres or 28.4% of Ocean County's marshes were filled in for housing development. He also notes that extremely heavy losses occurred along the Metedeconk River and northern Barnegat Bay areas.^{13/}

In a Lagoon Study done by Rutgers University 1972, it was reported that over 90% of the total development taking place along the New Jersey shore is located in Ocean County. Within the study area, there are 5,301.6 acres of lagoon systems present. This is about 63% of the total lagoon development area that has taken place in Ocean County. This was estimated to be 203,850 feet of developed shoreline. The total length of these lagoons was 491,620 feet and having the capacity for 16,434 homes. At present it is reported that there are 8,000 built.^{15/}

The Rutgers study further notes that the only municipalities having shoreline but no lagoon development were Point Pleasant Beach and Bay Head. However, Brick, Dover and Lacey townships contain relatively large amounts of lagoon development; Point Pleasant, Berkeley and Ocean townships contain a significant amount of lagoon development, and Mantoloking and Seaside Park contain relatively little development.^{15/}

Sewage Treatment Plants:

There are 15 municipalities which comprise the study area. According to the Ocean County Master Plan for Wastewater Management 1972, within these municipalities there were a total of 15 Regional Pumping Stations, 2 Regional Lifting Stations, 16 Existing Sewage Treatment Plants and two outfall pipes coming from the Central and Northern Regional Sewage Treatment Plants (see Table I). The Atlantic Ocean is the receiving water for both the Central (via Seaside Park Boro) and Northern (via Mantoloking Boro) outfall pipes. Only those facilities that were situated east of the Garden State Parkway and within the upper and lower boundaries of the survey area are listed.

As was previously mentioned, a great deal of housing development has transpired in Ocean County over the years. With this type of development, water frontage or lagoon homes are provided to a great number of people in relatively small areas. Not all areas were designed to provide the sewage facilities needed to accommodate such large masses. In the past, homes were connected to septic tanks; however, due to changes in law, sewer lines are now being installed.

Table II lists data collected by Rutgers University on those treatment plants that do provide service for a lagoon system situated within the study area. Table III, also from this study, lists the particular systems that are now connected to these plants. Approximately 36%, or 16 out of the total 44 lagoon developments, do have sewer lines. From the 16 systems, 10 are situated in the municipality of Dover.

This listing has been given to present possible sources of pollution and as well provide some insight as to what type of facility and location now exist within this watershed.

TABLE I. Sewage Facilities in Upper
Barnegat System

Municipality	Type of Facility	Location
Ocean Twp.	R.P.S. and S.T.P.	Lockiel Creek, Peeble Beach
Ocean Twp.	T.P.S. and S.T.P.	Waretown Crk., Birdsall St.
Lacey Twp.	S.T.P.	Between South Branch of Forked River and Oyster Creek
Lacey Twp.	R.L.S. and S.T.P.	North Branch of Forked River, Parker Avenue
Berkeley Twp.	R.L.S. and S.T.P.	Holly Park, Rogers Rd.
Berkeley Twp.	S.T.P.	Pinewald, Keswick Rd.
Berkeley Twp.	R.P.S.	Shore Boulevard
Berkeley Twp.	Central Regional S.T.P.	South of Ocean Gate
Berkeley Twp.	R.P.S. and S.T.P.	South Seaside Park
Dover Twp.	R.P.S. and S.T.P.	Toms River, Flint Road
Dover Twp.	R.P.S.	Cranmoor, Toms River
Dover Twp.	E.P.S.	Windsor Park
Dover Twp.	S.T.P.	So. Branch of Silver Bay
Dover Twp.	S.T.P.	So. Branch of Kettle Crk.
Brick Twp.	S.T.P.	No. Branch of Kettle Crk.
Brick Twp.	R.P.S. and S.T.P.	So. Branch of Metedeconk River, Chambers Bridge
Brick Twp.	S.T.P.	So. Branch of Metedeconk River, Route 70
Brick Twp.	R.P.S.	Wardell's Neck, Princeton Avenue
Brick Twp.	Northern Regional S.T.P.	Mantoloking Bridge, Rt. 528
Ocean Gate Boro	R.P.S.	Toms River

TABLE I. (Continued)

<u>Municipality</u>	<u>Type of Facility</u>	<u>Location</u>
Pine Beach Boro	No Facility	Toms River
Beachwood Boro	No Facility	Toms River
Island Heights Boro	No Facility	Toms River
Point Pleasant Boro	R.P.S.	Oriole Way
Bay Head Boro	R.P.S.	Clayton Avenue
Mantoloking Boro	No Facility	Mantoloking
Lavallette Boro	R.P.S. and S.T.P.	Lavallette
Seaside Heights Boro	R.P.S. and S.T.P.	Seaside Heights
Seaside Park Boro	R.P.S. and S.T.P.	Seaside Park

R.P.S. - Regional Pumping Station

R.L.S. - Regional Lifting Station

S.T.P. - Sewage Treatment Plant

TABLE II. Sewerage Treatment Plant Data*

Treatment Plant No.	Location	Operator	Design Capacity (mgd.)	Average Flow (mgd.)	Type of Treatment	Receiving Waters
1	Ocean Twp.	Mid-Jersey Sewerage Co.	0.085	0.035 S 0.02 W	Secondary	Waretown Creek to Barnegat Bay
2	Ocean Twp.	Indianola Sewerage Co.	0.1 0.4	0.10 S 0.08 W	Tertiary	Lochiel Creek to Barnegat Bay
3	Berkeley Twp.	Berkeley Twp. Sewerage Authority	0.3	0.22	Secondary	Lagoon to Barnegat Bay
4	Berkeley Twp.	Berkeley Twp. Sewerage Authority	0.25	0.05 S 0.04 W	Secondary	Clamming Creek to Barnegat Bay
5	Dover Twp.	Dover Sewerage Authority	6.0	0.9 S 0.25 W	Secondary	Atlantic Ocean
6	Seaside Park	Municipality of Seaside Park	0.96	0.93 S 0.25 W	Primary	Atlantic Ocean

S - Summer
W - Winter

* Nieswand, Stillman & Esser - Rutgers University.

<u>Municipality</u>	<u>Development Name</u>	<u>Type of Sewage Dis- posal System</u>	<u>Connec- tion Date</u>	<u>Treatment Plant Number</u>
Dover	Green Island	Sewers	1972	5
Dover	Silver Bay	Sewers	1972	5
Dover	Anchorage	Sewers	1972	5
Dover	Snug Harbor	Sewers	1971	5
Dover	Seaside Heights Harbor	Sewers	1970	5
Dover	Dover Shores	Sewers	1970	5
Dover	Bayshore	Sewers	1970	5
Dover	Point O' Woods	Sewers	1972	5
Berkeley	Berkeley Shore Estates	Sewers	1966	3
Berkeley	Glenn Cove	Sewers	1966	4
Ocean	Skipppers Cove	Sewers	1960	1
Ocean	Barnegat Shore Estates	Sewers	1962	2
Brick	Mantoloking Estates	Sewers	1965	5
Dover	Normandy Beach	Sewers	1962-67	5
Dover	Ortley Beach	Sewers	1965	5
Seaside Park	North Harbor	Sewers	1949	6

* Nieswand, Stillman & Esser - Rutgers University

MORPHOMETRIC DATA

Upper and lower boundaries of the Upper Barnegat System were established arbitrarily for the purpose of survey and analysis as follows (see Figure 1):

Upper Boundary: Farthest point north of Barnegat Bay indicated by a line from Bay Head across the mouth of Point Pleasant Canal.

Lower Boundary: Indicated by a line across the bay from Barnegat Light to mouth of Barnegat Lagoons.

The data compiled included the following measurements and calculations according to Shuster 1959 and Welch 1948:

(1) Maximum Length (MxL): 21.6 Statute Miles; 18.8 nautical miles.

Length of line connecting the two most extremities of the bay and crossing no land other than islands. In this case, a line from Flashing Light #1 (Intracoastal Waterway) to Flashing Red Light #10 (off the mouth of Point Pleasant Canal).

(2) Maximum Effective Length (MxEL): 13.7 Statute Miles; 11.9 Nautical Miles.

Length of straight line connecting the most remote extremities of the bay along which wind and wave action occur without any kind of land interruption. In this case, from Flashing Red Light #68 (Intracoastal Waterway) to Thomas Mathis Bridge (State Highway Route #37).

(3) Maximum Width (MxW): 4.6 Statute Miles; 4.0 Nautical Miles.

Length of a straight line connecting most remote extremities of the bay and crossing no land other than islands. It is a line

approximately at right angles to the maximum length axis. It is a line from a point just south of Sands Point to Island Beach State Park (area back of Sedge Islands).

(4) Maximum Effective Width (MxEW): 3.7 Statute Miles;
3.2 Nautical Miles.

Length of straight line connecting the most remote extremities of the width of the bay along which wind and wave action occur without any kind of land interruption. It is a line from point north of Forked River mouth to cove on Island Beach State Park (north of Lookout Tower).

(5) Mean Width (MeW): 2.4 Statute Miles; 2.1 Nautical Miles.

The area of the bay divided by its maximum length.

(6) Maximum Depth (MxD): 24 feet; 7.3 meters; 4.0 fathoms.

The maximum depth known.

(7) Mean Depth (MeD): 5.3 feet; .88 fathoms.

The volume of the bay divided by its surface area.

(8) Mean Depth-Maximum Depth Relation (MeD/MxD): 0.22

The mean depth divided by the maximum depth. This is expressed as a decimal value and serves as an index figure which indicates in general the character of the approach of basin shape to conical forms.

(9) Maximum Depth-Surface Area Relation (MxD/AS): .001.

The maximum depth divided by the square root of the surface area. It is expressed as a decimal value and is an indication of the relation of depth to horizontal extent.

(10) Total Surface Area (AS): 47.3 Square Miles (Statute
30,285 Acres.

Total surface area of the bay. Coast and Geodetic Survey Chart was divided into twelve sectors to enable easier and more accurate handling of the planimeter. The results for each sector were combined to give the total area.

(11) Length of Shoreline (LSH): East shoreline: 36.7 Statute Miles; West shoreline: 41.6 Statute Miles; Total: 78.3 Statute Miles.

The length of the shoreline enclosing the bay measured in statute miles.

(12) Volume (V): 6,929,960,400 Cubic Feet;
51,839,707,372 Gallons.

$$\text{Formula} - V = Y_3 \frac{1}{3} (A_1 + A_2 + \sqrt{A_1 + A_2}) h$$

Where A_1 is the area of the upper surface of a contour stratus and A_2 is the area of the lower surface of the same stratum, the height of the stratum is shown by h . The volume for each stratum is computed from the formula, the sum of the volumes being the total volume at mean low water (Reid 1961).

(13) Hypsographic Curve: A curve constructed by plotting depth along the ordinate and area along the abscissa. Such a curve provides not only certain elements in the form of a basin but it also provides a means whereby areas at any depth level may be determined (see Figure 3).

(14) Profiles: These provide a pictorial representation of the basin configuration along a selected line. The profiles were constructed with a vertical scale of 1 mm. equal to 1.33 ft. All the profiles selected were perpendicular to the ship channel (Figure 4). The profiles are illustrated in Figure 5.

TABLE IV. Area of Submerged Contours

A_1 = surface to 3 feet contour depth; A_2 = 3 to 6 feet;
 A_3 = over 6 feet.

(A) Area of Submerged Contours in Lower Barnegat Bay

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>
A_1	9,727	41.6	27.4
A_2	6,258	26.8	17.6
A_3	<u>7,413</u>	<u>31.6</u>	<u>20.9</u>
	23,398	100.0	65.9

(B) Area of Submerged Contours in Upper Barnegat Bay

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>
A_1	2,958	42.9	8.3
A_2	3,657	53.1	10.3
A_3	<u>272</u>	<u>4.0</u>	<u>0.8</u>
	6,887	100.0	19.4

(C) Total Area and Volume of Barnegat Bay

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-Feet)</u>
A_1	12,685	41.9	35.8	62,570
A_2	9,915	32.7	28.0	33,691
A_3	<u>7,685</u>	<u>25.4</u>	<u>21.7</u>	<u>62,829</u>
	30,285	100.0	85.5	159,090

TABLE IV. (Continued)

(D) Volume, Length and Area of Submerged Contours in Metedeconk River

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	273	26.7	0.8	1,824	
A ₂	436	42.6	1.2	1,054	
A ₃	<u>314</u>	<u>30.7</u>	<u>0.9</u>	<u>747</u>	<u> </u>
	1,023	100.0	2.9	3,625	4.0

(E) Volume, Length and Area of Submerged Contours in Toms River

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	321	17.9	0.9	2,879	
A ₂	808	44.9	2.3	1,638	
A ₃	<u>669</u>	<u>37.2</u>	<u>1.9</u>	<u>1,106</u>	<u> </u>
	1,798	100.0	5.1	5,623	5.0

(F) Volume, Length and Area of Submerged Contours in Forked River

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	48	23.2	0.1	355	
A ₂	59	28.5	0.2	160	
A ₃	<u>100</u>	<u>48.3</u>	<u>0.3</u>	<u>157</u>	<u> </u>
	207	100.0	0.6	672	2.3

(G) Volume, Length, and Area of Submerged Contours in Kettle Creek

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	398	48.9	1.1	1,781	
A ₂	<u>416</u>	<u>51.1</u>	<u>1.2</u>	<u>407</u>	<u> </u>
	814	100.0	2.3	2,188	2.8

TABLE IV. (Continued)

(H) Volume, Length and Area of Submerged Contours in Silver Bay

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Roral Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	324	41.1	0.9	1,619	
A ₂	<u>465</u>	<u>58.9</u>	<u>1.3</u>	<u>589</u>	<u> </u>
	789	100.0	2.2	2,208	2.0

(I) Volume, Length, and Area of Submerged Contours in Beaverdam Creek

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	100	59.9	0.3	396	
A ₂	<u>67</u>	<u>40.1</u>	<u>0.2</u>	<u>249</u>	<u> </u>
	167	100.0	0.5	645	2.3

(J) Volume, Length and Area of Submerged Contours in Cedar Creek

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	250	81.7	0.7	833	
A ₂	<u>56</u>	<u>18.3</u>	<u>0.2</u>	<u>106</u>	<u> </u>
	306	100.0	0.9	939	2.2

(K) Volume, Length and Area of Submerged Contours in Oyster Creek

	<u>Acres</u>	<u>Percent of Portion</u>	<u>Percent of Total Estuary</u>	<u>Volume (Acre-feet)</u>	<u>Length (miles)</u>
A ₁	15	19.0	0.0	128	
A ₂	18	22.8	0.0	49	
A ₃	<u>46</u>	<u>58.2</u>	<u>0.1</u>	<u>87</u>	<u> </u>
	79	100.0	0.1	264	1.6

FINDINGS:

I. Water Quality and Nutrients

In order to simplify presenting both nutrient and water quality data collected within Barnegat Bay, the bay was divided and will be referred to both here and in the discussion as the following:

1. Lower bay - includes only area from Flashing Red Light #68 (lower boundary line) to the Seaside Heights Bridge (Route #37).
2. Middle bay - includes area from the Seaside Heights Bridge north to the Mantoloking Bridge.
3. Upper bay - includes area from the Mantoloking Bridge to the mouth of Point Pleasant Canal (Fl. R.#10).

Barnegat Inlet

The inlet is relatively shallow and narrow, permitting only a small volume of tidal water to enter or leave the bay. Mud flats divide the area into two major channels (Oyster Creek and Double Creek Channels). Water depth within these channels at mean low water ranges from one-half foot to 28 feet. Currents within the inlet are found to be rapid.

Station WQB-0 was situated in the south channel, approximately 35 yards off the historical Barnegat Light House. Water depth was 13 feet at mean low water with a bottom composition of hard sand. Only surface water quality data was collected due to the strong currents.

Surface water temperatures at this station ranged from 3.0 to 24.0° C. and air temperatures from 3.0 to 28.0° C. (see Table 1). Salinity varied from 22.8 ‰ to 31.47 ‰. The pH readings were all basic (7.7 to 8.3). Dissolved oxygen concentrations ranged from 5.4 to 11.2 ppm. and percent saturation from 73 to 104%. Carbon

dioxide values were from 3.2 to 6.8 ppm. Dissolved solids ranged from 23,400 to 29,880 ppm. Turbidity readings were found to range from 25 to 30 JTU (Jackson Turbidity Units).

Lower Bay

The land barrier along the eastern portion of the bay extending from Barnegat Inlet north to Seaside Park is known as Island Beach State Park. This area is of particular interest since it has not been altered by development and its shoreline remains in a natural state. The western shore, however, consists of both bulkheading and lagoon development as well as marshland and natural shoreline.

There were fifteen water quality and eight nutrient stations selected in this portion of the bay. See Figure 1 for the exact locations of stations WQB-1 to 15 and NQB-1 to 8. Depths ranged from one to ten feet at mean low water with bottom composition varying from hard sand to soft mud, detritus and submerged vegetation.

Water temperatures recorded ranged from 1.0° to 29.4° C. and air temperatures from 1.9° to 34.0° C. (see Tables 2 to 16 and 51 to 58). Salinity varied from 9.7 to 28.2 ‰. The pH readings ranged from acid to basic (6.4 to 8.4). Dissolved oxygen levels varied from 4.1 to 14.6 ppm. and percent saturation from 51 to 121%. Carbon dioxide values were from 0.0 to 34.5 ppm. Dissolved solids ranged from 9,600 to 23,400 ppm. Turbidity readings were found to range from 25 to 90 JTU. Small amounts of nitrite (0.0 to .03 ppm.) and nitrate (0.0 to .09 ppm.) were found. Orthophosphate values recorded ranged from 0.0 to .36 ppm. and total phosphate from .02 to 3.5 ppm. Detergent concentrations varied from 0.0 to .10 ppm. and ammonia from .12 to 2.6 ppm.

Middle Bay

In this portion of the bay, the eastern shore has been ex-

tensively developed (bulkheaded and lagoon systems). Most of the areas that were not bulkheaded were used as private beaches. As a result this eastern section is virtually barren of marshland except for a few adjacent islands. The western shore also has been developed but to a smaller degree. Marshland still exists around Tilton Point, Applegate Cove and patches extending from Seaweed Point north to the Mantoloking Bridge.

Eleven water quality and four nutrient stations (WQB-16 to 26 and NQB-9 to 12) were sampled (see Figure 1). Water depths ranged from 1 to 11 feet at mean low water. The bottom composition varied from hard sand to soft mud, detritus and submerged vegetation.

Water temperatures recorded in this region ranged from $.3^{\circ}$ to 29.5° C. and air temperatures from 3.0° to 34.0° C. (see Tables 17 to 27, and 59 to 62). Salinity varied from 8.9 to $19.7^{\circ}/\text{oo}$. pH values ranged from slightly acid to basic (6.8 to 8.3). Dissolved oxygen concentrations ranged from 4.7 to 13.5 ppm. and percent saturation from 54 to 127%. Carbon dioxide values were from 1.5 to 7.0 ppm. Dissolved solids measured ranged from 9,000 to 18,480 ppm. Turbidity readings ranged from ≤ 25 to 25 JTU. Small amounts of nitrite (0.0 to .20 ppm.) and nitrate (0.0 to .13 ppm.) were found. Orthophosphate values ranged from .02 to .18 ppm. and total phosphate from .14 to .80 ppm. Low concentrations of detergent were observed (0.0 to .05 ppm.). Ammonia readings ranged from .24 to 1.56 ppm.

Upper Bay

This area extending from the Mantoloking Bridge north to the Point Pleasant canal is completely bulkheaded along the eastern shore. Saline water via the Point Pleasant canal greatly influences this region.

Two water quality (WQB-27 and 28) stations and one nutrient

(NQB-13) station were located in the Intracoastal Waterway. Water depths ranged from 7 to 14 feet at mean low water with a bottom composition varying from hard sand to mixtures of mud and detritus. Currents are stronger in this region as compared to the rest of the bay due to the influence of the Point Pleasant canal.

Water temperatures recorded in this area ranged from 6.5° to 23.6° C. and air temperatures from 8.0° to 27.0° C. (see Tables 28, 29 and 63). Salinity varied from 12.6 to 30.3 ‰. All pH readings were basic (7.7 to 8.2). Dissolved oxygen levels were from 5.5 to 11.3 ppm. and percent saturation from 73 to 122%. Carbon dioxide values ranged from 3.3 to 7.6 ppm. Dissolved solids measured from 10,200 to 26,280 ppm. Turbidity readings ranged from ≤ 25 to 25 JTU. Nitrite values ranged from 0.0 to .26 ppm. and nitrate from 0.0 to .62 ppm. Orthophosphate values ranged from .04 to .32 ppm. and total phosphate from .14 to 1.80 ppm. Detergent concentrations were low (0.0 to .05 ppm.). Ammonia values varied from .24 to 1.44 ppm.

Beaverdam Creek

This water stream is located in the northern region of the survey area. Station WQB-29 was situated at the confluence of the two branches, 50 yards west of the Beaverdam Creek Bridge. Bottom was composed of soft mud and detritus and had a water depth of six feet, at mean low water.

Water temperatures recorded at this station ranged from 3.0° to 23.6° C. and air temperatures from 4.5 to 26.0° C. (see Table 30). Salinity varied from 1.5 to 27.2 ‰. pH values ranged from acid to basic (6.3 to 8.2). Dissolved oxygen concentrations ranged from 4.6 to 12.9 ppm. and percent saturation from 58 to 131%. Carbon dioxide readings varied from 3.2 to 10.9 ppm. Dissolved solids recorded ranged from 10,200 to 23,700 ppm. Turbidity measurements ranged from ≤ 25 to 30 JTU.

Metedeconk River

Situated in the northern region of the Barnegat Bay System, the Metedeconk River is tidally influenced from both the Point Pleasant Canal and bay. Upstream the river divides into a southern and northern branch.

Five water quality (WQM-30 to 34) and two nutrient (NQM-14 and 15) stations were situated in the main stem of the river (see Figure 1). Water depths ranged from three to eight feet at mean low water and the bottom composition was soft mud and detritus.

Water temperatures recorded at these stations varied from 1.5° to 26.2° C. and air temperatures from 5.0° to 28.0° C. (Tables 31 to 35, 64 and 65). Salinity readings varied from .6 to 26.8 ‰. pH values ranged from acid to basic (6.5 to 8.7). Dissolved oxygen concentrations ranged from 2.4 to 14.8 ppm. and percent saturation from 31 to 167%. Carbon dioxide readings varied from 0.0 to 15.9 ppm. Dissolved solids measured from 1,620 to 24,600 ppm. Turbidity values recorded ranged from <25 to 40 J.T.U. Nitrite values ranged from 0.0 to .46 ppm. and nitrate from 0.0 to 3.17 ppm. Orthophosphate readings were low ranging from .01 to .48 ppm. Total phosphate values varied from .28 to 3.20 ppm. Detergent concentrations ranged from 0.0 to .15 ppm. and ammonia from .24 to 2.40 ppm.

Kettle Creek

This water stream is connected to the upper middle portion of the bay. Upland drainage is received through the north and south (Polhemus) branches. Bulkheading and lagoon systems have reduced a great deal of natural shoreline and marsh within this area.

Stations WQK-35 and NQK-16 were situated near the northern shore whereas station WQK-36 was near the southern side of Kettle

Creek; approximately 5 yards from either shore (see Figure 1). The creek was found to be relatively shallow with a water depth ranging from one to four feet at mean low water. Only surface sampling was conducted in this area. The bottom was composed of mixtures of hard sand and mud.

Water temperatures recorded at these stations ranged from 2.3 ° to 26.0 ° C. and air temperatures from 2.3 ° to 25.0 ° C. (Tables 36, 37 and 66). Salinity values ranged from 5.6 to 17.7 ‰. pH readings varied from slightly acid to basic (6.8 to 8.1). Dissolved oxygen concentrations ranged from 5.1 to 12.8 ppm. and percent saturation from 62 to 129%. Carbon dioxide values varied from 2.3 to 6.4 ppm. and dissolved solids from 7,020 to 14,400 ppm. Turbidity measurements ranged from 25 to 75 JTU. Slight traces of nitrite were recorded (0.0 to .13 ppm.) Nitrate ranged from 0.0 to 1.94 ppm. Orthophosphate readings varied from .02 to .40 ppm. and total phosphate from .20 to 1.00 ppm. Detergent concentrations were found to be very slight (0.0 to .03 ppm.). Ammonia values varied from .24 to 1.68 ppm.

Silver Bay

Situated just south of Kettle Creek, Silver Bay connects with the lower middle portion of the bay (see Figure 1).

Stations WQS-37 and WQS-17 were located near the northern shore and station WQS-38 near the southern shore. All stations were sampled approximately 10 yards from shore. This water stream was found to be very shallow ranging in depth from 1 to 5 feet at mean low water. Only surface sampling was conducted here. Bottom composition was found to be a mixture of hard sand and mud.

Water temperatures recorded at these stations ranged from 1.8 to 29.5 ° C. and air temperatures from 4.5 to 33.0 ° C. (Tables

38, 39 and 67). Salinity readings ranged from 8.8 to 16.5 ‰. pH values recorded from slightly acid to basic (6.8 to 8.2). Dissolved oxygen concentrations varied from 6.4 to 11.9 ppm. and percent saturation from 86 to 104%. Carbon dioxide readings ranged from 3.5 to 6.4 ppm. and dissolved solids were from 9,000 to 15,600 ppm. Turbidity measurements varied from <25 to 35 J.T.U. Slight traces of nitrite were recorded (0.0 to .17 ppm.). Nitrate values ranged from 0.0 to 3.65 ppm. Low concentrations of orthophosphate (.02 to .18 ppm.) and total phosphate (.16 to .44 ppm.) were recorded. Small amounts of detergent were found (0.0 to .05 ppm.). Ammonia values ranged from .36 to 1.92 ppm.

Toms River

The mouth of Toms River is located just southwest of the Thomas Mathis Bridge (Seaside Heights Bridge). Stations WQT-39 to 43 and NQT-18 and 19 were situated within the main channel of the river (see Figure 1). Water depth at the sampling stations ranged from five to seven feet at mean low water and the bottom consisted of mixtures of soft mud and detritus.

Water temperatures recorded at these selected stations ranged from 2.0° to 29.0 ° C. and air temperatures varied from 3.0 ° to 31.0 ° C. (see Tables 40 to 44, 68 and 69). Salinity varied from .21 to 18.2 ‰. pH readings ranged from very acid to basic (4.5 to 8.3). Dissolved oxygen concentrations recorded from 0.0 to 12.5 ppm. and percent saturation from 0.0 to 111%. Dissolved solids ranged from 45 to 16,500 ppm. Turbidity measurements varied from <25 to 75 J.T.U. Nitrite ranged from 0.0 to .33 ppm. and nitrate from 0.0 to 2.38 ppm. Orthophosphate values varied from .02 to .50 ppm. and total phosphate from .14 to 2.30 ppm. Detergent readings recorded were low (0.0 to .20 ppm.). Ammonia ranged from

.24 to 2.28 ppm.

Cedar Creek

This water stream is located in the lower section of Barnegat Bay. The creek was found to be very shallow with water depths ranging from one to three feet. Only surface sampling was conducted here. Station WQC-44 was situated approximately 100 yards from the south shore (see Figure L). The bottom was composed of soft mud.

Water temperatures recorded at this station ranged from 6.7 to 25.5 °C. and air temperatures from 9.0 ° to 29.0 ° C. (Table 45). Salinity values ranged from 3.9 to 14.4 ‰. pH readings ranged from slightly acid to basic (6.9 to 7.7). Dissolved oxygen concentrations ranged from 5.4 to 10.6 ppm. and percent saturation from 65 to 92%. Carbon dioxide values varied from 4.0 to 6.1 ppm. and dissolved solids from 13,080 to 18,000 ppm. All turbidity measurements recorded were < 25 J.T.U.

Forked River

Located three miles south of Cedar Creek, Forked River is also tidally influenced from the lower section of Barnegat Bay. The main channel divides into the north, middle and south branches. The south branch was of particular interest since its tidal flow is unidirectional (flood). As previously mentioned the water from this branch is used for the cooling system of the Nuclear Oyster Creek Electric Plant.

Stations WQF-45, 46 and NQF-20 were situated in the main channel of the river and station WQF-47 was in the south branch. Water depth at these stations ranged from two to eight feet at mean low water and the bottom composition was hard sand and mud.

Water temperatures recorded at these stations ranged from

1.0 to 28.4 °C. and air temperatures from 2.0 to 31.0 °C. (Tables 46 to 48, and 70). Salinity ranged from 10.9 to 25.3 ‰. pH values varied from slightly acid to basic (6.6 to 8.2). Dissolved oxygen concentrations ranged from 5.3 to 11.6 ppm. and percent saturation from 69 to 109%. Carbon dioxide values recorded ranged from 2.2 to 8.3 ppm. Dissolved solids measured from 15,000 to 21,780 ppm. Turbidity readings ranged from < 25 to 45 J.T.U. No traces of nitrite or nitrate were found. Very small amounts of orthophosphate (0.0 to .24 ppm.), total phosphate (.10 to .48 ppm.) and detergent (0.0 to .30 ppm.) were recorded. Ammonia values ranged from .24 to 1.20 ppm.

Oyster Creek

Located less than three-quarters of a mile south of Forked River, this water system which has been previously deepened and widened due to dredging, serves as the receiving canal for the thermal discharge of the Nuclear Oyster Creek Electric Plant. The tidal flow also was found to be uni-directional (ebb) with water depth ranging from 9 to 11 feet at mean low water. Bottom composition was hard sand mixed with mud and stumps.

Stations WQO-48, 49 and NWO-21 were located in the main stem of the creek (see Figure L).

Water temperatures recorded at these stations ranged from 7.5 to 35.0 °C. and air temperatures from 1.5 to 30.00 °C. (see Tables 49, 50 and 71). Salinity varied from 8.3 to 23.6 ‰. pH readings recorded ranged from slightly acid to basic (6.9 to 8.1). Dissolved oxygen concentrations ranged from 5.4 to 11.0 ppm. and percent saturation 79 to 148%. Carbon dioxide values ranged from 4.0 to 9.1 ppm. Dissolved solids measured from 12,900 to 21,600 ppm. Turbidity readings ranged from < 25 to 25 J.T.U. Small traces of

nitrite (0.0 to .07 ppm.) and nitrate (0.0 to .04 ppm.) were recorded. Orthophosphate values ranged from 0.0 to .14 ppm. and total phosphate from .10 to .36 ppm. Detergent concentrations were low (0.0 to .20 ppm.). Ammonia values ranged from .24 to 1.92 ppm.

II. Water Temperatures

As was previously mentioned, seven thermographs were placed in selected areas to record daily water temperatures over a 45-day period. (See Figure 1). However, a great deal of problems persisted during the 12-month study. For example, during the months of January and February only 3 of the 7 recorders functioned. Several different instruments were placed at the Liberty Harbor Marina, just south of Waretown. But not one day of temperatures were recorded. The apparent malfunctions were attributed to either water seepage or a faulty inner-spring mechanism.

Figure 6 shows the monthly mean, standard deviation and ranges of temperatures for each station. Figure 7 compares the monthly average water temperature according to location. It can be noted that in the Metedeconk River during July and August, and in Barnegat Bay (Havens Point) during most of the month of July, water temperatures had exceeded the range on the tape ($> 25^{\circ} \text{C.}$). This was due to a shortage of available instruments calibrated for a high range ($+10$ to $+40^{\circ} \text{C.}$) and the situation was not corrected until August. For a comparison of stations, 25°C. was plotted as the monthly average. It would be probable to assume that the average as well as the extreme water temperature for these stations exceeded 25°C.

III. Pesticide and Heavy Metal Analysis

The monthly fish collections showed it was very difficult

to collect the same species consistently at selected stations. Even more so to collect a sufficient quantity of any species at a particular station. Both sampling stations and fish species were selected according to their availability. This was especially evident during the winter period when only one sample could be used. Silverside, Menidia berylina, winter flounder, Pseudopleuronectes americanus, bay anchovy, Anchoa mitchilla, and white perch, Roccus americanus, were selected species in all chlorinated hydrocarbons and heavy metals analysis. Silversides, winter flounder and bay anchovy made up 87% of the samples collected for this survey.

Twenty-four fish and 31 sediment samples were sent for analysis to the State of New Jersey Fisheries Laboratory, Lebanon. However, some of the fish samples used in the heavy metal analysis were lost due to digestion problems.

Results of residue analyses for 11 chlorinated hydrocarbons in both fish and sediment samples are listed in Tables 72 and 73. All results are reported in ppb (microgram/kilogram).

Results of heavy metal concentrations for five elements analyzed in both fish and sediment samples are listed in Tables 74 and 75. Zinc, cadmium, lead, chromium and mercury levels (sediment samples only) are reported in ppm. (milligram/kilogram). Mercury levels detected in the fish products are reported in ppb.

Radioactivity concentrations detected in 22 fish samples are listed in Table 76. Results of 14 nucleotides are reported as pci/kg-fresh.

Pesticides

Pesticides have been in use for many years because of the tremendous success in controlling pests. However, the chlorinated hydrocarbon insecticides generally speaking are the most toxic of the

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pesticides to aquatic life. They are known to be very stable compounds and found to be very difficult to control once exposed to the environment (e.g. DDT has a half life of 10-15 years). Means of transport are generally wind, rain and/or surface runoff from the soil. Once in the waterstream, Nicholson (1967) reports that DDT and its compounds strongly adsorbs to organic matter and sediment.

Ferguson (1966) reports that fish concentrate insecticides through feeding or direct uptake from water via the gills. Insignificant residues entered through the skin or by ingestion of water. Nicholson (1970) points out that a process called biological magnification occurs involving the chlorinated hydrocarbon insecticides. Basically, organisms within the food chain may be exposed to small quantities of insecticide. As predators after predator consume such quantities, concentrations can build so that eventually fish are found to contain large levels of an insecticide or several types.

DDT and its metabolites were detected in 91% of the fish samples with values ranging up to 300 ppb. Chlordane, dieldrin, endrin, lindane and methoxychlor were not detected in any of the samples. BHC, aldrin and heptachlor were not found consistently in any sample. Next to DDT, heptachlor was the next highest found in 22% of the samples with a maximum level of 34 ppb.

A seasonal comparison of mean insecticide levels shows that DDT concentrations were observed in three out of four periods with summer collections containing the highest level (Figure 8). As was previously mentioned, winter collections were limited. It is also seen that aldrin and heptachlor were not detected in any of the fall samples. This probably could be attributed to the small quantity of samples analyzed for this period (3 samples). Both spring and summer samples had similar average levels.

winter flounder, white perch and bay anchovy (see Figure 9). The data shows DDT and heptachlor levels were detected in the four species. DDT concentrations appeared to be higher in the silverside and bay anchovy. BHC was detected only in the winter flounder and aldrin in the white perch.

Fishes netted in Silver Bay had the lowest average DDT levels but the highest heptachlor levels (Figure 10). Aldrin was detected only in fish netted in Toms River and BHC in the Metedeconk River.

DDT and its metabolites were the only pesticides detected in 64% of the mud samples. Concentrations ranged up to 2,234 ppb. Table 73 shows that concentrations over 1,000 ppb. were found in mud samples collected both north and south of the Thomas Mathis Bridge (State Highway #37) and the mouth of Toms River. Other stations with such levels included Kettle Creek, Forked River and Oyster Creek.

Smith (1972) reported DDT concentrations ranging from 1.15 to 3.70 ppm. resulted in 55 to 98% mortality of winter flounder embryos and vertical deformities were observed in 2 - 44% of the hatched larvae. Loosanoff (1960) also reported that many insecticides tested adversely affect mollusks. 1.0 ppm. of DDT caused the death of oyster larvae, and .025 ppm. interfered with growth.

The average DDT level was found to be five times greater in sediments than in the fish. DDT levels detected in the fish samples did not exceed FDA's established maximum level in fish for human consumption. However, it would appear that DDT concentrations recorded in the Barnegat Bay system are in sufficient quantities to have sub-lethal or lethal effects on estuarine organisms. What

possible effects have resulted would necessitate a more thorough study.

Heavy Metals

Analysis on 19 fish samples showed mercury, zinc, cadmium, and lead present. Only traces of chromium were detected in 47% of the tests. Concentrations ranged from 50 to 350 ppb (Hg), 2.5 to 38.8 ppm. (Zn), 9.5 to 13.2 ppm. (Cd), 7.5 to 15.8 ppm. (Pb) and 0.0 to .25 ppm. (Cr.).

Results showed that the average concentrations of cadmium and lead were found to be similar (see Figures 11, 12, and 13). Out of the five elements analyzed, zinc was found in the highest concentration. The silverside and bay anchovy showed the largest levels of zinc. (Figure 12). Chromium was not detected in the white perch or bay anchovy.

Figure 12 also shows that mercury concentrations were highest in the white perch. Fish netted in Toms River appeared to have the largest levels as compared to the other areas (Figure 13). Three fish samples were used in the Toms River analysis. The only white perch used in this survey made up two of these samples. However, analysis of the sediment samples seem to indicate that high levels of mercury (> 1 ppm.) exist in this region (see Table 75). Other areas found with high concentrations in the sediment included Pelican Island and Forked River. Abnormally high levels of mercury are considered to be those exceeding the FDA established maximum of 0.5 ppm. for food and 0.005 ppm. for water. According to Julian (unpublished paper), hard clams taken from Barnegat Bay were found to have mercury levels ranging from 0 to 0.275 mg/kg in edible tissue and 0 to 0.3 mg/kg in the shell. Levels detected in both hard clams and fish are well within the limits established by the FDA.

All five elements were detected in the sediment samples with concentrations ranging from 5 - 25 ppm. (Zn), 2 - 10 ppm. (Cd), 10 - 70 ppm. (Pb), 5 - 50 ppm. (Cr) and .09 to 1.590 ppm (Hg).

These metals are, in varying degree, poisonous to humans and marine life, although some of them are essential in trace amounts to humans as well as other animal life.

Raymont and Shields (1962) reported that the polychaete worm (Nereis virens) when exposed to 1 ppm. Cr solution, resulted in 50% mortality after three weeks. Kalabina (1948) reports that the toxic concentration of lead for aerobic bacteria is 1.0 ppm.; for flagellates and infusoria, 0.5 ppm. The bacterial decomposition of organic matter is inhibited by 0.1 to 0.5 ppm. of lead.

Dow and Hurst (1972) have summarized from the literature effects of heavy metals on marine resources:

Cadmium - Extremely toxic to oysters, less toxic to hard clams, and moderately to all other animals. Damage to intestinal tract, kidney and gills of marine fish. It increases the toxicity of other metals.

Lead - Toxic to oyster gonads; also adversely affects hard and soft clam reproduction. Toxic to most enzyme systems. One hundred percent mortality to lobsters in tanks. Inhibits one-cell algal growth. .5 ppm. in water 100% lethal in seven days. Oyster larvae killed by 3 ppm. levels. Extremely toxic to soft clams above .02 ppm. in water.

Zinc - Damage to gills of fish. Toxic to oysters in very small amounts.

Chromium - Not toxic except in large concentrations.

It would appear that heavy metal concentrations recorded in

the Barnegat Bay system are in sufficient quantities to have sub-lethal effects on estuarine organisms.

IV. Isohaline and Isotherm Distribution

Figures 14 & 15 present isohaline and isotherm distribution patterns mapped throughout the Barnegat system during the summer months.

V. Dredge Hole Survey

Eighteen of the original nineteen dredge holes were located and re-examined during the period August through November 1972. Their exact locations are shown on Charts 1 and 2. Borrow pit #7 could not be located. Maximum depths at time of investigations ranged from six to 32 feet.

All data collected during this particular survey can be found in Table 27 listed according to designated areas. Table 78 briefly summarizes observations made during 1969 and 1972 according to depth, dissolved oxygen and hydrogen sulfide classification ranges (see footnote in Table for explanation).

It can be seen in Table 79 when comparing dissolved oxygen levels in the 18 dredge holes that 6 holes were found to have dissolved oxygen concentrations of less than 1.0 ppm. 4 had concentrations between 1.0 to 5.0 ppm. and 8 had concentrations greater than 5.0 ppm.

The holes were further compared according to Murawski's type classification. Type I (holes not connected to any channel) in Table 80 shows that from the 12 holes found to be within this category, 4 had dissolved oxygen concentrations less than 1.0 ppm., 3 had between 1.0 to 5.0 ppm., and five had levels greater than 5.0 ppm. Type II (holes attached at least partially or in some manner to a channel) in Table 81 reveals that from these six borrow areas,

2 had oxygen concentrations less than 1.0 ppm., one had between 1.0 to 5.0 ppm. and three had levels greater than 5.0 ppm.

Hydrogen sulfide was observed in concentrations greater than 5.0 ppm. in the bottom waters of some of these holes. From the 18 holes examined, 11 did not contain any traces of hydrogen sulfide, 4 less than 5.0 ppm., and three with levels greater than 5.0 ppm. (Table 82). Sulfide levels greater than 5.0 ppm. were observed at oxygen levels less than 1.0 ppm.

Bottom organisms were observed in 6 out of 18 dredge holes (Table 83). Five of these holes had oxygen levels greater than 5 ppm. and 1 less than 5.0 ppm. Out of the other 12 holes that did not contain any bottom invertebrate, oxygen levels were greater than 5.0 ppm in three holes, less than 5 ppm. in three holes and less than 1 ppm. in six holes.

Comparison of 1969 and 1972

A revaluation of the dredge holes in the Upper Barnegat System has shown that some of the bottom and/or mid waters are still devoid of oxygen. Out of 18 holes examined, 6 contain no oxygen ($< .5$ ppm.) and 4 with levels less than 5.0 ppm. This would indicate that still over half of the borrow pits do not contain adequate oxygen levels needed to support finfish populations.

Table 78 briefly summarizes and as well compares data compiled during 1969 and 1972. It can be seen that holes #8, 10, 14, 17 and 18 are still found to have bottom oxygen levels suitable for fish habitat. Five other holes were observed to have increased in oxygen concentration but that only 3 (holes #16, 28 and 32) were greater than 5.0 ppm. Only the bottom waters of hole #12 was found to have decreased in oxygen.

An obvious change to have transpired from the original

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survey period of 1963-66 was a reduction in depth in a great deal of these holes. Over 50% have filled in five feet or more. In some cases as much as 8 feet. Examples of this would be holes #16, 31 and 32. Four holes (#8, 10, 18 and 19 - Type I) were found to be near their original reported depths. Their depths were 10, 10, 23, and 15 feet, respectively.

It also appears that hydrogen sulfide concentrations have reduced in some of the bottom waters but nevertheless still detected in 50% of the borrowpits. Originally hydrogen sulfide levels greater than 5.0 ppm. were reported in seven holes. Only holes #13, 18 and 23 still have such levels. Holes #9, 28, 29, and 31 have been observed with lower levels and higher oxygen concentrations. An exception to this was hole #31. Four borrow pits (#16, 17, 20 and 21) not found to have any sulfide levels now show traces. Depth in these holes were 16 feet or more but each contain different levels of oxygen.

Bottom organisms were still found in only six holes, or 33%. No invertebrae were found in areas containing ≤ 1 ppm. oxygen or greater than 5.0 ppm. H_2S .

Results seem to indicate that stagnation can occur in holes of any depth even in those of less than ten feet (Table 79). An example of this would be hole #13. However, in this particular case the hole was found to be completely anaerobic from surface to bottom. This probably could be attributed to its location being in a small cove very close to shore where very little mixing occurs. In the bottom waters large quantities of decaying aquatic vegetation (primarily eel grass) have accumulated resulting in high levels of hydrogen sulfide and zero oxygen.

One can conclude that dredge holes result in the loss of

finfish habitat. Regardless of depth and location, holes do have the potential of going anaerobic and probably remaining in this state for a good number of years. This, of course, would be dependent on the amount of detritus, wave action or circulation that would come in contact with an area. Also, equally important would be surrounding water quality. This was evident in Toms and Metedeconk Rivers (See Discussion).

On the other hand, some dredge holes could be beneficial for overwintering populations such as white perch, Morone americanus (see Mullica-Great Bay Survey, Collins Cove). The warmer temperatures observed in these holes during the winter months seem to attract schools of perch. It has been reported that overwintering striped bass, Morone saxatilis, prefer deeper saline water of an estuary; however, they have not been directly linked with dredge holes.

In conclusion, the data has shown that 50% of these holes have been found basically in the same state as the original survey. It is on this assumption that the following recommendations are made:

1. Holes #12, 13, 18, 20, 23 and 31 have been found in both surveys with bottom waters in an anaerobic condition (< 1 ppm.). Since water quality existing within these areas are not suitable for finfish, then they should be considered as possible spoil sites.

2. Since the bottom waters of holes #9, 11, 21 and 29 were not found to be completely void of oxygen (1 - 5 ppm.), they could be considered as possible spoil sites but only after another investigation.

3. Holes #16, 28, and 32 were originally reported with poor water quality but they now appear to be greatly improved. It would seem that these areas could return to a poor state; therefore,

an investigation should be made during the critical months before
a decision.

DISCUSSION

Water temperatures during this twelve month survey ranged from -1.0°C . to 37.2°C . The lowest temperature was recorded during the month of February in the Metedeconk River. In the bay (Good Luck Point) the lowest extreme was 0.9°C . recorded during February and 3.5°C . in Oyster Creek during January. Normally temperatures would not drop that low in Oyster Creek; however, the Oyster Creek Nuclear Generating Station had shut down during this period. It was not until March before any temperature data could be recorded at the other thermograph stations.

The highest temperature of 37.2°C . (99°F .) was recorded during the month of July in Oyster Creek. As was previously mentioned this water stream serves as the receiving waters for the thermal discharge from the Nuclear Generating Station. Figure 7 shows that Oyster Creek had an average water temperature of 32.8°C . (90°F .) during July, and was also the warmest area during most of the sampling periods except for the months of May and June. It would appear from this graph that during these particular months, average water temperatures throughout the system, excluding the Inlet, were very similar.

In Toms River, the maximum temperature was 25.3°C . (77.5°F .) and in the bay (Haven's Point) 26.9°C . (80.6°F .); both were recorded during the months of August and September. As was previously mentioned and appears on the graph, both upper bay during July and the Metedeconk River during the months of July and August recorded water temperatures exceeding the range ($> 25^{\circ}\text{C}$.) on the tape.

Although some of the thermograph stations had a great deal of data missing, an attempt was made to compare the mean water temperature distribution. Monthly averages whenever comparable in the

Metedeconk River, Toms River, upper and lower bay, did not differ more than 2.4° C. in any one month. Average temperatures in Oyster Creek did not differ from the other areas more than 8.8° C. in any one month.

Figure 7 shows the beginning of a warming trend within the bay during the month of March and remains warmer than the ocean until about September. It is during this period that the shallow bay waters begin to cool quickly.

During water quality sampling, both surface and bottom water temperatures throughout the estuary had not differed more than 3.5° in lower bay, 1.5° in middle bay, 2.5° in upper bay, 2.7° in Metedeconk River, 5.0° in Toms River, $.5^{\circ}$ in Forked River, and 1.5° in Oyster Creek.

Figure 16 compares water quality data collected at the Route 9 bridges in both the intake (S. Branch of Forked River) and discharge (Oyster Creek) canals of the Nuclear Generating Station. It shows that there was at least an 11° difference in the surface water temperature of both canals during the winter months.

Dissolved oxygen ranged from 0.0 to 14.8 ppm. or 131% saturation. The lowest parameter was recorded during the summer months of June, July and August in the submerged water of Toms River (Station WTQ-43). The highest level was observed during December in the surface waters at the mouth of the Metedeconk River (Station WQM-30).

Water quality sampling did not include the bottom waters of the estuary until April. Figure 17 shows monthly levels of oxygen for the system. It can be seen that both the surface and bottom waters did follow a normal trend with high concentrations of oxygen during the winter months followed by a gradual decrease

through the spring and attaining an annual low during the summer month of July. From this period through the fall, oxygen concentrations markedly increase.

Figure 18 compares oxygen levels in the surface and bottom waters of Barnegat Bay, Toms River and the Metedeconk River. It can be seen that levels were below 5.0 ppm. in the submerged water of the Metedeconk (June, July and September) and Toms (June and July) Rivers. However, it was observed that both rivers from the period of April through to September had decreasing levels of oxygen from the mouth going upstream. In most cases, bottom levels at the mouth of both rivers were equivalent to the adjoining bay area.

A closer examination of the submerged waters of the Metedeconk River revealed oxygen level less than 5 ppm. at the following stations: WQM-30 was 4.8 ppm. (June); -31 in June and August was 3.3 and 4.2 ppm., respectively; and -32, May through September, ranged from 2.4 to 3.8 ppm. Saturation levels ranged from 29 to 53%. Station WQM-32 was situated approximately five feet downstream from dredge hole #31 (see Chart #1). Table 33 indicates an oxygen level of 0.0 ppm. at this station; however, this level was probably recorded in the dredge hole and cannot be considered as the true bottom level for this station.

In the submerged waters of Toms River, oxygen levels below 5 ppm. were recorded at the following stations: WQT-40 in July was 2.8 ppm.; -41 in July and September were 1.8 and 4.9 ppm., respectively; -42 in June, July and September were 3.7, 1.8 and 2.5 ppm., respectively; and -43 June through August were 0.0 ppm. and in September .2 ppm. Saturation levels ranged from 0.0 to 69%.

Other stations exhibiting bottom levels below 5 ppm. were Beaverdam Creek (4.6 ppm. or 58%) and mid-channel Buoy D (4.8 ppm.

or 65%). Such levels were recorded during the month of July.

Surface levels below 5 ppm. were recorded at station WQB-12 (4.1 ppm. or 51%) during August and station WQM-33 (4.9 and 4.3 ppm.) during the months of June and July.

The vertical distribution of oxygen did not exceed 2.9 ppm. within the bay during the sampling period.

The pH readings throughout the Barnegat system ranged from 4.5 to 8.7. Within the bay region, readings ranged from 6.4 to 8.4. Most of the measurements of 7.0 or below were observed during the winter months when only shore sampling could be done.

In Toms River, pH levels were observed as low as 4.5. This was the lowest reading recorded in the estuary and was observed at upstream station NQT-19. Normally, pH levels did not go below 6.0. In the Metedeconk River values were observed as high as 8.7. Although there did not appear to be any particular pattern of occurrence, pH readings of 8.4 or greater were observed several times within this area but only during surface sampling. It is noted by Sverdrup, "where the water is in equilibrium with the CO_2 in the atmosphere, the pH is between 8.1 and 8.3, but higher values may occur when the photosynthetic activity of plants has reduced the content of carbon dioxide." The pH values of 8.4 or greater have been recorded with CO_2 levels of 0.0 ppm. and high dissolved oxygen and saturation levels.

"Free carbon dioxide measured in this estuarine system ranged from 0.0 to 18.7 ppm. Zero levels were only observed in the Metedeconk River and the lower eastern bay area near Island Beach State Park. In the Metedeconk River such levels were found during the months of December, January, March and September with oxygen saturation levels over 120% and in most cases a pH of 8.4 or over.

Along the lower eastern bay, zero levels were recorded during June, July and September, with June having the largest number of occurrences. Within this region pH readings were more variable with values as low as 7.9 and saturation levels of 94% or over.

The highest level was recorded in the submerged waters of Toms River at Station WQT-43 during the month of July. An exception was observed at station WQB-12 (Island Beach State Park) with a level of 34.5 ppm. The range at this station was 0.0 to 10.6 ppm.

Figure 17 shows the mean distribution of dissolved oxygen and carbon dioxide within the estuary. Basically, it shows that the pattern of distribution of carbon dioxide is the reverse to that of oxygen.

Salinity ranged from .21 to 31.5 ‰ with the highest averages recorded during the early fall months (September and October). In the bay regions, salinity levels ranged from 8.9 to 30.3 ‰. The average salinity within the middle bay section was computed to be 14 ‰ whereas both the upper and lower bay sections were near 20 ‰. It would appear fresh water mixing is greater in this area than the two adjacent sections.

Salinity levels above 30 ‰ were measured in the bottom waters of stations WQB-0 (31.5 ‰) and WQB-28 (30.3 ‰). Their respective ranges were 22.9 to 31.5 ‰ and 12.6 to 30.3 ‰. Readings below 3.0 ‰ were recorded in the surface waters of stations WQM-33 and 34 (Metedeconk River), WQB-29 (Beaverdam Creek), and WQY-42, 43 (Toms River). Station WQT-43 had the least number of readings over 3.0 ‰ with a range of .21 to 8.73 ‰. The bottom waters at this station, however, were found to be more saline ranging from 6.7 ‰ to 15.9 ‰.

The maximum vertical salinity difference recorded at any one station during the sampling period was in Beaverdam Creek ($16^{\circ}/\text{o}$

The maximum salinity fluxuation recorded in the surface waters at any one station occurred at Station WQM-34 ($.59^{\circ}/\text{oo}$ to $21.76^{\circ}/\text{oo}$), located at the mouth of the South Branch, Metedeconk River.

Only six months of data were collected for dissolved solids levels. It is hoped to eventually abandon the costly titration method for determining salinity. However, a closer examination of the data will be needed before such a decision.

Turbidity values ranged from ≤ 25 to 130 J.T.U. (Jackson Turbidity Units). The Jackson Turbidimeter has a usable range only above 25 JTU; lower turbidities could not be measured on this instrument. Shore sampling was conducted during the months of December through to March.

Results showed that all open water measurements within the bay never exceeded 25 units; however, along the peripheral (< 3.0 feet) readings were as high as 130 units with a higher frequency of occurrence due to wind agitation and erosion. This also was characteristic of results recorded at stations in Silver Bay and Kettle Creek with a depth at mean low water of two feet. The highest turbidity level recorded within these two areas was 75 JTU.

NUTRIENT ANALYSIS

Nitrite: Traces of nitrite were recorded in the estuarine system ranging from 0.0 to .46 ppm. Within the bay region, slight traces were recorded only during the months of February, April and November (0.0 - .26 ppm.) In the river systems, levels were found to be more frequent in occurrence than in the bay. The highest level recorded in Toms River was .33 ppm. and in the Metedeconk

River was .46 ppm.

Nitrate: Nitrate values in the bay were found to be very slight (maximum .62 ppm.). However, this level was recorded in the upper bay regions and was the only level to exceed .13 ppm. In the rivers, however, traces of nitrate were also much more frequent in occurrence (see Figure 19). Levels were found to be much higher at both upstream stations as compared to the mouth indicating possible upstream influence. The maximum level recorded in Toms River was 2.38 ppm. and in the Metedeconk River was 3.17 ppm. (see Tables NQT-19 and NQM-15). The highest concentration of nitrate recorded within the estuarine system was in Silver Bay (3.65 ppm.) during the month of January at Station NQS-17. This was the only time that levels exceeded .70 ppm. within this area. Figure 21 shows that average nitrate levels within the system were highest during the winter months and decreased in the summer months.

Ammonia: Water samples collected in the bay were found to have ammonia levels ranging from .12 to 2.6 ppm.; in Toms River from .24 to 2.28 ppm.; and in the Metedeconk River from .24 to 2.40 ppm. Ellis (1937) notes that although the tolerance of fish differs with species and other factors, 2.5 mg/l of ammonia is considered harmful to fish in the 7.4 to 8.5 pH and that concentrations of 1.5 ppm. are not harmful to most varieties of fish. The highest concentrations of 2.6 ppm. was recorded at station NQB-3 during the month of February. Except for one other instance, levels did not exceed 2.0 ppm. within the bay. The average ammonia level for the estuary was found to be higher during the summer months (see Figure 21).

Orthophosphate: Small concentrations of the soluble form of phosphate were observed. In the bay ortho levels ranged from

0.0 to .36 ppm., Toms River, from .02 to .50 ppm.; and in the Metedeconk River, from .01 to .48 ppm. Figure 22 shows that average levels throughout the survey were found to be consistent.

Total Phosphate: Total phosphate values observed in the bay region ranged from .02 to 3.50 ppm.; in Toms River, from .14 to 2.30 ppm.; and in the Metedeconk River, from .28 to 3.2 ppm. Maximum level in the Metedeconk River (NQM-14) was recorded during March, and in Toms River (NQT-19) and the bay (NQB-7) during June. Figure 22 shows peak level of total phosphate for the estuary was during June.

Detergent: Detergent levels observed in this estuarine system were found to be very slight ranging from 0.0 to .30 ppm. Levels in the bay and in the Metedeconk River never exceeded .15 ppm. According to Eisler (1965) the effect of detergent concentrations of .5 ppm. on fish life is believed to be minimal.

SUMMARY

The Upper Barnegat Bay System Study was conducted within the following boundary lines: the farthest visible point north of Barnegat Bay indicated by a line from Bay Head across the mouth of Point Pleasant Canal; the southern portion indicated by a line across the bay from Barnegat Light to mouth of Barnegat Lagoons.

The survey concentrated on Barnegat Bay and major tributaries such as the Metedeconk, Toms and Forked Rivers. Also included were creeks such as Oyster, Cedar, Silver Bay, Kettle and Beaverdam. Within this estuarine system 68,196 acres were sampled including Island Beach State Park (State owned land).

Water acreage surveyed consisted of 35,468 acres. From this total, Barnegat Bay was 30,284 acres, Metedeconk (1,023 acres), Toms (1,798 acres) and Forked Rivers (207 acres).

The bay consisted of 51,839,707,372 gallons with a mean depth of 5.3 feet and a shoreline length of 78.3 statute miles.

A great deal of marshland development has occurred within this system. It has been found that presently there are 5,301.6 acres of lagoon development resulting in 203,850 feet of developed shoreline.

Shellfish found in this area are the oyster, Crassostrea virginica, hard clams, Mercenaria mercenaria, soft-shelled clam, Mya arinaria and bay scallops, Aequipectera irradian.

Water temperatures ranged from -1.0°C to 37.2°C . Monthly means, whenever comparable did not differ more than 2.4 in any one month. An exception was Oyster Creek (discharge canal for the Nuclear Generating Station) where average temperatures did not differ more than 8.8°C in any one month.

Dissolved oxygen ranged from 0.0 to 14.8 ppm. with the lowest concentrations recorded during the summer months. In the submerged waters of both the Metedeconk and Toms River, from the period of April through to September, oxygen levels decreased from the mouth going upstream. Levels in the rest of the estuary were not found below 4 ppm. The vertical distribution of dissolved oxygen did not exceed 2.9 ppm. within the bay.

pH readings throughout the Barnegat system ranged from 4.5 to 8.7. Normally pH were not observed below 6.0.

"Free" carbon dioxide measured ranged from 0.0 to 18.7 ppm. An exception was near Island Beach State Park when a level of 34.5 ppm. was observed. The range within this area was 0 - 10.6 ppm.

Salinity ranged from .21 to $31.5^{\circ}/\text{oo}$ with the highest averages observed during the early fall months. The maximum vertical salinity difference recorded at any one station during the

sampling period was in Beaverdam Creek ($16^{\circ}/\text{oo}$). The maximum salinity fluxuation recorded in the surface waters at any one station was in the South Branch, Metedeconk River ($.59^{\circ}/\text{oo}$ to $21.76^{\circ}/\text{oo}$).

Turbidity values ranged from < 25 to 130 J.T.U. All open water measurements within the bay never exceeded 25 units; however, during peripheral (< 3.0 feet) sampling readings were recorded as high as 130 units with a greater frequency of occurrence due to wind agitation and erosion.

Traces of nitrite were observed in the estuarine system ranging from 0 to .46 ppm.

Nitrate values ranging from 0 to 3.65 ppm. were highest during the winter months and decreased in the summer. The highest value recorded in the bay area was .62 ppm., in Toms River, 2.38 ppm. and in the Metedeconk River was 3.17 ppm.

Ammonia levels detected in the bay ranged from .12 to 2.6 ppm. in Toms River from .24 to 2.28 ppm. and in the Metedeconk River from .24 to 2.40 ppm.

Small concentrations of orthophosphate were observed ranging in the bay from 0.0 to .36 ppm., in Toms River from .02 to .50 ppm., and in the Metedeconk River from .01 to .48 ppm.

Total phosphate values ranged in the bay from .02 to 3.50 ppm., in Toms River from .14 to 2.30 ppm. and in the Metedeconk River from .28 to 3.20 ppm.

Slight traces of detergent were detected within this system ranging from 0 to .30 ppm.

Results of residue analyses for 11 chlorinated hydrocarbons in 24 fish samples showed that DDT and its metabolites were detected in 91% of the tests with values ranging up to 300 ppb. B.H.C., aldrin and heptachlor were the only other insecticides detected. Heptachlor

was the next highest found in 22% of the samples. From the four fish compared, DDT levels were highest in the silverside and bay anchovy. B.H.C. was detected only in the winter flounder and aldrin in the white perch.

DDT and its metabolites were the only pesticides detected in 64% of the mud samples with concentrations ranging up to 2,234 ppb.

Heavy metal analysis on 19 fish samples showed mercury ranging from 50 to 350 ppb., zinc from 2.5 to 38.8 ppm., cadmium from 9.5 to 13.2 ppm., lead from 7.5 to 15.8 ppm. and chromium from 0.0 to .25 ppm. From the five metals analyzed, zinc was detected in largest concentrations. This was evident in the silverside and bay anchovy. Chromium was not detected in the white perch or bay anchovy.

In the sediment samples, mercury concentrations ranged from .09 to 1.59 ppm., zinc from 5 to 25 ppm., cadmium from 2 to 10 ppm., lead from 10 to 70 ppm. and chromium from 5 to 50 ppm. High levels of mercury were detected in Toms River and adjacent bay area.

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TABLE 1. Water Analysis Data

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (‰)		Diss. (ppm.)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
*1/26/72	12:53 PM	Low +2½	17.8	3.0	-	22.86	-	-
2/15/72	12:41 PM	High +6	5.0	3.6	-	29.88	-	-
3/20/72	2:30 PM	High +3	6.0	6.0	-	27.47	-	26,500
4/18/72	-	-	-	-	-	-	-	-
5/11/72	8:00 AM	High +3½	11.0	10.0	9.3	27.79	28.06	26,400
6/7/72	7:05 AM	High +4	17.5	14.3	13.5	29.96	-	29,880
7/18/72	6:55 AM	Low	22.0	24.0	-	24.60	-	23,400
8/22/72	9:23 AM	High +4	28.0	22.4	-	30.23	-	26,040
9/12/72	9:00 AM	Low +5	21.0	21.0	-	30.46	31.47	26,280
10/18/72	9:30 AM	Low	9.0	13.5	13.8	29.16	29.57	-
11/22/72	12:00 PM	Low +½	3.0	8.0	-	28.46	-	-

* Blow out tide.

TABLE 2. Water Analysis Data Collected at the

4/18/72	9:18 AM	Low +2	14.0	11.0	10.5	23.33	24.42	21,900
5/11/72	7:20 AM	Low +5	12.0	11.0	10.5	22.61	24.05	21,660
6/7/72	6:20 AM	High +1	17.0	19.5	18.0	21.55	21.73	21,000
7/18/72	3:30 AM	High +3½	26.0	26.5	26.5	22.70	23.78	21,480
8/22/72	8:49 AM	High +1	28.0	23.4	23.3	24.70	25.23	21,600
9/12/72	8:45 AM	Low +2½	21.0	20.5	21.0	24.96	25.30	22,200
10/18/72	9:00 AM	High +3	7.0	13.0	12.5	23.87	23.96	-
11/22/72	12:35 PM	Low +4½	1.9	5.5	5.5	20.14	20.50	-

TABLE 3. Water Analysis Data Collected

12/31/71	1:15 PM	High + 3½	14.0	7.0	-	24.78	-	-
*1/26/72	12:10 PM	High +5½	17.2	1.7	-	23.80	-	-
2/17/72	12:04 PM	High	5.0	4.5	-	24.79	-	-
3/20/72	1:45 PM	Low +5½	5.0	8.0	-	22.90	-	19,800
4/18/72	9:50 AM	Low +1½	14.0	11.0	-	23.48	-	22,920
5/11/72	7:35 AM	Low +4	12.0	11.5	-	22.61	-	21,600
6/7/72	6:40 AM	High +½	18.0	19.5	-	20.91	-	20,400
7/18/72	6:10 AM	High +3	25.0	26.0	-	21.80	-	21,480
8/15/72	12:45 PM	Low +4½	20.0	21.5	-	24.33	-	21,000
9/12/72	8:20 AM	Low +1½	21.0	20.0	-	24.69	-	19,800
10/18/72	8:45 AM	High +2½	7.0	11.5	-	23.69	-	-
11/22/72	11:25 AM	Low +3	1.9	5.5	-	19.87	-	-

* Blow out tide.

TABLE 4. Water Analysis Data Collected at the

4/18/72	10:55 AM	Low +3	15.0	11.0	10.0	21.67	23.69	21,600
5/11/72	9:20 AM	High +1	13.0	12.0	11.5	19.56	24.67	19,800
6/7/72	8:30 AM	High +2½	20.0	19.5	19.0	20.55	25.05	21,000
7/18/72	8:20 AM	High +4½	29.0	28.0	24.5	18.44	21.26	18,600
8/22/72	8:30 AM	High	25.0	25.4	23.0	23.24	28.17	21,600
9/12/72	10:40 AM	Low +4	23.0	22.7	20.7	23.78	24.87	20,700
10/18/72	10:50 AM	High +4½	12.0	17.5	14.5	22.00	24.33	-
11/22/72	12:20 PM	Low +4	2.0	5.5	5.5	19.24	26.94	-

Solids	pH		Turb.	Dpth.	CO ₂ (ppm)		D.O. (ppm)		D.O. % sat.	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.7	-	<25.0	-	4.4	-	11.2	-	96	-
-	8.1	-	30.0	-	6.7	-	10.2	-	94	-
-	8.0	-	<25.0	-	4.8	-	10.9	-	104	-
-	-	-	-	-	-	-	-	-	-	-
26,520	8.0	8.3	<25.0	-	4.0	8.5	9.7	9.9	102	91
-	7.9	-	<25.0	-	5.9	-	8.3	-	96	-
-	8.0	-	<25.0	-	5.5	-	5.4	-	73	-
-	8.2	-	<25.0	-	3.3	-	8.5	-	92	-
-	8.1	7.9	<25.0	-	3.2	5.9	6.9	6.7	91	-
-	7.9	7.9	<25.0	-	6.8	6.1	7.9	8.0	89	92
-	8.0	-	<25.0	-	6.0	-	9.1	-	92	-

Barnegat Bay Station Flashing Light #68 (WQB-1).

22,800	7.9	8.0	-	10°	4.1	5.5	9.6	8.4	99	87
23,400	7.9	8.0	<25.0	10°	4.9	4.4	8.9	10.3	92	107
24,000	7.8	7.7	<25.0	9°	3.5	3.4	8.4	7.3	101	86
23,200	8.1	8.0	<25.0	8°	1.5	3.2	6.8	6.5	95	91
22,680	8.3	8.2	<25.0	8°	1.1	3.0	8.4	7.0	111	103
22,200	8.2	8.2	<25.0	8°	2.6	1.7	7.5	7.5	94	95
-	8.0	7.9	<25.0	8°	3.0	5.7	8.4	8.3	91	91
-	8.0	7.9	<25.0	9°	5.3	6.5	11.1	10.2	99	92

at the Barnegat Beach Station (WQB-2).

-	8.0	-	<25.0	-	4.3	-	11.6	-	113	-
-	7.5	-	<25.0	-	5.4	-	12.1	-	107	-
-	7.9	-	130.0	-	6.9	-	10.2	-	92	-
-	8.0	-	30.0	-	2.1	-	11.4	-	111	-
-	8.0	-	<25.0	-	3.4	-	10.0	-	104	-
-	7.8	-	<25.0	-	5.0	-	9.1	-	95	-
-	8.0	-	<25.0	-	3.0	-	6.3	-	76	-
-	7.8	-	<25.0	-	3.6	-	6.2	-	85	-
-	8.1	-	60.0	-	7.0	-	7.3	-	93	-
-	7.9	-	<25.0	-	1.7	-	7.7	-	96	-
-	7.9	-	<25.0	-	4.1	-	8.3	-	87	-
-	7.9	-	<25.0	-	7.6	-	10.7	-	96	-

Barnegat Bay Station Buoy #66 (WQB-3).

24,000	7.9	7.9	<25.0	8°	4.5	4.1	10.1	10.1	104	103
25,080	7.7	7.7	<25.0	9°	6.3	4.3	8.8	8.5	91	90
25,260	7.8	7.7	<25.0	9°	5.4	5.9	7.7	7.0	92	86
22,800	8.0	8.1	<25.0	9°	5.9	5.8	6.3	6.0	88	79
25,800	8.2	8.0	<25.0	9°	4.1	6.0	7.7	5.7	105	77
21,900	8.2	8.1	<25.0	8°	3.6	5.4	7.4	6.8	97	86
-	-	-	<25.0	8°	6.2	4.6	8.6	8.0	105	91
-	8.0	7.9	<25.0	9°	5.7	6.0	10.2	10.7	91	83

TABLE 5. Water Analysis Data Collected

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (‰)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
12/31/71	1:02 PM	Low	17.0	6.5	-	24.04	-	-
*1/26/72	11:53 AM	High +5½	17.8	2.5	-	24.54	-	-
2/17/72	11:45 AM	High	5.0	12.6	-	22.68	-	-
3/20/72	1:30 PM	Low +5	5.3	11.2	-	20.77	-	20,400
4/18/72	10:05 AM	Low +2	15.0	14.0	-	21.56	-	21,000
5/11/72	8:35 AM	High	13.0	11.0	-	22.50	-	21,900
6/7/72	7:30 AM	High +1½	16.0	19.5	-	19.92	-	20,460
7/18/72	7:25 AM	High +4½	27.0	29.0	-	19.52	-	19,200
8/15/72	12:30 PM	Low +4½	20.0	22.5	-	21.73	-	19,200
9/12/72	9:50 AM	Low +3	20.0	21.0	-	24.14	-	20,400
10/18/72	9:50 AM	High +4	10.0	14.5	-	22.90	-	-
11/20/72	12:30 PM	High +3½	2.0	7.5	-	19.60	-	-

* Blow out tide.

TABLE 6. Water Analysis Data Collected at the

4/18/72	12:00 N	Low +3½	17.0	11.5	10.5	20.21	20.86	19,500
5/11/72	9:40 AM	High +1	13.0	12.0	11.7	20.23	22.45	20,400
6/7/72	8:55 AM	High +2½	20.5	19.8	19.0	20.64	23.78	19,800
7/18/72	8:40 AM	High +5	27.0	27.0	26.0	16.89	19.52	16,380
8/16/72	12:08	Low +3	25.2	21.7	19.7	22.72	25.48	20,400
9/12/72	10:50 AM	Low +3½	23.0	20.0	20.0	23.15	23.69	20,400
10/18/72	11:05 AM	High +4½	12.0	12.5	14.0	21.82	22.72	-
11/22/72	1:15 PM	Low +4½	2.0	5.5	8.0	19.60	22.83	-

TABLE 7. Water Analysis Data Collected at

12/31/71	11:40 AM	High +1½	10.0	5.5	-	21.87	-	-
*1/26/72	10:43 AM	High +3½	17.2	2.3	-	20.99	-	-
2/17/72	10:47 AM	Low +4	3.0	3.1	-	19.94	-	-
3/20/72	12:18 PM	Low +3½	5.0	7.5	-	15.82	-	15,300
4/18/72	12:30 PM	Low +3½	17.0	11.5	-	19.61	-	19,200
5/11/72	9:55 AM	High +1	14.0	12.8	-	18.68	-	18,300
6/7/72	9:15 AM	High +2½	19.0	20.5	-	17.85	-	17,400
7/18/72	8:55 AM	High +5	28.0	27.5	-	14.25	-	13,440
8/15/72	8:22 AM	High +6	21.0	21.7	-	18.44	-	16,740
9/12/72	11:00 AM	Low +3½	23.0	20.5	-	22.90	-	20,400
10/18/72	11:35 AM	High +6	12.0	12.0	-	16.20	-	-
11/27/72	11:00 AM	Low +1	10.0	6.5	-	16.53	-	-

* Blow out tide.

Solids	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.9	-	<25.0	-	5.3	-	11.0	-	98	-
-	7.6	-	<25.0	-	4.8	-	11.8	-	102	-
-	7.8	-	90.0	-	6.8	-	8.8	-	96	-
-	8.1	-	40.0	-	5.3	-	11.8	-	121	-
-	7.8	-	<25.0	-	5.5	-	9.3	-	101	-
-	7.9	-	<25.0	-	6.1	-	9.9	-	102	-
-	8.0	-	<25.0	-	4.0	-	7.2	-	86	-
-	7.9	-	<25.0	-	5.0	-	5.6	-	81	-
-	8.1	-	70.0	-	4.4	-	7.4	-	95	-
-	8.2	-	<25.0	-	2.4	-	7.7	-	98	-
-	8.0	-	<25.0	-	5.5	-	8.5	-	94	-
-	7.9	-	<25.0	-	6.4	-	10.3	-	96	-

Barnegat Bay Station Mid Channel Buoy "D" (WQB-5).

22,800	8.0	8.0	<25.0	9	5.4	4.9	10.1	10.2	104	103
21,900	7.9	8.0	<25.0	9	5.7	5.9	8.9	8.5	93	89
23,220	8.0	7.9	<25.0	9	1.9	4.3	7.9	6.7	95	80
18,600	8.2	8.1	<25.0	9	3.9	7.1	7.0	4.8	95	65
24,900	8.1	8.0	<25.0	8	4.0	7.8	7.4	5.2	94	65
20,400	8.1	8.1	<25.0	9	2.8	4.2	7.5	7.0	90	87
-	8.1	8.1	<25.0	8	4.0	4.6	9.1	8.5	96	92
-	7.9	7.9	<25.0	10	7.8	6.5	11.1	10.8	97	83

the Laurel Harbor Station (WQB-6).

-	7.8	-	<25.0	-	4.4	-	11.1	-	100	-
-	7.5	-	<25.0	-	3.8	-	11.8	-	98	-
-	7.9	-	40.0	-	6.3	-	11.1	-	94	-
-	7.7	-	<25.0	-	4.9	-	11.8	-	111	-
-	8.0	-	<25.0	-	4.8	-	9.9	-	101	-
-	7.9	-	<25.0	-	5.7	-	9.3	-	97	-
-	8.0	-	<25.0	-	4.8	-	7.1	-	85	-
-	8.2	-	<25.0	-	4.7	-	6.8	-	91	-
-	7.8	-	<25.0	-	6.3	-	6.9	-	86	-
-	8.1	-	<25.0	-	3.5	-	7.6	-	95	-
-	8.0	-	<25.0	-	4.1	-	9.1	-	92	-
-	8.0	-	90.0	-	4.7	-	11.1	-	99	-

TABLE 8. Water Analysis Data

Date	Time EST	Tide	Temp. (° C)			Sal. (°/oo)		Diss. (ppm) Sur.
			Air	Sur.	Bot.	Sur.	Bot.	
12/31/71	11:21 AM	High +1	9.0	5.0	-	22.54	-	-
*1/26/72	10:20 AM	Low +2 $\frac{1}{2}$	17.8	2.0	-	17.72	-	-
2/17/72	10:25 AM	Low +3 $\frac{1}{2}$	2.1	3.1	-	17.77	-	-
3/20/72	11:55 AM	Low +2 $\frac{1}{2}$	4.5	6.5	-	16.53	-	15,720
4/18/72	1:15 PM	Low +4	17.0	12.0	-	14.74	-	15,720
5/11/72	10:35 AM	High +1	16.0	13.5	-	17.59	-	17,280
6/7/72	10:00 AM	High +3	21.0	20.5	-	17.48	-	15,720
7/18/72	9:30 AM	High +5 $\frac{1}{2}$	29.0	28.0	-	14.34	-	13,920
8/15/72	8:35 AM	High +6	22.0	22.0	-	17.99	-	16,800
9/12/72	11:30 AM	Low +3 $\frac{1}{2}$	23.0	19.8	-	21.46	-	17,940
10/18/72	12:10 PM	High +4	12.0	12.5	-	17.48	-	-
11/27/72	11:30 AM	Low +1	9.0	6.0	-	15.81	-	-

* Blow out tide.

TABLE 9. Water Analysis Data Collected at

4/18/72	1:00 PM	Low +4	16.0	11.5	11.0	19.16	22.70	19,200
5/11/72	10:20 AM	High +1	16.0	12.5	12.3	17.77	19.38	16,800
6/7/72	9:45 AM	High +3	20.0	20.5	20.0	17.76	17.76	18,000
7/18/72	9:15 AM	High +5	28.0	27.0	26.0	12.79	16.71	14,520
8/16/72	11:54 AM	Low +2	24.5	22.0	21.6	19.25	21.08	17,400
9/12/72	11:20 AM	Low +3 $\frac{1}{2}$	23.0	19.0	20.1	21.98	22.18	29,400
10/18/72	12:00 N	High +5	12.0	12.0	12.5	17.11	19.74	-
11/28/72	12:20 PM	Low +1	11.0	6.0	6.5	14.45	16.71	-

TABLE 10. Water Analysis Data Collected at

12/31/71	11:00 AM	High	9.0	5.0	-	16.53	-	-
*1/26/72	10:00 AM	High +2	16.8	3.0	-	16.62	-	-
2/17/73	10:12 PM	Low +3	2.0	3.3	-	14.94	-	-
3/20/72	11:30 AM	Low +2	4.5	6.9	-	14.79	-	14,700
4/18/72	1:25 PM	Low +4	17.5	12.0	-	12.81	-	17,400
5/11/72	10:50 AM	High +2	16.5	13.5	-	16.42	-	15,600
6/7/72	10:05 AM	High +3	22.0	21.0	-	15.77	-	15,600
7/18/72	9:35 AM	High +5	30.0	25.0	-	-	-	10,920
8/15/72	9:11 AM	Low +0	21.0	23.0	-	16.26	-	15,300
9/12/72	11:45 AM	Low +3 $\frac{1}{2}$	23.0	20.0	-	19.00	-	16,200
10/18/72	12:20 PM	High #5	11.0	12.0	-	16.74	-	-
11/27/72	11:40 AM	Low +1	9.0	6.3	-	14.16	-	-

* Blow out tide.

Collected at the Holly Park Station (WQB-7).

Solids Bot.	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	8.0	-	<25.0	-	4.2	-	12.3	-	111	-
-	7.4	-	<25.0	-	3.4	-	11.8	-	95	-
-	8.0	-	30.0	-	5.0	-	11.9	-	99	-
-	7.6	-	<25.0	-	2.2	-	12.0	-	107	-
-	8.0	-	<25.0	-	4.1	-	9.8	-	98	-
-	7.6	-	<25.0	-	2.8	-	9.0	-	94	-
-	7.8	-	<25.0	-	2.5	-	7.3	-	88	-
-	8.2	-	<25.0	-	4.5	-	6.6	-	89	-
-	7.9	-	<25.0	-	6.0	-	6.7	-	84	-
-	8.0	-	<25.0	-	4.8	-	7.8	-	95	-
-	7.9	-	<25.0	-	4.3	-	9.5	-	98	-
-	8.1	-	<25.0	-	4.9	-	11.1	-	91	-

the Barnegat Bay Station Buoy #63 (WQB-8).

18,600	7.8	7.8	<25.0	9	4.6	7.1	10.1	9.2	103	94
18,900	7.7	7.8	<25.0	8	5.4	4.6	9.2	8.4	95	87
18,600	8.1	8.1	<25.0	9	2.0	2.4	7.8	7.7	94	92
17,040	7.8	7.8	<25.0	8	2.8	3.9	7.2	5.5	95	73
19,200	8.1	8.1	<25.0	7	4.4	4.5	7.5	6.6	94	83
19,680	7.9	8.0	<25.0	8½	4.5	5.8	7.9	7.5	95	92
-	7.9	7.9	<25.0	7	4.4	5.0	9.3	8.6	94	90
-	7.9	8.1	<25.0	8	4.8	5.4	11.2	10.6	98	95

the Berkeley Shore Station (WQB-9).

-	7.8	-	<25.0	-	2.8	-	12.5	-	108	-
-	6.4	-	<25.0	-	4.6	-	11.1	-	91	-
-	7.8	-	<25.0	-	5.2	-	11.0	-	95	-
-	6.6	-	<25.0	-	2.0	-	12.4	-	111	-
-	7.9	-	<25.0	-	5.4	-	10.2	-	101	-
-	7.7	-	30.0	-	3.7	-	9.8	-	102	-
-	8.1	-	<25.0	-	1.0	-	8.0	-	96	-
-	8.2	-	<25.0	-	3.2	-	7.1	-	-	-
-	7.8	-	<25.0	-	3.1	-	7.3	-	91	-
-	8.1	-	<25.0	-	3.2	-	8.0	-	97	-
-	8.0	-	<25.0	-	3.5	-	9.4	-	96	-
-	8.0	-	<25.0	-	4.4	-	11.2	-	99	-

TABLE 11. Water Analysis Data Collected at the

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (‰)		Diss. (ppm.)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
4/20/72	12:40 PM	Low +2 $\frac{1}{2}$	12.0	14.5	14.2	27.65	23.21	-
5/11/72	12:00 PM	High +3 $\frac{3}{4}$	16.5	13.3	-	20.10	20.46	19,800
6/7/72	11:15 AM	High +5 $\frac{3}{4}$	22.0	20.0	20.0	20.37	20.46	21,000
7/18/72	11:00 AM	Low +1	31.0	28.5	28.0	-	-	16,860
8/17/72	11:20 AM	Low +1 $\frac{1}{2}$	21.0	20.7	21.0	23.33	23.51	20,460
9/12/72	12:45 PM	Low +6	22.0	19.5	20.0	24.04	22.18	20,400
10/18/72	1:05 PM	Low + $\frac{1}{2}$	11.8	12.0	12.0	19.47	20.19	-
11/28/72	11:00 AM	Low + $\frac{1}{2}$	13.0	6.3	7.5	16.53	20.41	-

TABLE 12. Water Analysis Data Collected at the

12/21/71	1:55 PM	Low	14.0	8.3	-	20.43	-	-
1/24/72	2:08 PM	Low +2	18.0	6.9	-	18.08	-	-
*2/10/72	1:18 PM	Low	7.5	1.5	-	16.92	-	-
3/16/72	1:50 PM	High +2 $\frac{1}{2}$	11.0	6.0	-	22.94	-	21,600
4/20/72	12:35 PM	Low +1 $\frac{1}{2}$	13.5	14.5	-	23.69	-	23,400
5/11/72	11:40 AM	High +2 $\frac{1}{2}$	16.0	13.0	-	17.95	-	17,100
6/7/72	10:55 AM	High +4 $\frac{1}{2}$	23.0	20.5	-	20.64	-	21,600
7/18/72	10:50 AM	Low + $\frac{1}{2}$	31.0	28.5	-	-	-	19,200
8/15/72	10:58 AM	Low +2 $\frac{1}{2}$	23.0	21.5	-	22.70	-	21,000
9/12/72	12:40 PM	Low +5 $\frac{1}{2}$	22.0	19.5	-	23.95	-	20,100
10/18/72	-	-	-	-	-	-	-	-
11/28/72	11:15 AM	Low	12.0	6.0	-	17.43	-	-

* Ice present.

TABLE 13. Water Analysis data Collected at the

12/28/72	1:40 PM	High +5 $\frac{1}{2}$	14.0	7.6	-	17.27	-	-
1/24/72	1:53 PM	Low + $\frac{1}{2}$	18.0	6.8	-	16.02	-	-
*2/10/72	12:55 PM	High +5 $\frac{1}{2}$	7.0	1.0	-	14.99	-	-
3/16/72	1:40 PM	High +2	10.5	5.5	-	23.22	-	19,800
4/20/72	12:10 PM	Low +1	14.5	14.5	-	18.62	-	18,000
5/11/72	11:25 AM	High +2	16.0	13.0	-	16.96	-	17,280
6/7/72	10:35 AM	High +3 $\frac{1}{2}$	21.0	20.7	-	18.66	-	19,200
7/18/72	10:30 AM	High	29.0	28.5	-	-	-	16,080
8/15/72	10:35 AM	Low +1 $\frac{1}{2}$	22.0	21.5	-	18.53	-	17,700
9/12/72	12:18 PM	Low +4 $\frac{1}{2}$	23.0	19.5	-	19.81	-	16,800
10/18/72	1:00 PM	High +6	11.0	11.5	-	21.27	-	-
11/28/72	11:35 AM	Low	12.0	6.5	-	16.17	-	-

* Ice present.

Sedge Island Station, Flashing Red Light #2 (WQB-10).

Solids Bot.	pH			Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.	Turb.		Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	8.2	8.3	Δ 25.0	4	2.3	2.5	8.8	8.8	102	97
21,660	7.9	8.0	Δ 25.0	4	3.5	2.8	9.9	10.6	104	112
21,000	8.3	8.3	Δ 25.0	5	0.0	0.0	8.6	8.9	104	107
19,500	8.2	8.1	Δ 25.0	4	1.9	0.0	7.4	7.9	-	-
21,600	8.1	8.1	Δ 25.0	6	2.6	5.9	7.9	7.9	99	100
21,000	8.2	8.1	Δ 25.0	4	.50	1.4	7.7	8.0	95	98
-	8.1	8.1	Δ 25.0	5	5.6	5.5	9.2	8.9	95	92
-	8.1	8.1	Δ 25.0	5	4.7	5.2	11.2	10.5	101	99

Island Beach State Park Station, South (WQB-11).

-	7.3	-	75.0	-	14.3	-	7.7	-	74	-
-	7.7	-	-	-	4.7	-	12.2	-	111	-
-	7.7	-	Δ 25.0	-	9.2	-	9.6	-	76	-
-	8.0	-	Δ 35.0	-	5.5	-	12.2	-	115	-
-	8.2	-	Δ 25.0	-	2.0	-	7.9	-	88	-
-	8.0	-	Δ 25.0	-	3.1	-	10.1	-	105	-
-	8.2	-	Δ 25.0	-	0.0	-	8.7	-	108	-
-	7.9	-	Δ 25.0	-	0.0	-	8.0	-	-	-
-	7.8	-	Δ 25.0	-	7.9	-	6.7	-	85	-
-	8.1	-	Δ 25.0	-	0.0	-	7.9	-	97	-
-	-	-	-	-	-	-	-	-	-	-
-	8.2	-	Δ 25.0	-	5.8	-	11.1	-	100	-

Island Beach State Park Station, North (WQB-12).

-	7.3	-	Δ 25.0	-	10.6	-	7.8	-	72	-
-	7.6	-	-	-	3.8	-	12.1	-	109	-
-	7.5	-	Δ 25.0	-	8.7	-	12.0	-	93	-
-	7.9	-	Δ 30.0	-	5.1	-	12.2	-	112	-
-	7.8	-	Δ 25.0	-	5.4	-	8.6	-	93	-
-	7.9	-	Δ 25.0	-	3.3	-	9.6	-	99	-
-	8.2	-	Δ 25.0	-	0.0	-	7.8	-	95	-
-	8.0	-	Δ 25.0	-	2.3	-	6.8	-	-	-
-	7.6	-	Δ 25.0	-	34.5	-	4.1	-	51	-
-	8.1	-	Δ 25.0	-	5.0	-	7.3	-	87	-
-	8.1	-	Δ 25.0	-	5.1	-	9.3	-	96	-
-	8.0	-	Δ 25.0	-	3.3	-	11.5	-	103	-

TABLE 14. Water Analysis Data Collected at the

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
4/20/72	11:50 AM	Low + $\frac{1}{2}$	15.0	14.5	14.2	16.17	16.35	15,900
5/11/72	11:15 AM	High +2	15.5	13.0	13.0	17.05	18.04	17,520
6/7/72	10:25 AM	High +3 $\frac{1}{2}$	22.0	20.7	20.7	20.01	16.74	19,200
7/18/72	10:15 AM	High +6	29.0	28.0	27.5	-	-	14,700
8/17/72	10:55 AM	Low	21.5	20.8	21.2	18.89	19.25	17,700
9/12/72	12:05 PM	Low +4 $\frac{1}{2}$	23.0	19.5	20.5	19.15	20.99	17,100
10/18/72	12:45 PM	High +5 $\frac{1}{2}$	11.0	11.5	12.0	14.94	15.84	-
11/28/72	11:45 AM	Low +5	12.0	6.3	6.5	15.08	14.96	-

TABLE 15. Water Analysis Data Collected at the

12/28/71	1:25 PM	High +5	13.3	7.6	-	15.26	-	-
1/24/72	1:40 PM	Low +1	18.0	6.5	-	12.88	-	-
*2/10/72	12:35 PM	High +5	6.7	1.0	-	10.82	-	-
3/16/72	1:25 PM	High +1	10.0	5.0	-	16.94	-	16,200
4/20/72	11:37 AM	Low	15.0	14.5	-	12.97	-	12,600
5/11/72	11:00 AM	High +1	16.0	13.0	-	12.52	-	12,000
6/7/72	10:15 AM	High +3	22.0	21.0	-	13.30	-	13,200
7/18/72	9:40 AM	High +5	28.0	27.5	-	-	-	10,800
8/15/72	9:55 AM	Low	21.0	20.9	-	13.33	-	12,900
9/12/72	12:00 N	Low +3 $\frac{1}{2}$	23.0	19.5	-	18.93	-	16,500
10/18/72	12:30 PM	Low +1 $\frac{1}{2}$	11.0	12.0	-	14.38	-	-
11/28/72	12:00 N	Low	11.0	6.0	-	16.35	-	-

* Ice Present

TABLE 16. Water Analysis Data Collected at the

*1/24/72	1:25 PM	High + $\frac{1}{2}$	17.0	6.5	-	8.80	-	-
x*2/10/72	12:12 PM	High +4 $\frac{1}{2}$	6.8	3.2	-	9.49	-	-
*3/16/72	1:10 PM	High +1	11.0	4.5	-	13.06	-	17,100
4/19/72	8:30 AM	High +4 $\frac{1}{2}$	16.5	12.0	-	12.67	16.83	14,400
5/12/72	11:20 AM	High + $\frac{1}{2}$	23.0	15.0	15.0	11.87	12.05	12,300
6/8/72	9:30 AM	High +1	27.0	21.0	20.8	11.56	13.12	12,000
7/19/72	11:00 AM	High +5 $\frac{1}{2}$	33.0	29.0	28.8	9.67	10.23	9,660
8/16/72	10:17 AM	Low	22.0	22.0	21.7	14.07	14.79	12,900
9/14/72	12:50 PM	Low +3 $\frac{1}{2}$	34.0	22.0	21.6	16.47	17.29	17,700
10/27/72	12:18 PM	High +2 $\frac{1}{2}$	7.0	7.5	7.5	15.63	17.79	-
11/20/72	2:40 PM	Low +4	8.0	7.3	7.0	14.70	14.81	-

* Sample collected 1300 yards from Light #1 at shore.

x Ice present.

Barnegat Bay Station, Island Beach State Park (WQB-13).

Solids	pH		Dpth.	CO ₂	(PPM)		D.O. (ppm)		D.O. (% Sat.)		
	Sur.	Bot.			Turb.	Ft.	Sur.	Bot.	Sur.	Bot.	Sur.
17,400	7.8	7.8	Δ	25.0	4	5.6	4.2	9.5	9.2	100	98
18,120	7.9	7.8		25.0	6	5.7	4.3	9.8	9.1	102	94
19,200	8.1	8.1	Δ	25.0	6	0.0	0.0	7.7	7.6	94	91
17,100	8.1	8.1	Δ	25.0	8	2.3	2.1	7.2	6.3	-	-
18,000	8.1	8.0	Δ	25.0	6	3.4	3.0	7.8	7.9	94	98
18,000	8.2	8.1	Δ	25.0	7	4.0	4.1	7.5	7.1	89	87
-	8.2	8.2	Δ	25.0	6	5.4	3.0	9.9	9.4	98	95
-	8.1	8.0	Δ	25.0	6	3.9	4.2	11.5	11.6	102	102

Seaside Park Dock Station, Old Railroad Trestle (WQB-14).

-	7.9	-	35.0	-	2.6	-	12.5	-	114	-
-	7.6	-	-	-	4.2	-	12.6	-	110	-
-	7.4	-	25.0	-	4.8	-	14.6	-	110	-
-	8.0	-	25.0	-	4.8	-	12.2	-	106	-
-	7.7	-	25.0	-	4.9	-	9.2	-	96	-
-	7.9	-	30.0	-	.85	-	10.3	-	104	-
-	8.3	-	25.0	-	1.4	-	8.4	-	100	-
-	-	-	25.0	-	2.8	-	7.6	-	-	-
-	8.0	-	25.0	-	5.4	-	7.8	-	92	-
-	8.3	-	25.0	-	0.0	-	7.7	-	92	-
-	8.3	-	25.0	-	2.2	-	10.7	-	107	-
-	8.2	-	25.0	-	3.3	-	11.6	-	103	-

Barnegat Bay Station, Flashing Green Light #1 (WQB-15).

-	7.4	-	-	-	7.0	-	12.2	-	-	-
-	7.5	-	25.0	-	4.3	-	14.3	-	106	-
-	7.9	-	25.0	-	3.4	-	12.4	-	103	-
15,840	7.6	7.7	25.0	7	2.6	4.0	10.2	9.8	100	98
12,300	8.1	8.1	25.0	6	3.5	4.1	9.8	9.7	103	102
13,200	7.9	8.0	25.0	7	2.2	2.5	5.5	5.0	92	84
11,400	7.9	7.9	25.0	6	3.8	4.1	7.3	7.1	99	95
16,080	8.1	8.2	25.0	6	4.0	4.0	7.8	7.4	95	99
16,800	8.1	8.1	25.0	6.5	2.0	-	8.6	7.7	106	94
-	7.9	7.9	25.0	6	.65	5.5	10.6	10.5	97	98
-	8.0	8.1	25.0	7	5.2	6.1	10.2	10.3	92	99

TABLE 17. Water Analysis Data Collected at the Barnegat

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
4/19/72	11:10 AM	Low	14.0	13.0	12.0	13.30	13.42	13,800
5/12/72	9:15 AM	Low +4 $\frac{1}{2}$	18.0	14.0	14.0	12.14	12.05	12,000
6/8/72	7:45 AM	Low +4 $\frac{1}{2}$	20.0	19.5	19.5	12.65	12.65	12,600
7/19/72	9:15 AM	High +3 $\frac{1}{2}$	34.0	28.5	28.5	9.67	9.49	10,080
8/6/72	8:25 AM	Low +4 $\frac{1}{2}$	20.0	20.7	20.7	12.61	12.88	12,000
9/14/72	11:10 AM	Low +1 $\frac{1}{2}$	30.0	22.0	21.5	15.66	15.66	14,940
10/20/72	10:20 AM	High + $\frac{1}{2}$	3.0	7.8	7.8	16.71	15.26	-
11/20/72	12:15 PM	Low +1 $\frac{1}{2}$	8.5	7.5	7.5	13.35	13.71	-

TABLE 18. Water Analysis Data Collected at the

12/29/71	1:48 PM	High +3 $\frac{1}{2}$	7.9	6.5	-	12.74	-	-
*1/25/72	12:40 PM	High +5	13.0	5.6	-	7.78	-	-
2/15/72	11:23 AM	Low +5	6.2	3.0	-	14.60	-	-
3/17/72	11:45 AM	High +4	14.0	6.5	-	12.21	-	12,900
4/19/72	11:20 AM	Low	24.0	13.0	-	13.60	-	13,260
5/12/72	9:50 AM	Low +4 $\frac{1}{2}$	17.5	14.0	-	12.43	-	12,480
6/8/72	7:55 AM	Low +4 $\frac{1}{2}$	22.0	19.4	-	12.94	-	13,200
7/19/72	9:20 AM	High +6	34.0	29.0	-	9.85	-	10,140
8/16/72	8:35 AM	High +4	21.0	20.8	-	10.59	-	11,700
9/14/72	11:20 AM	Low +1	30.0	22.0	-	15.66	-	14,520
10/20/72	10:45 AM	High + $\frac{1}{2}$	3.5	7.8	-	15.44	-	-
11/20/72	1:00 PM	Low +1 $\frac{1}{2}$	9.0	7.5	-	13.62	-	-

* High winds and rain.

TABLE 19. Water Analysis Data Collected at the Barnegat

4/19/72	12:00 N	Low + $\frac{1}{2}$	24.0	13.5	12.5	14.13	15.90	13,800
5/12/72	10:30 AM	Low +5	18.0	14.0	13.8	12.79	12.97	13,200
6/8/72	8:25 AM	High +1	23.0	20.0	20.0	12.94	11.09	12,960
7/19/72	9:50 AM	High +3 $\frac{1}{2}$	24.0	28.0	29.5	9.58	9.58	9,360
8/16/72	9:16 AM	High +5	22.0	21.0	20.7	11.60	11.87	11,340
9/14/72	11:45 AM	Low +1 $\frac{1}{2}$	23.0	22.0	21.5	15.39	15.57	13,800
10/20/72	11:30 AM	High +1	6.0	8.0	7.5	16.44	16.53	-
11/20/72	1:45 PM	High +2	9.0	6.0	6.5	13.98	14.07	-

Solids

	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
13,380	7.5	7.5	△ 25.0	6	6.0	5.6	9.7	9.4	99	94
12,000	7.8	8.0	25.0	6	3.3	3.7	9.7	9.7	100	100
12,060	7.8	7.9	25.0	6	3.8	4.0	7.3	7.0	83	80
9,780	7.8	7.8	△ 25.0	5	3.1	3.4	7.0	6.5	94	87
12,000	8.1	8.3	△ 25.0	6	4.5	4.1	7.7	7.3	91	86
13,980	7.9	8.0	△ 25.0	5	1.9	3.8	8.1	8.1	99	98
-	7.9	7.8	△ 25.0	6	4.9	5.4	10.0	10.2	93	94
-	7.8	7.7	△ 25.0	6	6.5	3.0	10.1	10.6	91	96

Shelter Cove Station (WQB-17).

-	8.1	-	△ 25.0	-	3.4	-	12.4	-	110	-
-	7.8	-	△ 25.0	-	4.0	-	12.2	-	105	-
-	7.9	-	30.0	-	4.0	-	11.8	-	95	-
-	7.6	-	△ 25.0	-	4.5	-	11.7	-	102	-
-	7.6	-	△ 25.0	-	6.2	-	9.3	-	94	-
-	7.9	-	25.0	-	3.9	-	9.8	-	100	-
-	8.0	-	25.0	-	3.6	-	-	-	-	-
-	8.0	-	25.0	-	3.6	-	6.8	-	93	-
-	8.1	-	25.0	-	4.6	-	4.7	-	54	-
-	8.0	-	25.0	-	5.1	-	7.9	-	96	-
-	7.9	-	△ 25.0	-	5.0	-	9.8	-	88	-
-	7.9	-	△ 25.0	-	5.5	-	10.3	-	93	-

Bay Station, Mid-Channel Buoy "B" (WQB-18).

12,900	7.6	7.7	△ 25.0	7	5.0	6.0	9.6	10.1	99	103
13,200	8.0	8.1	25.0	7	3.2	2.6	10.1	10.1	104	104
12,900	7.9	8.0	25.0	6	3.3	4.4	7.5	7.3	86	85
10,140	7.8	7.8	△ 25.0	7	3.2	3.6	6.9	5.7	91	77
11,340	8.1	8.0	△ 25.0	7	3.5	4.9	7.9	7.3	93	85
14,880	8.1	8.1	△ 25.0	7.5	3.6	3.1	8.2	8.0	100	97
-	7.9	7.9	△ 25.0	7	4.7	5.3	9.8	10.2	91	93
-	7.8	8.0	△ 25.0	8	5.5	5.9	10.6	10.8	92	95

TABLE 20. Water Analysis Data

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
12/29/71	11:50 AM	High +1½	7.8	5.5	-	11.51	-	-
*1/25/72	11:10 AM	High +3	12.0	5.6	-	12.57	-	-
2/15/72	9:51 AM	Low +3	5.8	2.5	-	12.29	-	-
3/17/72	10:15 AM	High +2	10.0	6.5	-	12.83	-	13,200
4/26/72	9:50 AM	Low +4½	9.0	10.5	-	12.61	-	12,600
5/16/72	9:20 AM	Low	17.5	16.5	-	11.47	-	12,720
6/19/72	10:55 AM	High +4½	21.0	21.4	-	10.59	-	10,260
7/27/72	7:50 AM	Low	20.5	24.4	-	9.40	-	9,060
8/17/72	7:29 AM	High +1½	20.5	20.8	-	8.91	-	9,660
9/26/72	10:20 AM	Low +1½	24.0	19.0	-	17.66	-	15,300
10/25/72	10:30 AM	Low +2	12.0	11.3	-	16.35	-	-
11/27/72	1:00 PM	Low +1	9.0	6.7	-	12.54	-	-

* High winds and rain.

TABLE 21. Water Analysis Data Collected

12/29/71	11:40 AM	High +1	10.0	5.5	-	15.72	-	-
*1/25/72	11:00 AM	High +3	12.0	5.6	-	13.62	-	-
2/15/72	9:38 AM	Low +2½	5.0	3.0	-	14.90	-	-
3/17/72	9:55 AM	High +3½	9.0	6.0	-	13.42	-	11,520
4/26/72	10:00 AM	Low +4½	8.5	10.5	-	15.57	-	15,660
5/16/72	9:30 AM	High	17.5	16.5	-	13.26	-	12,900
6/19/72	11:00 AM	High +4½	20.5	20.7	-	12.23	-	12,600
7/27/72	7:55 AM	Low	20.2	29.0	-	10.68	-	10,260
8/17/72	7:37 AM	High +1½	20.6	20.6	-	13.12	-	11,820
9/26/72	10:30 AM	Low +1½	14.0	19.0	-	18.21	-	15,000
10/25/72	10:35 AM	Low +2	13.0	11.0	-	17.25	-	-
11/27/72	1:10 PM	Low +1	9.0	6.3	-	13.44	-	-

* High winds and rain.

TABLE 22. Water Analysis Data Collected

12/28/71	1:06 PM	High +4	14.8	6.6	-	12.56	-	-
1/24/72	1:07 PM	Low	17.0	5.0	-	13.45	-	-
*2/10/72	11:55 AM	High +3½	6.5	.30	-	14.89	-	-
3/16/72	12:50 PM	Low +5½	10.5	5.0	-	12.67	-	12,900
4/19/72	8:03 AM	High +4	16.5	11.5	-	13.71	-	13,200
5/12/72	11:05 AM	Low +5½	23.0	15.2	-	12.43	-	10,860
6/8/72	9:10 AM	High	27.5	21.0	-	13.93	-	13,080
7/19/72	10:40 AM	High +4½	34.0	29.0	-	9.49	-	10,140
8/16/72	10:01 AM	High +6	23.2	22.5	-	12.61	-	12,000
9/19/72	12:30 PM	Low +2½	33.0	22.0	-	15.03	-	13,500
10/20/72	12:05 PM	High +2	7.0	7.5	-	14.34	-	-
11/20/72	2:22 PM	Low +3	9.0	7.0	-	13.08	-	-

* Ice present

Collected at the Shore Acres Station (WQB-19).

Solids		pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
Bot.	Sur.	Bot.	Sur.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	8.1	-	<	25.0	-	2.4	-	11.9	-	100	-
-	7.7	-		25.0	-	3.8	-	11.5	-	98	-
-	7.7	-		25.0	-	4.1	-	12.2	-	96	-
-	7.2	-		30.0	-	4.5	-	11.0	-	96	-
-	7.1	-	<	25.0	-	5.6	-	9.2	-	88	-
-	7.8	-		25.0	-	2.7	-	9.5	-	102	-
-	7.7	-	<	25.0	-	4.1	-	9.0	-	119	-
-	7.9	-	<	25.0	-	5.2	-	7.1	-	88	-
-	8.0	-	<	25.0	-	4.8	-	7.3	-	84	-
-	8.0	-	<	25.0	-	2.4	-	10.9	-	127	-
-	7.8	-	<	25.0	-	4.3	-	9.8	-	98	-
-	7.8	-	<	25.0	-	4.7	-	11.2	-	99	-

at the Havens Pt. Station (WQB-20).

-	8.0	-	<	25.0	-	1.9	-	12.0	-	100	-
-	7.8	-		30.0	-	4.5	-	12.0	-	103	-
-	7.7	-	<	25.0	-	5.0	-	11.9	-	97	-
-	7.4	-		45.0	-	5.5	-	11.1	-	96	-
-	7.2	-	<	25.0	-	6.4	-	9.7	-	94	-
-	8.0	-		25.0	-	4.1	-	8.9	-	96	-
-	7.7	-	<	25.0	-	5.4	-	8.9	-	114	-
-	8.0	-	<	25.0	-	3.2	-	7.7	-	96	-
-	8.1	-	<	25.0	-	4.0	-	7.6	-	89	-
-	8.1	-	<	25.0	-	2.0	-	10.7	-	126	-
-	7.9	-	<	25.0	-	4.5	-	10.4	-	104	-
-	7.9	-		25.0	-	5.8	-	11.4	-	100	-

at the West Point Island Station South. (WQB-21).

-	7.9	-	<	25.0	-	3.9	-	12.1	-	106	-
-	7.7	-			-	3.8	-	12.7	-	100	-
-	7.7	-	<	25.0	-	5.2	-	13.5	-	103	-
-	7.9	-		24.0	-	4.2	-	12.3	-	104	-
-	7.3	-	<	25.0	-	5.2	-	9.4	-	93	-
-	8.1	-		30.0	-	2.9	-	9.6	-	101	-
-	-	-	<	25.0	-	4.9	-	7.0	-	83	-
-	7.8	-		25.0	-	6.2	-	6.9	-	94	-
-	7.9	-	<	25.0	-	5.5	-	7.5	-	91	-
-	8.1	-	<	25.0	-	6.4	-	8.5	-	103	-
-	7.8	-	<	25.0	-	4.6	-	10.5	-	95	-
-	8.1	-	<	25.0	-	5.8	-	10.4	-	92	-

TABLE 23. Water Analysis Data Collected at the

Date	Time E.S.T.	Tide		Temp. (°C.)			Sal. (°/oo)		Diss. (ppm.)
				Air	Sur.	Bot.	Sur.	Bot.	Sur.
12/28/71	12:51 PM	High	+3 $\frac{1}{2}$	13.3	6.5	-	12.65	-	-
1/24/72	12:55 PM	High	+6 $\frac{1}{2}$	18.0	4.0	-	13.01	-	-
*2/10/72	11:37 AM	High	+3	6.5	.60	-	14.24	-	-
3/16/72	12:42 PM	Low	+5 $\frac{1}{2}$	10.5	4.0	-	13.04	-	13,140
4/19/72	12:30 PM	Low	+1	24.0	13.0	-	13.71	-	14,100
5/12/72	11:00 AM	Low	+5 $\frac{1}{2}$	21.0	14.5	-	12.79	-	13,200
6/8/72	8:50 AM	Low	+6 $\frac{1}{2}$	26.0	20.5	-	12.74	-	12,600
7/19/72	10:15 AM	High	+3 $\frac{1}{2}$	34.0	28.5	-	9.76	-	10,140
8/16/72	9:41 AM	High	+5 $\frac{1}{2}$	23.0	21.5	-	12.05	-	12,000
9/14/72	12:15 PM	Low	+2	33.0	22.5	-	14.56	-	13,200
10/20/72	11:50 AM	High	+1 $\frac{1}{2}$	7.0	7.7	-	15.08	-	-
11/20/72	2:10 PM	High	+2 $\frac{1}{2}$	9.0	8.0	-	14.16	-	-

* Ice present.

TABLE 24. Water Analysis Data Collected at the

4/19/72	12:15 PM	Low	+1	24.5	14.0	13.5	14.43	15.01	14,700
5/12/72	10:45 AM	Low	+5	19.5	14.0	14.0	13.33	13.51	13,800
6/8/72	8:37 AM	Low	+5	25.0	20.5	20.5	12.94	13.12	13,320
7/19/72	10:05 AM	High	+4	33.0	29.0	28.5	9.76	9.85	10,140
8/16/72	9:28 AM	High	+5 $\frac{1}{2}$	22.0	20.7	21.0	12.61	12.6	11,700
9/14/72	12:00 N	Low	+2	32.0	22.5	21.7	15.30	15.30	14,280
10/20/72	11:40 AM	High	+1 $\frac{1}{2}$	6.0	8.0	8.0	17.70	18.24	-
11/20/72	2:00 PM	High	+2 $\frac{1}{2}$	9.0	7.0	7.0	14.43	14.34	-

TABLE 25. Water Analysis Data Collected at

12/28/71	12:38 PM	High	+3	12.8	6.7	-	13.13	-	-
1/24/72	12:40 PM	High	+6	19.0	5.5	-	14.58	-	-
*2/10/72	11:07 AM	High	+2 $\frac{1}{2}$	5.0	1.0	-	16.06	-	-
3/16/72	12:05 PM	Low	+4 $\frac{1}{2}$	10.0	5.0	-	15.35	-	15,000
4/26/72	10:10 AM	Low	+4 $\frac{1}{2}$	8.5	11.0	-	15.16	-	15,600
5/16/72	9:45 AM	Low	+1 $\frac{1}{2}$	18.0	16.0	-	13.08	-	13,200
6/19/72	11:10 AM	High	+4 $\frac{1}{2}$	20.0	20.3	-	12.43	-	12,600
7/27/72	8:02 AM	Low	+1 $\frac{1}{2}$	20.5	24.3	-	10.95	-	9,900
8/17/72	7:46 AM	High	+2	20.7	20.7	-	12.74	-	12,060
9/26/72	10:30 AM	Low	+2	24.0	19.0	-	17.65	-	15,600
10/25/72	10:10 AM	Low	+2 $\frac{1}{2}$	13.0	11.0	-	16.53	-	-
11/27/72	12:05 PM	Low	+1	8.0	6.3	-	14.34	-	-

* Ice present.

Solids		pH		Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% sat.)	
Bot.	Sur.	Bot.	Turb.		Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.9	-	<25.0	-	4.7	-	12.0	-	105	-
-	7.8	-	-	-	4.2	-	13.0	-	107	-
-	8.1	-	<25.0	-	5.7	-	12.6	-	96	-
-	7.7	-	<25.0	-	3.9	-	12.5	-	103	-
-	7.8	-	<25.0	-	5.4	-	9.5	-	96	-
-	8.1	-	25.0	-	3.3	-	9.8	-	102	-
-	7.9	-	<25.0	-	4.8	-	5.0	-	84	-
-	7.9	-	25.0	-	5.6	-	6.8	-	91	-
-	8.2	-	25.0	-	5.3	-	7.7	-	91	-
-	8.1	-	<25.0	-	5.1	-	8.1	-	99	-
-	7.9	-	<25.0	-	5.9	-	10.2	-	93	-
-	7.9	-	<25.0	-	5.6	-	10.7	-	98	-

Middle Sedge Island Station, Flashing Red Light #2 (WQB-23).

15,300	7.9	7.9	<25.0	4	5.2	5.5	9.6	10.4	100	108
13,800	8.2	8.2	25.0	6	2.6	2.7	10.3	10.2	106	105
13,500	7.9	7.9	<25.0	5	4.0	4.7	7.2	7.1	85	83
9,600	7.9	7.9	25.0	5	3.6	4.1	7.1	6.6	96	89
12,000	8.2	8.1	<25.0	4	5.0	5.1	8.0	8.0	94	94
14,280	8.2	8.1	<25.0	4	4.3	2.9	7.9	8.0	97	97
-	7.9	7.9	<25.0	4	5.2	4.8	10.4	10.1	97	95
-	8.0	7.9	<25.0	5	5.5	6.0	10.6	10.4	94	93

the Mantoloking Estates Station (WQB-24).

-	8.1	-	<25.0	-	3.1	-	12.0	-	106	-
-	7.7	-	-	-	3.6	-	12.6	-	109	-
-	7.9	-	<25.0	-	5.0	-	13.3	-	103	-
-	7.9	-	<25.0	-	4.7	-	12.6	-	108	-
-	7.5	-	<25.0	-	6.2	-	10.2	-	100	-
-	8.1	-	25.0	-	3.2	-	9.1	-	98	-
-	7.5	-	<25.0	-	4.9	-	10.2	-	90	-
-	8.1	-	<25.0	-	4.4	-	7.4	-	92	-
-	8.1	-	<25.0	-	4.7	-	7.6	-	90	-
-	8.1	-	25.0	-	1.5	-	10.0	-	114	-
-	8.0	-	<25.0	-	4.0	-	10.5	-	104	-
-	7.9	-	<25.0	-	3.5	-	11.3	-	100	-

TABLE 26. Water Analysis Data

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm.)
			Air	Sur.	Bot.	Sur.	Bot.	
12/28/71	12:20 PM	High +2½	13.5	6.6	-	14.96	-	-
1/24/72	12:26 PM	High +5	18.0	6.3	-	13.30	-	-
*2/10/72	11:20 AM	High +2	6.0	.75	-	13.98	-	-
3/16/72	12:15 PM	Low +4½	9.5	4.5	-	12.90	-	12,900
4/26/72	10:45 AM	Low +5	8.5	10.0	-	18.24	-	17,880
5/16/72	10:07 AM	Low +½	16.5	16.0	-	13.80	-	14,400
6/19/72	11:30 AM	High +4½	20.0	20.5	-	13.80	-	13,800
7/27/72	8:21 AM	Low +½	20.8	24.0	-	11.42	-	11,190
8/17/72	8:04 AM	High +2	21.0	10.7	-	14.56	-	13,680
9/26/72	11:00 AM	Low +2	24.5	19.8	-	19.83	-	17,100
10/25/72	11:05 AM	Low +2½	13.5	11.7	-	18.87	-	-
11/21/72	1:25 PM	High +½	8.0	6.5	-	14.52	-	-

* Ice present.

TABLE 27. Water Analysis Data Collected at the

4/26/72	10:30 AM	Low +4½	9.0	10.0	9.5	17.20	18.62	16,800
5/6/72	10:00 AM	High +4	17.0	16.0	15.9	13.53	14.07	13,800
6/19/72	11:20 AM	High +4½	20.0	20.5	19.5	12.97	13.89	12,900
7/27/72	8:14 AM	Low +½	21.0	23.8	24.6	10.23	14.43	11,100
8/17/72	7:55 AM	High +1½	20.5	20.7	21.1	13.66	16.20	12,660
9/26/72	10:45 AM	Low +1½	24.5	19.5	18.5	19.29	19.65	16,200
10/25/72	10:50 AM	Low +2	13.0	11.5	12.0	19.69	19.78	-
11/21/72	1:35 PM	Low +½	8.0	6.5	7.0	14.34	14.52	-

TABLE 28. Water Analysis Data Collected at the

*12/28/71	12:05 PM	High +5½	13.5	6.5	-	16.33	-	-
* 1/24/72	12:13 PM	Low +1½	18.0	5.5	-	15.57	-	-
*x2/10/72	10:52 AM	High +5	6.0	-.5	-	17.74	-	-
* 3/16/72	11:50 AM	High +1½	10.5	4.5	-	15.57	-	15,600
4/26/72	11:00 AM	High +2½	8.5	10.0	9.5	21.64	21.71	21,000
5/16/72	10:15 AM	Low +4	16.0	15.5	15.3	14.90	20.86	13,920
6/19/72	11:45 AM	Low +1½	20.0	20.2	19.0	14.52	16.53	14,700
7/27/72	8:30 AM	Low +4	21.0	23.6	23.5	14.79	18.26	15,000
8/17/72	8:10 AM	High +5	21.2	20.7	20.9	15.03	16.83	13,800
9/26/72	11:10 AM	Low +5½	25.0	20.0	19.3	21.27	28.08	19,800
10/25/72	11:10 AM	Low +6	12.5	13.0	13.5	27.57	28.73	-
11/27/72	1:15 PM	Low +4	9.0	7.0	8.5	16.08	25.61	-

* Sample collected 100 yards from Fl. R. #20 at shore.

x Ice present.

Solids

Bot.	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	8.0	-	Δ 25.0	-	3.1	-	11.9	-	107	-
-	7.6	-	-	-	5.4	-	12.5	-	109	-
-	7.9	-	Δ 25.0	-	3.7	-	13.5	-	103	-
-	7.8	-	Δ 25.0	-	3.6	-	12.4	-	104	-
-	8.1	-	Δ 25.0	-	5.4	-	9.9	-	94	-
-	8.1	-	Δ 25.0	-	3.5	-	8.8	-	95	-
-	7.8	-	Δ 25.0	-	5.0	-	7.7	-	105	-
-	8.1	-	Δ 25.0	-	5.1	-	7.3	-	95	-
-	8.2	-	Δ 25.0	-	3.6	-	8.0	-	95	-
-	8.1	-	Δ 25.0	-	2.9	-	9.6	-	115	-
-	8.0	-	Δ 25.0	-	4.5	-	9.5	-	98	-
-	7.8	-	Δ 25.0	-	4.4	-	10.2	-	90	-

Barnegat Bay Nun Buoy #26 Station (WQB-26).

16,500	7.9	7.9	Δ 25.0	9	6.1	7.0	11.3	10.0	110	97
14,880	8.1	8.1	Δ 25.0	5	3.6	4.5	8.8	8.8	94	94
14,700	7.6	7.6	Δ 25.0	7	5.0	5.3	9.1	9.7	125	104
14,580	8.1	8.1	Δ 25.0	8	3.9	5.3	8.2	5.5	100	70
18,600	8.2	8.1	Δ 25.0	7	4.4	6.6	8.3	7.2	98	87
16,500	8.1	8.0	Δ 25.0	7	4.9	4.6	9.1	6.2	108	72
-	8.0	8.0	Δ 25.0	8	4.5	3.9	9.1	9.4	93	97
-	7.8	7.8	Δ 25.0	6	5.0	5.5	10.1	10.3	89	91

Herring Island Station, Flashing Red Light #20 (WQB-27).

-	8.0	-	Δ 25.0	-	4.8	-	12.0	-	107	-
-	7.8	-	-	-	3.6	-	12.7	-	110	-
-	7.9	-	Δ 25.0	-	5.8	-	13.1	-	100	-
-	7.8	-	Δ 25.0	-	4.2	-	12.3	-	105	-
21,000	8.0	8.1	Δ 25.0	8	6.2	5.5	10.5	11.3	98	112
15,120	8.1	7.8	Δ 25.0	9	4.3	7.6	8.6	8.4	92	93
15,060	7.8	7.8	Δ 25.0	7	4.8	6.5	8.8	9.6	120	104
17,940	8.1	8.1	Δ 25.0	8	5.1	7.3	6.4	6.0	81	77
17,100	8.2	8.1	Δ 25.0	9	3.9	5.9	7.9	6.9	94	83
24,000	8.1	8.0	Δ 25.0	8	4.3	6.4	10.0	7.3	122	92
-	7.9	7.9	Δ 25.0	8.5	4.0	3.9	8.2	7.7	91	87
-	8.0	8.0	Δ 25.0	10	4.6	5.5	10.2	8.9	92	90

TABLE 29. Water Analysis Data Collected at the

Date	Time E.S.T.	Tide	Temp. (°C.)			Sal. (‰)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	
4/26/72	11:15 AM	High +3	8.5	8.5	8.0	21.89	22.25	21,300
5/16/72	10:30 AM	Low +4 $\frac{1}{2}$	16.0	15.3	14.5	15.26	19.24	16,200
6/26/72	10:30 AM	High +1	23.0	17.3	17.0	12.61	16.71	10,200
7/27/72	8:55 AM	Low +4 $\frac{1}{2}$	21.0	23.4	22.4	-	25.48	17,700
8/17/72	8:19 AM	High +5 $\frac{1}{2}$	21.0	20.7	20.4	16.89	23.26	15,660
9/26/72	11:30 AM	Low +6	25.0	19.5	18.5	28.71	30.32	22,800
10/25/72	11:20 AM	High +0	13.0	13.5	13.5	29.43	29.97	-
11/21/72	1:00 PM	High +3 $\frac{1}{2}$	8.0	6.5	9.0	15.81	23.53	-

TABLE 30. Water Analysis Data Collected

*1/24/72	11:03 AM	High +6	14.0	6.5	-	13.82	-	-
x*2/10/72	9:27 AM	High +2 $\frac{1}{2}$	4.5	3.0	-	1.51	-	-
*3/16/72	10:02 AM	Low +4 $\frac{1}{2}$	11.0	5.6	-	9.15	-	11,400
4/26/72	11:35 AM	High +2	9.0	11.5	11.0	14.61	20.77	16,500
5/16/72	10:45 AM	Low +3	17.0	17.5	17.5	14.52	20.68	12,400
6/26/72	10:50 AM	Low +6	23.0	19.0	16.7	9.67	25.84	10,200
7/27/72	9:17 AM	Low +3 $\frac{1}{2}$	19.8	23.6	22.5	16.96	20.26	13,500
8/17/72	8:35 AM	High +4 $\frac{1}{2}$	21.0	20.4	21.0	17.14	23.96	18,000
9/26/72	11:45 AM	Low +5	26.0	20.0	20.0	22.00	25.05	18,600
10/25/72	11:40 AM	Low +5	14.0	13.5	13.0	19.60	27.21	-
11/21/72	12:50 PM	High +2	8.0	6.0	9.0	10.34	20.86	-

* Sample collected 300 yards from the station off the bank.

x Ice present.

TABLE 31. Water Analysis Data Collected at the

12/28/71	11:50 AM	High +3 $\frac{1}{2}$	14.0	8.5	-	15.34	-	-
1/24/72	12:00 N	High +6	14.0	6.3	-	14.10	-	-
*2/10/72	10:38 AM	High +2 $\frac{1}{2}$	5.0	1.5	-	9.96	-	-
3/16/72	11:30 AM	Low +5	10.0	4.9	-	18.57	-	18,600
4/26/72	12:00 N	High +1 $\frac{1}{2}$	8.5	11.0	11.0	15.39	18.98	17,700
5/16/72	11:00 AM	Low +2 $\frac{1}{2}$	17.0	16.5	14.0	11.35	13.98	11,400
6/26/72	11:05 AM	Low +5 $\frac{1}{2}$	23.0	19.0	17.0	8.39	14.79	8,400
7/27/72	9:26 AM	Low +3	20.2	24.4	22.3	14.43	21.17	14,100
8/17/72	8:45 AM	High +4	21.0	20.4	20.3	14.94	20.37	15,000
9/26/72	12:00 N	Low +4 $\frac{1}{2}$	26.0	19.5	19.0	20.10	24.42	16,800
10/25/72	11:55 AM	Low +4 $\frac{1}{2}$	13.0	13.5	13.7	20.32	22.83	-
11/21/72	12:40 PM	High +1	8.0	6.5	8.0	18.69	13.26	-

* Ice present.

Point Pleasant Canal Station, Flashing Red Light #10 (WQB-28).

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Solids	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
21,600	8.0	8.0	Δ 25.0	12	5.3	6.4	11.1	10.5	108	102
17,760	8.1	8.0	Δ 25.0	13	3.3	6.6	10.0	7.8	107	84
18,000	7.9	7.7	Δ 25.0	6	5.0	6.6	9.5	7.5	105	84
25,200	8.1	8.1	Δ 25.0	17	7.4	6.0	6.1	5.5	-	73
20,280	8.2	8.1	Δ 25.0	12	4.7	6.5	8.6	6.2	104	76
26,280	8.0	7.9	Δ 25.0	20	7.5	5.7	7.5	6.1	93	76
-	7.9	7.9	Δ 25.0	12	4.6	3.7	8.0	7.6	91	86
-	7.9	8.1	Δ 25.0	12	6.4	6.0	9.9	8.8	88	88

at the Beaverdam Creek Station (WQB-29).

-	7.3	-	-	-	3.4	-	12.9	-	114	-
-	6.3	-	Δ 25.0	-	5.7	-	11.9	-	89	-
-	6.4	-	Δ 25.0	-	4.8	-	11.9	-	100	-
22,200	7.8	7.7	Δ 25.0	7	5.4	7.7	10.0	9.1	99	93
19,800	8.2	7.9	30.0	7	4.4	9.1	10.6	6.6	118	77
21,840	7.8	7.5	30.0	6	4.1	10.9	11.2	6.4	125	76
23,700	8.1	8.1	25.0	7	7.0	10.1	8.1	4.6	103	58
22,200	8.2	8.0	25.0	7	5.7	9.3	8.1	5.0	96	63
18,600	7.9	7.8	Δ 25.0	7	3.2	9.3	10.5	10.5	128	131
-	7.9	7.8	Δ 25.0	8	4.4	6.2	9.5	7.4	101	82
-	7.5	8.0	Δ 25.0	8	5.7	6.9	10.2	6.3	87	62

Metedeconk River Station Flashing Red Light #2 (WQM-30).

-	8.4	-	Δ 25.0	-	0.00	-	14.8	-	138	-
-	8.4	-	-	-	0.00	-	14.2	-	124	-
-	7.1	-	Δ 25.0	-	4.8	-	13.5	-	100	-
-	7.6	-	Δ 25.0	-	5.2	-	12.8	-	112	-
21,000	8.0	8.0	Δ 25.0	6	2.5	4.4	11.5	10.9	113	110
24,600	8.1	8.2	35.0	5	0.0	3.2	12.1	8.8	130	91
18,600	7.9	7.8	Δ 25.0	7	5.0	8.4	11.1	4.8	122	53
22,080	8.2	8.1	Δ 25.0	7	1.1	2.0	8.6	5.6	108	72
22,800	8.3	8.2	Δ 25.0	7	.25	5.1	9.8	6.7	116	82
22,200	8.4	8.0	Δ 25.0	6	0.0	7.2	11.9	7.1	142	87
-	8.0	8.0	Δ 25.0	6.5	2.6	2.5	9.5	8.6	102	94
-	8.0	7.8	Δ 25.0	8	5.5	6.5	9.9	9.6	90	87

TABLE 32. Water Analysis Data Collected at the

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
4/26/72	12:15 PM	High $+1\frac{1}{2}$	8.5	11.5	11.0	13.71	18.98	13,740
5/16/72	11:15 AM	Low $+1\frac{1}{2}$	18.0	16.8	14.9	5.12	19.24	14,520
6/26/72	11:15 AM	Low $+4\frac{1}{2}$	26.0	19.0	17.5	8.57	18.53	9,000
7/27/72	9:42 AM	Low +2	20.5	24.5	24.4	10.28	16.80	13,800
8/17/72	9:08 AM	High +3	21.5	21.6	21.2	14.38	23.24	14,100
9/26/72	12:05 PM	Low +3	26.0	21.0	19.0	21.46	24.33	17,400
10/25/72	12:10 PM	Low $+3\frac{1}{2}$	13.0	13.5	13.5	20.68	23.28	-
11/21/72	12:30 PM	Low +6	9.0	6.5	7.0	10.34	15.99	-

TABLE 33. Water Analysis Data Collected at the

4/26/72	12:35 PM	High	8.5	11.5	11.5	11.13	12.23	11,340
5/16/72	11:30 AM	Low $+1\frac{1}{2}$	18.0	18.0	17.5	3.91	18.06	14,400
6/26/72	11:26 AM	Low +4	28.0	19.5	18.0	5.88	18.71	11,280
7/27/72	9:56 AM	Low $+1\frac{1}{2}$	19.8	24.7	23.4	13.30	22.14	12,600
8/17/72	9:16 AM	High $+2\frac{1}{2}$	21.8	22.3	20.3	11.65	20.64	12,600
9/26/72	12:20 PM	Low +3	26.5	21.5	18.8	20.73	26.83	17,400
10/25/72	12:15 PM	Low +3	14.0	13.0	12.8	21.85	24.63	-
11/21/72	12:15 PM	Low +5	9.0	7.0	7.5	12.52	17.79	-

TABLE 34. Water Analysis Data Collected at the

4/26/72	12:40 PM	High $+1\frac{1}{2}$	8.5	11.5	-	7.83	-	9,120
5/16/72	11:40 AM	Low $+1\frac{1}{2}$	18.5	18.0	-	1.42	-	10,260
6/26/72	11:35 AM	Low +4	25.0	19.3	-	.77	-	1,620
7/27/72	10:07 AM	Low +2	19.5	23.6	-	7.27	-	12,600
8/17/72	9:25 AM	High $+2\frac{1}{2}$	22.5	21.3	-	6.69	-	14,400
9/26/72	12:25 PM	Low +3	27.0	22.0	-	6.98	-	5,700
10/25/72	12:20 PM	Low +3	14.0	13.0	-	17.07	-	-
11/21/72	12:05 PM	Low +5	9.0	7.0	-	4.83	-	-

TABLE 35. Water Analysis Data Collected at the

12/28/71	11:35 AM	High $+1\frac{1}{2}$	15.5	8.3	-	10.35	-	-
1/24/72	11:45 AM	High +4	18.0	5.5	-	13.39	-	-
* 2/10/72	10:16 AM	High $+1\frac{1}{2}$	5.5	3.5	-	.59	-	-
3/16/72	11:10 AM	Low +3	11.0	5.5	-	2.54	-	3,720
4/26/72	1:20 PM	High +1	9.5	12.5	-	7.83	-	7,200
5/16/72	11:50 AM	Low $+1\frac{1}{2}$	19.0	18.2	-	2.99	-	3,300
6/26/72	11:45 AM	Low $+4\frac{1}{2}$	24.0	20.5	-	8.75	-	9,600
7/27/72	10:14 AM	Low +2	20.5	23.8	-	11.47	-	12,000
8/17/72	9:32 AM	High +3	21.0	20.4	-	6.06	-	9,600
9/26/72	12:30 PM	Low +3	27.0	22.0	-	21.64	-	17,520
10/25/72	12:40 PM	Low $+3\frac{1}{2}$	14.0	13.5	-	21.76	-	-
11/21/72	12:00 N	Low +5	9.0	8.0	-	12.36	-	-

* Ice Present.

Metedeconk River Station (WQM-31).

Solids	pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
19,800	8.4	7.8	Δ 25.0	8	1.3	7.3	12.1	8.3	120	84
21,780	8.5	7.7	Δ 25.0	8	0.0	10.2	12.5	5.0	130	54
20,400	7.7	7.4	Δ 25.0	8	5.9	11.40	9.3	3.3	103	38
16,800	8.3	8.1	Δ 25.0	8	3.7	4.1	8.2	5.0	102	64
21,600	8.2	8.2	Δ 25.0	8	.25	8.7	10.3	4.2	124	53
22,200	8.5	8.0	Δ 25.0	7	0.0	7.0	13.4	6.7	167	82
-	8.1	8.0	Δ 25.0	8	3.2	4.5	10.5	8.3	113	96
-	7.7	7.8	Δ 25.0	8.5	5.9	8.0	9.7	8.6	84	78

Metedeconk River Station, Flashing Light #6 (WQM-32).

14,400	8.3	8.3	-	7	2.4	1.9	-	-	-	-
19,320	8.0	7.6	Δ 25.0	8	8.1	11.6	11.0	3.7	117	43
19,200	7.2	6.6	Δ 25.0	8	6.3	11.5	8.2	2.7	91	31
22,800	8.2	7.5	Δ 25.0	19	5.3	35.3	7.1	0.0	90	0.0
21,600	8.3	7.6	40.0	7	2.7	15.9	10.1	2.4	121	29
21,000	8.4	7.6	Δ 25.0	14	0.0	15.2	12.9	3.8	161	47
-	8.0	7.8	Δ 25.0	6.5	5.0	5.1	9.5	8.6	102	94
-	7.5	7.8	Δ 25.0	9	5.5	5.9	9.0	8.6	79	80

Metedeconk River Station, North Branch (WQM-33).

-	8.0	-	Δ 25.0	-	3.9	-	10.3	-	98	-
-	6.7	-	Δ 25.0	-	5.3	-	6.6	-	69	-
13,080	7.3	-	Δ 25.0	-	6.4	-	4.9	-	52	-
-	7.7	-	Δ 25.0	-	9.9	-	4.3	-	51	-
-	7.5	-	Δ 25.0	-	5.8	-	6.7	-	77	-
-	7.4	-	Δ 25.0	-	6.0	-	8.8	-	103	-
-	7.6	-	Δ 25.0	-	8.5	-	8.3	-	86	-
-	6.8	-	Δ 25.0	-	4.6	-	8.9	-	75	-

Metedeconk River Station, South Branch (WQM-34).

-	7.3	-	Δ 25.0	-	6.9	-	12.2	-	110	-
-	7.1	-	-	-	8.8	-	7.8	-	67	-
-	6.5	-	Δ 25.0	-	4.7	-	9.1	-	68	-
-	6.6	-	Δ 25.0	-	3.9	-	10.4	-	83	-
-	8.0	-	Δ 25.0	-	4.9	-	10.3	-	100	-
-	6.5	-	Δ 25.0	-	5.5	-	8.4	-	88	-
-	6.5	-	Δ 25.0	-	8.3	-	7.3	-	84	-
-	8.1	-	30.0	-	-	-	8.6	-	107	-
-	7.3	-	Δ 25.0	-	4.2	-	9.3	-	104	-
-	7.5	-	Δ 25.0	-	6.6	-	11.5	-	143	-
-	7.6	-	Δ 25.0	-	9.5	-	9.1	-	96	-
-	7.5	-	Δ 25.0	-	7.3	-	9.2	-	83	-

TABLE 36. Water Analysis Data Collected

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (°/oo)		Diss. (ppm.)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
12/29/71	12:25 PM	High +1½	6.8	6.5	-	11.40	-	-
*1/25/72	11:26 AM	High +3	11.0	6.3	-	10.82	-	-
2/15/72	10:10 AM	Low +3	5.8	2.5	-	7.27	-	-
3/17/72	10:30 AM	High +2	12.0	7.0	-	9.58	-	9,600
4/26/72	9:26 AM	Low +3½	11.0	10.5	-	11.87	-	11,640
5/16/72	9:10 AM	High +5½	17.0	17.0	-	5.59	-	12,300
6/19/72	10:40 AM	High +4	21.0	21.7	-	7.27	-	9,900
7/27/72	7:30 AM	Low	19.6	24.8	-	6.26	-	7,800
8/17/72	7:16 AM	High +1	20.5	22.5	-	6.33	-	9,600
9/26/72	10:09 AM	Low +1	24.0	21.5	-	13.48	-	13,500
10/25/72	10:15 AM	Low +1½	11.7	11.5	-	17.66	-	-
11/27/72	12:45 PM	Low +½	9.0	6.5	-	9.25	-	-

* High winds and rain.

TABLE 37. Water Analysis Data Collected

12/29/71	12:45 PM	High +2	7.2	6.5	-	10.86	-	-
*1/25/72	11:48 AM	High +3½	12.0	6.2	-	12.25	-	-
2/15/72	10:33 AM	Low +3½	7.9	3.5	-	13.13	-	-
3/17/72	10:55 AM	High +2½	13.0	7.0	-	11.56	-	10,800
4/26/72	9:45 AM	Low +4.02	10.0	11.0	-	11.33	-	18,000
5/16/72	9:15 AM	High +5	17.0	17.0	-	9.02	-	12,000
6/19/72	10:45 AM	High +4	21.0	21.3	-	8.39	-	8,700
7/27/72	7:43 AM	Low	20.1	24.4	-	7.36	-	7,500
8/17/72	7:23 AM	High +1½	20.5	21.7	-	9.1	-	9,540
9/26/72	10:15 AM	Low +1½	24.0	19.5	-	16.92	-	13,800
10/25/72	10:20 AM	Low +1½	11.9	11.5	-	15.57	-	-
11/27/72	12:20 PM	Low	10.0	6.3	-	12.36	-	-

* High winds and rain.

TABLE 38. Water Analysis Data Collected

12/29/71	1:30 PM	High +3	6.8	6.5	-	11.9	-	-
*1/25/72	12:04 PM	High +4	11.0	6.6	-	11.22	-	-
2/15/72	10:45 AM	Low +3½	6.8	2.7	-	11.64	-	-
3/17/72	11:15 AM	High +3	14.0	7.0	-	8.93	-	11,460
4/19/72	11:35 AM	High +6½	23.0	14.5	-	12.70	-	12,900
5/12/72	10:10 AM	Low +4	18.5	14.5	-	12.43	-	12,900
6/8/72	8:05 AM	Low +4	22.0	20.3	-	12.02	-	13,080
7/19/72	9:35 AM	High +3	33.0	29.5	-	8.75	-	9,600
8/16/72	8:55 AM	High +4½	21.0	21.3	-	10.59	-	10,200
9/14/72	11:30 AM	Low +1	31.0	23.0	-	11.80	-	12,000
10/20/72	11:10 AM	High +½	5.0	8.0	-	16.53	-	-
11/20/72	1:20 PM	High +1½	9.0	7.5	-	12.72	-	-

* High winds and rain.

at the Kettle Creek Station, North (WAK-35).

Solids		pH		Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm.)		D.O. (% Sat.)	
Bot.	Sur.	Bot.	Turb.		Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.9	-	75.0	-	2.3	-	12.5	-	110	-
-	7.6	-	25.0	-	4.6	-	12.0	-	102	-
-	7.3	-	25.0	-	3.5	-	11.7	-	90	-
-	7.3	-	25.0	-	3.9	-	11.1	-	96	-
-	6.8	-	25.0	-	6.2	-	8.9	-	85	-
-	7.5	-	25.0	-	3.5	-	9.2	-	97	-
-	7.8	-	25.0	-	4.3	-	10.7	-	102	-
-	7.9	-	25.0	-	5.4	-	5.1	-	62	-
-	7.7	-	25.0	-	4.8	-	5.6	-	66	-
-	7.8	-	25.0	-	6.4	-	10.6	-	127	-
-	7.7	-	25.0	-	6.2	-	8.6	-	89	-
-	7.5	-	25.0	-	4.1	-	11.1	-	95	-

at the Kettle Creek Station, South (WOK-36).

-	8.0	-	75.0	-	2.3	-	12.8	-	110	-
-	7.6	-	25.0	-	4.0	-	12.2	-	106	-
-	7.9	-	35.0	-	4.9	-	10.9	-	89	-
-	7.5	-	25.0	-	4.10	-	11.8	-	104	-
-	7.0	-	25.0	-	5.4	-	9.1	-	87	-
-	7.5	-	25.0	-	2.8	-	8.9	-	95	-
-	7.8	-	25.0	-	3.5	-	10.1	-	112	-
-	7.9	-	25.0	-	4.4	-	7.0	-	85	-
-	7.8	-	25.0	-	3.8	-	6.6	-	78	-
-	7.8	-	25.0	-	3.1	-	11.0	-	129	-
-	7.8	-	25.0	-	5.1	-	8.3	-	83	-
-	7.8	-	25.0	-	4.6	-	10.7	-	93	-

at the Silver Bay Station, North (WQS-37).

-	7.7	-	25.0	-	3.8	-	11.5	-	100	-
-	8.1	-	25.0	-	3.9	-	11.5	-	100	-
-	7.6	-	25.0	-	3.6	-	11.9	-	94	-
-	7.4	-	25.0	-	5.1	-	10.7	-	93	-
-	7.5	-	25.0	-	6.4	-	9.2	-	96	-
-	7.3	-	30.0	-	4.1	-	10.0	-	104	-
-	8.0	-	25.0	-	4.1	-	7.5	-	88	-
-	7.7	-	25.0	-	4.5	-	6.4	-	86	-
-	8.2	-	25.0	-	4.9	-	7.7	-	90	-
-	7.9	-	25.0	-	3.5	-	8.2	-	100	-
-	7.7	-	25.0	-	4.9	-	9.5	-	89	-
-	7.7	-	25.0	-	5.9	-	10.2	-	92	-

TABLE 39. Water Analysis Data Collected

Date	Time E.S.T.	Tide		Temp. (° C.)			Sal. (‰)		Diss. (ppm)
				Air	Sur.	Bot.	Sur.	Bot.	Sur.
12/29/71	2:08 PM	High	+3½	6.8	6.5	-	12.30	-	-
*1/25/72	12:23 PM	High	+4½	13.0	5.6	-	12.68	-	-
2/15/72	11:04 AM	Low	+4	6.2	3.4	-	13.26	-	-
3/17/72	11:30 AM	High	+3	13.0	6.5	-	12.14	-	12,000
4/19/72	11:45 AM	Low	-	23.0	14.0	-	12.82	-	12,900
5/12/72	10:15 AM	Low	+4	18.0	14.5	-	12.05	-	12,060
6/8/72	8:10 AM	Low	+4½	22.5	20.5	-	12.02	-	12,000
7/19/72	9:40 AM	High	+3	33.0	29.5	-	9.50	-	10,080
8/16/72	9:00 AM	High	+4	21.5	20.9	-	10.50	-	9,600
9/14/72	11:35 AM	Low	+1	30.0	23.0	-	14.60	-	13,800
10/20/72	11:20 AM	High	+½	6.0	8.0	-	16.35	-	-
11/20/72	1:30 PM	High	+1½	9.0	7.7	-	12.90	-	-

* High Winds and rain.

TABLE 40. Water Analysis Data Collected

x12/29/71	2:25 PM	High	+5	6.2	6.5	-	13.60	-	-
x*1/25/72	12:52 PM	High	+5½	11.0	6.3	-	11.96	-	-
x2/15/72	11:37 AM	Low	+5½	5.8	3.3	-	13.04	-	-
x3/17/72	12:05 PM	High	+4½	14.0	7.0	-	9.89	-	12,600
4/19/72	8:50 AM	High	+4½	16.5	12.0	12.0	8.48	12.72	10,800
5/12/72	7:40 AM	Low	+2½	16.0	13.5	14.0	10.59	11.87	10,200
6/8/72	6:20 AM	Low	+2½	17.8	19.5	20.0	9.81	13.48	8,800
7/19/72	7:20 AM	High	+1½	28.0	28.0	27.5	8.93	9.67	9,240
8/16/72	6:45 AM	High	+3	17.5	20.5	21.0	11.87	12.79	11,100
9/14/72	9:50 AM	Low	-	27.0	21.7	21.0	14.94	17.11	13,140
10/20/72	9:05 AM	Low	+5½	3.0	8.0	8.5	15.44	14.99	-
11/20/72	12:26 PM	Low	+1½	9.0	7.5	7.0	11.80	11.80	-

x Sample collected 1000 yards from station off the north shore.

* High winds and rain.

TABLE 41. Water Analysis Data Collected at the

x12/31/71	10:53 AM	Low	+5½	9.0	5.0	-	8.86	-	-
x*1/25/72	1:47 PM	Low	-	11.0	6.5	-	13.12	-	-
x2/15/72	12:40 PM	High	+½	8.3	3.9	-	16.04	-	-
x3/16/72	1:00 PM	Low	+6	12.0	7.0	-	6.82	-	7,170
4/19/72	9:05 AM	Low	+6	17.5	13.0	11.0	6.56	13.98	6,600
5/12/72	7:55 AM	Low	+2½	16.0	13.8	14.0	9.27	12.47	9,600
6/8/72	6:35 AM	High	+5½	17.5	20.0	21.0	8.35	13.12	8,580
7/19/72	7:30 AM	High	+1½	30.0	28.0	27.5	4.31	10.59	5,400
8/16/72	7:10 AM	High	+3	20.5	21.1	21.4	11.33	11.90	10,200
9/14/72	10:05 AM	Low	+½	27.0	21.7	21.0	13.66	18.21	12,000
10/20/72	10:00 AM	High	-	3.0	7.5	8.0	9.34	11.62	-
11/20/72	12:10 PM	High	+1	8.5	8.0	7.5	9.43	11.26	-

x Sample collected 600 yards from the station off the south shore.

* High winds and rain.

Solids.		pH		Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
Bot.	Sur.	Bot.	Turb.		Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.6	-	Δ 25.0	-	3.6	-	11.8	-	100	-
-	7.8	-	Δ 25.0	-	4.5	-	11.8	-	101	-
-	7.8	-	Δ 25.0	-	3.8	-	11.8	-	96	-
-	7.3	-	Δ 25.0	-	5.2	-	10.9	-	96	-
-	7.5	-	Δ 25.0	-	5.4	-	9.4	-	97	-
-	7.2	-	Δ 25.0	-	3.9	-	10.0	-	103	-
-	8.0	-	Δ 30.0	-	4.7	-	7.6	-	89	-
-	7.8	-	Δ 35.0	-	4.8	-	7.1	-	97	-
-	8.1	-	Δ 25.0	-	5.5	-	7.9	-	92	-
-	8.0	-	Δ 25.0	-	3.9	-	8.1	-	100	-
-	7.8	-	Δ 25.0	-	5.0	-	10.0	-	93	-
-	7.6	-	Δ 25.0	-	5.1	-	10.5	-	94	-

at the Toms River Station, Coates Pt. (WQT-39).

-	8.0	-	Δ 25.0	-	2.2	-	12.5	-	110	-
-	7.6	-	Δ 25.0	-	3.7	-	11.6	-	101	-
-	7.7	-	Δ 25.0	-	4.8	-	11.8	-	95	-
-	7.5	-	Δ 25.0	-	4.1	-	11.4	-	99	-
12,720	7.6	7.6	Δ 25.0	8	5.8	5.8	9.8	9.9	94	98
12,540	7.4	7.6	Δ 25.0	8	4.1	4.2	9.2	9.0	92	92
12,780	7.8	7.9	Δ 25.0	7	3.2	2.4	7.7	7.1	86	82
11,280	7.7	7.8	Δ 25.0	7½	3.5	4.1	6.6	6.2	87	81
12,900	8.1	8.2	Δ 25.0	7	4.8	4.2	7.4	7.1	92	84
16,200	7.9	8.0	Δ 25.0	8	2.5	4.3	8.4	7.7	101	93
-	7.8	7.8	Δ 25.0	7	4.5	8.6	9.6	9.5	89	88
-	7.7	7.7	Δ 25.0	8½	5.5	7.9	10.0	10.1	89	89

Toms River Station, Flashing Red Light #2 (WQT-40).

-	7.8	-	Δ 25.0	-	2.9	-	12.0	-	98	-
-	7.6	-	Δ 25.0	-	3.7	-	12.1	-	106	-
-	8.0	-	Δ 30	-	6.3	-	11.9	-	100	-
-	7.0	-	Δ 25	-	3.8	-	11.3	-	96	-
13,140	7.4	7.5	Δ 25	7	4.9	5.4	9.1	9.1	89	88
14,160	7.7	7.7	Δ 25	8	4.6	4.0	8.7	8.9	88	91
12,900	7.6	7.6	Δ 25	7	2.8	4.6	5.3	4.1	85	69
10,980	7.2	7.0	Δ 25	8	7.7	6.3	6.4	2.8	80	37
11,100	8.0	8.1	Δ 25	7	5.0	7.2	6.8	6.8	80	81
16,500	8.1	8.0	Δ 25	7	2.1	4.2	8.5	5.6	102	69
-	7.7	7.6	Δ 25	8	3.6	4.3	10.2	9.7	89	87
-	7.4	7.5	Δ 25	8	6.0	5.5	10.6	10.1	94	90

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (‰)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	Sur.
x12/29/71	2:43 PM	High +5	5.8	6.0	-	10.75	-	-
x*1/25/72	1:07 PM	High +6	13.0	6.6	-	9.74	-	-
x2/15/72	11:48 AM	Low +5½	6.2	3.7	-	6.55	-	-
x3/17/72	12:18 PM	High +5	12.0	7.0	-	3.10	-	4,800
4/19/72	9:20 AM	Low +6	17.5	12.5	12.5	10.14	11.20	5,580
5/12/72	8:10 AM	Low +3	16.5	14.0	14.0	8.13	13.03	8,700
6/8/72	6:50 AM	Low +5½	18.0	19.5	21.0	6.69	12.38	6,660
7/19/72	7:45 AM	High +2	28.0	27.5	27.5	3.01	9.67	3,240
8/16/72	7:15 AM	High +3	20.1	20.0	21.7	7.09	10.32	7,080
9/14/72	10:15 AM	Low +½	27.0	21.7	20.7	13.38	16.92	11,400
10/20/72	9:10 AM	Low +5½	3.0	8.5	8.5	8.87	12.54	-
11/20/72	11:30 AM	High +½	9.0	7.5	7.0	5.86	12.07	-

x Sample collected 300 yards from the station off the north shore.

* High winds and rain.

TABLE 43. Water Analysis Data Collected at

x12/29/71	3:15 PM	High +5½	6.2	6.0	-	10.34	-	-
x*1/25/72	1:25 PM	High +6	11.0	6.5	-	8.84	-	-
x2/15/72	12:23 PM	High	8.3	3.8	-	11.06	-	-
x3/17/72	12:45 PM	Low +5½	11.0	6.5	-	2.09	-	2,160
4/19/72	10:30 AM	High +6	19.0	13.5	10.0	4.90	12.02	6,000
5/12/72	8:25 AM	Low +3	17.0	14.2	14.0	7.95	14.85	8,280
6/8/72	7:00 AM	Low +4	18.5	19.5	20.8	5.77	12.56	5,760
7/19/72	8:00 AM	High +2	29.0	27.5	26.0	1.71	8.57	3,600
8/16/72	7:25 AM	High +3	21.0	19.3	22.3	3.75	10.23	8,280
9/14/72	10:30 AM	Low +½	26.0	21.8	21.0	14.11	17.76	13,080
10/20/72	9:20 AM	Low +3½	3.0	9.0	10.0	8.33	12.90	-
11/20/72	11:45 AM	High +½	9.0	7.7	7.0	6.31	11.53	-

x Sample collected 400 yards from the station off the south shore.

* High winds and rain.

TABLE 44. Water Analysis Data Collected at the

x12/29/71	2:55 PM	High +5	4.1	6.0	-	8.73	-	-
x*1/25/72	1:22 PM	High +6	11.0	6.6	-	5.16	-	-
x2/15/72	12:07 PM	High	6.2	4.0	-	2.74	-	-
x3/17/72	12:33 PM	High +5	11.0	7.0	-	.50	-	4,170
4/19/72	10:45 AM	High +6	22.0	13.0	9.0	.59	10.63	300
5/12/72	8:40 AM	Low +3	17.5	14.0	13.5	.41	14.70	4,200
6/8/72	7:15 AM	Low +4	19.0	17.5	18.7	.68	11.65	600
7/19/72	8:10 AM	High +2	30.0	24.5	24.5	.21	6.71	60
8/16/72	7:35 AM	High +3	22.0	17.7	22.6	.32	9.31	4,200
9/14/72	10:40 AM	Low +½	28.0	21.5	21.7	2.16	15.93	1,800
10/20/72	9:35 AM	High +5½	3.5	8.0	12.0	.95	11.26	-
11/20/72	12:00 N	High +1	8.5	7.5	7.5	.85	10.81	-

x Sample collected 50 yards from the station off the north bulkhead.

* High winds and rain.

the Toms River Station, Island Heights (WQT-41).

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Solids		pH		Turb.	Dpth. Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
Bot.	Sur.	Bot.	Sur.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.9	-	-	Δ 25	-	3.4	-	12.3	-	100	-
-	7.4	-	-	75	-	6.3	-	11.4	-	98	-
-	7.3	-	-	Δ 25	-	3.3	-	11.5	-	90	-
-	7.7	-	-	Δ 25	-	2.3	-	10.8	-	89	-
13,920	7.2	7.2	Δ 25	7	7	3.4	4.7	8.1	9.2	79	91
15,060	7.5	7.5	Δ 25	8	8	4.6	5.5	8.5	8.0	85	83
12,660	7.5	7.5	Δ 25	7	7	3.7	4.6	7.3	6.8	81	70
9,900	6.9	6.8	Δ 25	8	8	8.5	9.7	6.1	1.8	86	24
10,320	8.1	8.3	Δ 25	8	8	2.8	4.1	8.5	7.1	94	81
15,600	8.1	7.8	Δ 25	7	7	2.7	6.3	9.4	4.9	111	58
-	7.5	7.4	Δ 25	6	6	4.1	5.3	9.5	8.2	85	75
-	7.1	7.5	Δ 25	7½	7½	4.1	5.3	9.8	7.6	84	68

the Toms River Station, Pine Beach (WQT-42).

-	7.5	-	Δ 25	-	-	4.0	-	11.8	-	100	-
-	7.1	-	45	-	-	4.5	-	11.3	-	96	-
-	7.6	-	Δ 25	-	-	2.4	-	12.2	-	99	-
-	6.7	-	Δ 25	-	-	2.8	-	10.5	-	86	-
12,660	6.6	6.7	Δ 25	7½	7½	6.0	5.7	8.6	8.6	83	81
9,060	7.3	7.2	Δ 25	8½	8½	5.9	9.2	8.3	6.9	83	72
11,280	7.4	7.1	Δ 25	7	7	4.8	5.6	6.7	3.7	74	43
9,600	6.7	6.5	Δ 25	7	7	11.1	14.5	5.3	1.8	65	22
9,900	7.3	7.9	Δ 25	7½	7½	3.2	6.1	8.2	5.4	89	65
15,680	7.7	7.3	Δ 25	7	7	5.0	11.1	6.5	2.5	78	30
-	7.5	7.3	Δ 25	7	7	4.5	5.5	8.7	8.4	79	79
-	7.1	7.4	Δ 25	9½	9½	4.5	6.0	9.8	7.5	83	66

Toms River Station, Flashing Green Light #19. (WQT-43).

-	7.3	-	Δ 25	-	-	3.8	-	10.8	-	91	-
-	7.0	-	30	-	-	3.6	-	10.2	-	85	-
-	6.2	-	Δ 25	-	-	3.2	-	11.1	-	86	-
-	6.4	-	Δ 25	-	-	3.4	-	10.3	-	84	-
12,900	6.1	6.1	Δ 25	9	9	5.0	8.4	9.2	6.2	86	56
14,700	5.9	6.6	Δ 25	8	8	2.5	7.3	7.1	6.3	68	65
12,600	6.1	6.0	Δ 25	12	12	6.5	13.5	5.5	0.0	61	0.0
6,960	6.0	5.8	Δ 25	8	8	13.8	18.7	5.3	0.0	62	0.0
12,000	6.3	6.8	Δ 25	8	8	6.0	11.9	6.7	0.0	72	0.0
13,800	6.5	6.8	Δ 25	8½	8½	3.5	11.4	6.5	.20	77	.02
-	7.1	6.4	Δ 25	8	8	3.7	5.9	8.6	5.1	72	50
-	6.2	6.6	Δ 25	8	8	5.0	6.9	9.7	8.1	80	71

TABLE 45. Water Analysis Data Collected

Date	Time E.S.T.	Tide	Temp. (°C.)			Sal. (‰)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	
4/18/72	12:45 PM	Low +3 $\frac{1}{2}$	16.0	11.0	-	3.91	-	17,100
5/11/72	10:05 AM	High + $\frac{1}{2}$	17.0	14.0	-	12.32	-	14,460
6/7/72	9:30 AM	High +2 $\frac{1}{2}$	19.0	21.0	-	9.63	-	17,280
7/18/72	9:00 AM	High +4 $\frac{1}{2}$	29.0	25.5	-	4.31	-	13,890
8/15/72	8:40 AM	High +5 $\frac{1}{2}$	23.0	23.6	-	14.43	-	13,080
9/12/72	11:15 AM	Low +3	23.0	20.0	-	6.33	-	18,000
10/18/72	11:45 AM	High +4	12.0	-	-	9.27	-	-
11/27/72	11:20 AM	Low + $\frac{1}{2}$	9.0	6.7	-	11.44	-	-

TABLE 46. Water Analysis Data Collected at the

4/18/72	11:12 AM	Low +3	16.0	10.5	10.0	22.11	24.38	21,600
5/11/72	12:15 PM	High +3 $\frac{1}{2}$	16.5	12.8	12.5	15.64	22.12	17,400
6/7/72	11:30 AM	High +5 $\frac{1}{2}$	23.0	21.0	21.0	21.82	21.64	21,720
7/18/72	11:10 AM	Low +1	30.0	28.0	28.0	17.99	18.80	17,700
8/15/72	6:55 AM	High +5	20.0	22.5	22.5	22.81	21.27	20,400
9/12/72	1:00 PM	High	22.0	21.5	22.0	25.32	24.13	21,000
10/18/72	1:10 PM	Low	12.0	13.5	14.0	22.90	22.90	-
11/22/72	1:25 PM	Low +5	2.0	4.9	5.0	19.24	19.24	-

TABLE 47. Water Analysis Data Collected at the

12/31/71	12:33 PM	High +2 $\frac{1}{2}$	13.0	8.5	-	11.82	-	-
*1/26/72	11:16 AM	High +4 $\frac{1}{2}$	18.9	2.5	-	19.20	-	-
2/17/72	11:12 AM	Low +4 $\frac{1}{2}$	3.8	4.0	-	22.97	-	-
3/20/72	12:50 PM	Low +4	6.0	7.5	-	21.24	-	17,700
4/18/72	11:27 AM	Low +3	16.0	10.5	-	22.16	-	19,860
5/11/72	12:30 PM	High +4	17.5	13.5	-	10.93	-	17,700
6/7/72	11:35 AM	High +5 $\frac{1}{2}$	23.5	21.0	-	21.27	-	20,520
7/18/72	11:15 AM	Low +1	30.0	28.0	-	18.44	-	18,000
8/15/72	7:00 AM	High +5	19.5	22.0	-	23.08	-	19,200
9/12/72	1:05 PM	High	22.0	21.0	-	23.06	-	21,000
10/18/72	1:30 PM	Low + $\frac{1}{2}$	11.5	13.5	-	22.72	-	-
11/22/72	1:35 PM	Low +2 $\frac{1}{2}$	2.0	4.9	-	18.69	-	-

* Blow out tide.

TABLE 48. Water Analysis Data Collected at the
Oyster Creek

12/31/71	12:40 PM	High +2	14.0	5.5	-	23.17	-	-
*1/26/72	11:32 AM	High +4	18.3	3.0	-	20.64	-	-
2/17/72	11:23 AM	Low +4 $\frac{1}{2}$	4.0	4.1	-	23.59	-	-
3/20/72	1:00 PM	Low +4	5.5	7.3	-	21.00	-	19,680
4/18/72	11:40 AM	Low +2 $\frac{1}{2}$	16.5	11.0	-	20.53	-	19,800
5/11/72	-	-	-	-	-	-	-	-
6/7/72	11:50 AM	High +4	24.0	21.0	-	18.75	-	19,080
7/18/72	11:20 AM	Low	31.0	28.0	-	18.53	-	17,400
8/15/72	7:15 AM	High +4 $\frac{1}{2}$	19.0	22.5	-	22.73	-	20,400
9/12/72	1:45 PM	High	23.0	21.5	-	23.06	-	-
10/18/72	2:10 PM	Low + $\frac{1}{2}$	11.0	14.0	-	22.18	-	-
11/22/72	1:15 PM	Low +4	2.0	5.0	-	17.07	-	-

* Blow out tide.

at the Cedar Creek Station (WQC-44).

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Solids		pH		Dpth Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
Bot.		Sur.	Bot.		Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
-	7.1	-	<25	-	4.0	-	9.0	-	82	-
-	6.9	-	<25	-	4.7	-	7.8	-	80	-
-	7.5	-	<25	-	5.1	-	6.6	-	74	-
-	7.6	-	<25	-	5.8	-	5.4	-	65	-
-	7.7	-	<25	-	5.1	-	6.3	-	78	-
-	7.6	-	<25	-	5.1	-	7.1	-	79	-
-	7.5	-	<25	-	6.0	-	8.9	-	-	-
-	7.7	-	<25	-	6.1	-	10.6	-	92	-

Forked River Station, Flashing Red Light #12 (WQF-45).

21,000	7.9	8.0	<25	8	4.9	4.3	9.9	10.1	101	104
19,200	7.6	7.7	<25	6	5.0	5.3	9.0	9.5	92	101
21,720	7.9	7.9	<25	6	3.6	4.2	7.1	7.1	89	88
17,700	8.0	8.0	<25	8	3.1	4.8	7.3	7.0	102	98
15,000	8.1	8.1	<25	6	4.9	4.7	6.1	5.8	79	74
21,000	7.9	7.9	<25	5	4.8	2.2	7.1	7.4	92	95
-	7.9	7.9	<25	6	5.7	-	8.9	9.0	97	98
-	7.9	7.9	<25	6	4.9	5.6	8.8	10.9	96	98

Forked River Station, Flashing Red Light #19 (WQF-46).

-	7.2	-	<25	-	5.4	-	11.0	-	100	-
-	7.4	-	<25	-	5.8	-	11.4	-	95	-
-	8.2	-	45	-	6.3	-	11.3	-	101	-
-	8.0	-	<25	-	5.3	-	11.6	-	106	-
-	8.0	-	<25	-	4.5	-	10.2	-	104	-
-	7.7	-	<25	-	4.7	-	8.8	-	89	-
-	7.8	-	25	-	4.6	-	7.7	-	96	-
-	7.9	-	<25	-	3.4	-	7.1	-	99	-
-	7.9	-	<25	-	5.3	-	5.8	-	74	-
-	7.9	-	<25	-	2.3	-	7.2	-	90	-
-	7.8	-	<25	-	4.9	-	9.0	-	94	-
-	7.9	-	<25	-	7.6	-	11.1	-	87	-

Forked River South Branch Station, Intake for Power Plant (WQF-47).

-	7.6	-	-	-	5.0	-	10.4	-	96	-
-	7.4	-	<25	-	4.8	-	10.7	-	91	-
-	8.1	-	<25	-	8.3	-	11.5	-	99	-
-	8.0	-	<25	-	5.4	-	11.6	-	109	-
-	7.9	-	<25	-	4.4	-	10.0	-	102	-
-	-	-	-	-	-	-	-	-	-	-
-	7.8	-	<25	-	5.5	-	7.8	-	95	-
-	7.8	-	<25	-	4.8	-	6.7	-	94	-
-	7.9	-	<25	-	3.4	-	5.3	-	69	-
-	-	-	-	-	-	-	7.7	-	98	-
-	7.8	-	<25	-	7.4	-	8.8	-	96	-
-	7.7	-	<25	-	6.4	-	10.0	-	96	-

Date	Time E.S.T.	Tide	Temp. (° C.)			Sal. (‰)		Diss. (ppm)
			Air	Sur.	Bot.	Sur.	Bot.	
4/18/72	10:18 AM	Low +2 $\frac{1}{2}$	16.0	17.0	17.5	19.52	19.70	19,800
5/11/72	8:50 AM	High + $\frac{1}{2}$	13.5	13.0	12.8	15.26	22.23	14,880
6/7/72	7:55 AM	High +2	17.5	20.0	19.8	16.83	17.02	16,900
7/18/72	7:45 AM	High +2 $\frac{1}{2}$	30.0	35.0	33.5	17.38	17.54	17,400
8/15/72	7:40 AM	High +6	25.5	29.8	30.5	20.91	20.91	18,480
9/12/72	10:05 AM	Low +3	22.0	27.0	27.0	23.60	22.90	19,800
10/18/72	10:10 AM	High +4	11.0	20.0	20.0	21.82	21.27	-
11/22/72	12:40 PM	Low +4	1.5	13.5	14.5	14.70	15.08	-

TABLE 50. Water Analysis Data Collected at the Oyster Creek

12/31/71	12:53 PM	High +3	16.0	17.5	-	17.85	-	-
*1/26/72	11:41 AM	High +5	18.3	14.5	-	19.34	-	-
2/17/72	11:35 AM	Low +5 $\frac{1}{2}$	4.5	15.5	-	20.23	-	-
3/20/72	1:15 PM	Low +4 $\frac{1}{2}$	5.0	13.0	-	19.51	-	19,200
4/18/72	10:39 AM	Low +2 $\frac{1}{2}$	16.0	17.5	-	19.02	-	17,700
5/11/72	9:05 AM	High + $\frac{1}{2}$	13.5	13.0	-	12.56	-	12,900
6/7/72	8:10 AM	High +2	19.0	20.0	-	17.48	-	17,700
7/18/72	7:55 AM	High +4 $\frac{1}{2}$	29.0	35.0	-	17.90	-	16,200
8/15/72	12:15 PM	Low +4	22.0	24.3	-	22.54	-	19,800
9/12/72	10:15 AM	Low +3	22.0	28.0	-	22.72	-	19,200
10/18/72	10:20 AM	High +4	12.0	20.0	-	21.09	-	-
11/22/72	12:55 PM	Low +4	1.9	13.5	-	12.63	-	-

* Blow out tide.

Oyster Creek Station, Sands Point Harbor (WQO-48)

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Solids	pH		Turb.	Dpth Ft.	CO ₂ (ppm)		D.O. (ppm)		D.O. (% Sat.)	
	Sur.	Bot.			Sur.	Bot.	Sur.	Bot.	Sur.	Bot.
19,200	7.8	7.7	<25	11	6.6	5.5	9.0	9.1	103	105
21,600	7.5	7.6	<25	11	4.2	7.6	8.5	8.3	88	88
16,920	7.9	7.7	25	10	4.2	4.4	7.2	6.7	85	79
17,100	7.7	7.7	<25	11	6.9	7.8	5.4	5.4	86	83
18,900	8.1	8.1	<25	8	6.3	5.3	6.8	6.4	100	95
19,820	8.1	8.1	<25	8	4.5	6.1	7.1	7.1	100	102
-	7.9	7.9	<25	8	6.0	6.4	8.0	8.1	98	98
-	7.5	7.5	<25	14	6.4	5.8	10.3	9.8	101	107

Station, Effluent for the Oyster Creek Power Plant (WQO-49).

-	7.4	-	<25	-	7.4	-	9.5	-	107	-
-	7.0	-	<25	-	5.9	-	9.9	-	107	-
-	7.9	-	<25	-	6.6	-	10.2	-	113	-
-	7.9	-	<25	-	4.90	-	11.0	-	116	-
-	7.7	-	<25	-	6.0	-	9.4	-	108	-
-	7.5	-	<25	-	6.0	-	8.1	-	85	-
-	7.9	-	<25	-	5.6	-	7.0	-	83	-
-	7.7	-	<25	-	5.6	-	5.7	-	90	-
-	8.0	-	<25	-	4.8	-	6.9	-	92	-
-	8.1	-	<25	-	4.0	-	7.5	-	148	-
-	7.9	-	<25	-	6.6	-	8.2	-	100	-
-	7.5	-	<25	-	9.1	-	10.3	-	105	-

TABLE 51. Nutrient Analysis Data Collected at the Barnegat Bay Station
Flashing Light #68. (NQB-1).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Ortho	Total		
4/27/72	9:30 AM	High + $\frac{1}{2}$	9.5	11.0	23.0	22,200	8.2	.12	0.0	.08	.20	0.0	0.0
5/23/72	10:45 AM	High + $\frac{1}{2}$	19.0	15.0	20.6	20,400	8.0	.24	0.0	.14	.64	0.0	0.0
6/27/72	10:35 AM	High + $\frac{1}{2}$	22.0	20.8	21.9	21,000	8.1	.48	0.0	.04	.26	0.0	.09
7/21/72	7:10 AM	High + $1\frac{1}{2}$	23.5	27.5	20.5	18,600	8.1	.72	.06	.06	.32	0.0	.09
8/22/72	8:49 AM	High +1	28.0	21.5	25.2	21,600	8.3	.48	0.0	.06	.38	0.0	.04
9/27/72	9:10 AM	Low +3	21.0	24.0	27.2	22,200	7.9	.48	0.0	.06	.20	0.0	.02
10/31/72	10:00 AM	High +5	6.0	11.0	25.5	-	8.0	1.08	0.0	.04	.20	0.0	0.0
11/30/72	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 52. Nutrient Analysis Data Collected at the Barnegat Beach
Station. (NQB-2).

1/21/72	11:43 AM	Low + $3\frac{1}{2}$	10.0	3.5	23.8	-	7.6	.24	0.0	.08	.80	0.0	0.0
*2/23/72	12:25 PM	Low	4.2	2.7	23.1	-	8.0	.36	0.0	.02	.28	0.0	0.0
3/24/72	3:17 PM	Low + $2\frac{1}{2}$	7.0	7.9	24.8	23,400	8.1	.36	0.0	.12	.30	0.0	0.0
4/27/72	9:20 AM	Low + $5\frac{1}{2}$	9.5	11.5	22.0	21,000	7.8	.24	0.0	.06	.44	0.0	0.0
5/23/72	11:37 AM	High +5	19.0	15.2	18.3	14,400	7.8	1.92	0.0	.02	.16	0.0	0.0
6/27/72	10:30 AM	High	25.0	21.8	21.7	20,400	7.9	.36	0.0	.02	.28	0.0	0.0
7/21/72	7:00 AM	High +1	23.5	28.2	20.5	20,880	8.0	.96	0.0	.02	.30	0.0	.04
8/22/72	8:40 AM	High + $\frac{1}{2}$	28.0	23.7	24.8	21,480	8.2	.36	0.0	.08	.30	0.0	.04
9/27/72	8:57 AM	Low +2	21.0	24.0	27.4	21,660	7.9	.48	0.0	.02	.14	0.0	.04
10/31/72	10:50 AM	High +5	6.0	10.5	25.3	-	8.1	.36	0.0	.04	.16	0.0	0.0
11/29/72	10:42 AM	High + $5\frac{1}{2}$	11.0	6.5	21.6	-	8.2	.72	0.0	.02	.16	0.0	0.0

* Ice near shore.

TABLE 53. Nutrient Analysis Data Collected at the Laurel Harbor Station (NQB-3).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (0/00)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Surf	Total		
*1/21/72	11:43 AM	Low +3	9.0	3.0	17.0	-	7.3	.72	0.0	.10	.12	0.0	0.0
*2/23/72	11:20 AM	High +5½	3.5	1.4	13.3	-	7.8	2.60	.05	.32	.02	0.0	0.0
3/24/72	12:25 PM	High +6	8.0	7.6	23.3	21,540	7.5	.24	0.0	.04	.32	0.0	0.0
4/27/72	10:50 AM	High +1	8.5	11.0	16.1	15,660	7.9	.24	0.0	.06	.16	0.0	0.0
5/23/72	12:15 PM	High +5	22.0	15.6	16.3	15,720	8.0	.48	0.0	.04	.16	0.0	0.0
6/27/72	11:15 AM	High	24.0	20.5	14.3	14,400	8.0	1.32	0.0	.00	.16	0.0	0.0
7/21/72	7:45 AM	High +1	23.5	27.1	16.0	15,300	7.9	1.32	.03	.00	.30	0.0	0.0
8/22/72	10:57 AM	High +2	26.0	24.0	19.5	17,280	7.9	1.56	.03	.12	.26	0.0	0.0
9/27/72	10:45 AM	Low +3	20.5	24.5	23.1	20,400	8.1	.84	0.0	.04	.24	0.0	0.0
10/31/72	12:30 PM	High +6	6.0	10.3	20.5	-	7.9	.72	0.0	.12	.28	0.0	0.0
11/29/72	11:15 AM	High +5½	11.0	7.3	15.9	-	8.0	.60	0.0	.04	.30	0.0	0.0

*Ice present.

TABLE 54. Nutrient Analysis Data Collected at the Barnegat Bay Station, Mid-Channel Buoy "D" (NQB-4).

4/27/72	11:05 AM	High +1½	8.5	11.0	18.6	17,400	7.8	.48	0.0	.02	.12	0.0	0.0
5/23/72	12:30 PM	High +5½	22.0	16.0	17.2	16,920	8.1	.24	0.0	.08	.24	0.0	0.0
6/27/72	11:25 AM	High +½	23.0	20.5	17.6	16,800	8.0	1.44	0.0	0.0	.12	0.0	0.0
7/21/72	7:55 AM	High +1½	24.0	27.4	16.1	16,200	8.0	1.56	.03	.02	.24	0.0	0.0
8/22/72	11:06 AM	High +2½	26.0	24.0	21.7	18,600	8.1	.36	.03	.36	.32	0.0	0.0
9/27/72	10:50 AM	Low +3½	20.5	24.0	25.1	20,400	8.2	.12	0.0	.04	.18	0.0	0.0
10/31/72	12:45 PM	Low +½	6.0	11.0	22.8	-	7.9	.36	0.0	.06	.20	0.0	0.0
11/30/72	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 55. Nutrient Analysis Data Collected at the Holly Park Station (NQB-5).

Date	Time E.S.T.	Tide		Temp. (°C.)		Sal. (o.oo)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
				Air	Sur.						Ortho	Total		
*1/21/72	12:00 PM	Low	+3	10.0	3.5	15.3	-	7.5	.60	0.0	.08	.20	0.0	0.0
*2/23/72	11:00 AM	High	+4 $\frac{1}{2}$	4.5	1.2	18.5	-	7.7	.12	.05	.04	.02	0.0	0.0
3/24/72	10:00 AM	High	+5	8.0	8.0	18.2	17,460	7.5	.24	0.0	.06	.40	0.0	0.0
4/28/72	9:20 AM	Low	+4	13.0	11.0	14.1	13,200	7.9	.48	0.0	.16	.20	.03	0.0
5/31/72	11:40 AM	Low	+4	23.5	21.0	16.3	15,300	8.0	2.16	0.0	-	-	0.0	0.0
6/28/72	10:05 AM	Low	+3 $\frac{1}{2}$	24.0	21.8	11.8	11,400	8.0	.96	.05	0.0	2.60	0.0	.09
7/24/72	11:55 AM	High	+2	24.0	29.4	15.7	14,700	7.9	.60	.03	.04	.20	0.0	0.0
8/25/72	10:36 AM	Low	+5	25.0	24.7	20.1	17,400	8.0	.96	0.0	.08	.44	0.0	0.0
9/27/72	10:30 AM	Low	+2 $\frac{1}{2}$	21.0	24.0	22.1	18,600	8.1	.72	0.0	.04	.14	0.0	0.0
10/31/72	12:15 PM	High	+5 $\frac{1}{2}$	7.5	10.7	20.3	-	8.0	.72	0.0	.28	.26	0.0	0.0
11/29/72	11:30 AM	High	+5 $\frac{1}{2}$	11.0	6.7	15.0	-	8.2	.48	0.0	.10	.28	0.0	0.0

* Ice present.

TABLE 56. Nutrient Analysis Data Collected at the Barnegat Bay Station, Flashing Red Light #60 (NQB-6).

4/28/72	9:30 AM	Low	+4	13.0	11.5	12.4	12,000	7.9	.36	0.0	.10	.34	.03	0.0
5/31/72	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6/28/72	10:15 AM	Low	+3 $\frac{1}{2}$	24.0	20.0	14.5	13,080	8.1	.84	.05	.04	.28	0.0	0.0
7/24/72	11:45 AM	High	+1 $\frac{1}{2}$	32.0	29.4	11.9	10,800	7.8	.84	.03	.04	.24	0.0	0.0
8/25/72	10:00 AM	Low	+4	28.0	26.0	19.7	16,800	8.2	.96	.03	.08	.30	0.0	0.0
9/27/72	10:15 AM	Low	+2	20.5	24.0	19.3	17,100	8.0	.96	0.0	.02	.12	0.0	0.0
10/31/72	12:05 PM	High	+5	7.0	10.5	17.9	-	7.9	.60	0.0	.04	.18	0.0	0.0
11/30/72	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 57. Nutrient Analysis Data Collected at the Island Beach State Park Station (NQB-7).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Ortho	Total		
1/12/72	12:43 PM	High +5 $\frac{1}{2}$	10.0	6.5	20.6	-	-	1.08	0.0	.14	.28	0.0	0.0
2/29/72	12:45 PM	High +2	11.0	6.5	21.1	-	8.3	.72	0.0	.10	.26	0.0	0.0
3/21/72	11:20 AM	Low +1 $\frac{1}{2}$	13.0	8.0	19.2	17,700	7.9	.60	0.0	.10	.28	0.0	0.0
4/27/72	10:20 AM	High + $\frac{1}{2}$	9.0	10.7	19.1	19,200	7.9	.48	0.0	.04	.80	0.0	0.0
5/23/72	11:45 AM	High +4 $\frac{1}{2}$	21.0	15.0	22.0	21,600	8.1	.24	0.0	.06	.20	0.0	0.0
6/27/72	11:00 AM	Low +5 $\frac{1}{2}$	24.0	20.5	19.2	18,600	8.1	.84	0.0	0.0	3.50	0.0	.04
7/21/72	7:34 AM	High +1 $\frac{1}{2}$	24.0	27.0	19.9	18,240	8.3	.48	0.0	.06	.40	0.0	.04
8/22/72	9:59 AM	High +1 $\frac{1}{2}$	29.0	23.6	24.0	20,280	8.0	.84	0.0	.18	.30	0.0	0.0
9/27/72	9:30 AM	Low +2	21.0	24.0	27.1	22,080	8.0	.48	0.0	.10	.18	0.0	0.0
10/31/72	11:45 AM	High +5 $\frac{1}{2}$	6.0	10.5	22.5	-	7.9	.60	0.0	.04	.12	0.0	0.0
11/30/72	10:25 AM	High +4	8.0	5.5	15.0	-	7.8	1.68	0.0	.10	.28	0.0	0.0

TABLE 58. Nutrient Analysis Data Collected at the Seaside Park Dock Station, Old Railroad Trestle (NQB-8).

1/12/72	12:25 PM	High +4	10.0	6.5	13.1	-	-	.36	0.0	.18	.50	0.0	0.0
2/29/72	12:25 PM	High + $\frac{1}{2}$	11.0	5.5	15.1	-	8.4	.72	0.0	.12	.12	0.0	0.0
3/21/72	11:00 AM	Low	12.0	7.5	18.3	17,100	7.9	.48	0.0	.16	.20	0.0	0.0
4/28/72	9:05 AM	Low +3 $\frac{1}{2}$	14.0	11.0	12.8	12,300	7.7	.36	0.0	.10	.24	.03	0.0
5/31/72	10:25 AM	Low +2 $\frac{1}{2}$	19.0	20.0	18.5	18,600	7.9	.96	0.0	-	-	0.0	0.0
6/28/72	10:55 AM	Low +4	26.0	22.0	11.3	10,980	8.2	.60	.10	0.0	1.80	0.0	0.0
7/24/72	10:02 AM	High	29.0	28.2	12.6	12,300	7.7	1.08	.05	.02	.26	0.0	0.0
8/22/72	10:25 AM	High + $\frac{1}{2}$	28.0	24.0	17.2	15,600	8.3	.84	.03	.04	.20	0.0	0.0
9/27/72	10:00 AM	Low +1 $\frac{1}{2}$	21.0	24.0	18.5	17,400	8.2	.60	0.0	.04	.18	0.0	.02
10/31/72	12:00 N	High +5	7.0	10.5	17.4	-	7.9	.72	0.0	.04	.36	0.0	0.0
11/30/72	10:00 AM	High +2 $\frac{1}{2}$	8.0	5.3	12.9	-	7.8	.60	0.0	.04	.10	0.0	0.0

TABLE 59. Nutrient Analysis Data Collected at the Shelter Cove Station (NQB-9).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Ortho	Total		
*1/20/72	12:12 PM	Low +3	10.0	2.0	11.0	-	-	.48	0.0	.10	.16	0.0	0.0
x2/22/72	12:40 PM	Low	5.0	1.4	15.6	-	7.5	.60	0.0	.12	.24	0.0	0.0
3/23/72	11:04 AM	High +4	9.0	8.6	13.9	10,920	7.7	.60	0.0	.06	.16	0.0	0.0
4/28/72	10:25 AM	Low +4	13.0	11.5	13.6	13,500	7.3	.60	0.0	.12	.16	0.0	0.0
5/30/72	10:30 AM	Low +2½	22.0	20.0	13.1	11,520	7.8	.48	0.0	.02	-	0.0	0.0
6/28/72	10:35 AM	Low +3½	24.0	21.6	11.7	11,460	8.1	1.08	.03	.04	.20	0.0	0.0
7/24/72	10:45 AM	Low +5½	29.0	28.7	9.7	10,200	7.7	.60	.05	.02	.40	0.0	0.0
8/25/72	7:38 AM	Low +1½	25.0	24.9	14.9	12,300	7.7	1.44	.03	.08	.30	0.0	0.0
9/28/72	9:00 AM	High +5	20.0	21.5	18.4	15,180	7.8	1.20	0.0	.06	.34	0.0	0.0
10/30/72	11:25 AM	High +4½	14.0	13.3	16.1	-	7.8	1.20	0.0	.12	.44	0.0	0.0
11/29/72	12:15 PM	High +5	12.0	6.3	14.2	-	7.8	.60	0.0	.04	.14	.20	.09

*Ice present

x Blow out tide

TABLE 60. Nutrient Analysis Data Collected at the Shore Acres Point Station (NQB-10).

*1/20/72	11:00 AM	High +1½	12.0	4.0	12.5	-	7.0	.60	0.0	.10	.24	0.0	0.0
x2/22/72	11:30 AM	High +5	4.0	1.6	18.0	-	7.9	.36	0.0	.02	.16	0.0	0.0
3/23/72	9:40 AM	High +2½	11.0	7.4	14.9	13,140	7.0	.84	0.0	.08	.24	0.0	0.0
4/30/72	12:50 PM	Low +5	19.0	16.0	14.0	13,740	7.7	.36	.05	.08	.20	0.0	.09
5/30/72	12:05 PM	Low +5½	22.0	20.1	14.8	13,200	8.1	.60	0.0	-	-	0.0	0.0
6/30/72	10:55 AM	Low +½	22.5	21.4	9.4	10,200	7.6	1.08	.05	.02	.28	0.0	.04
7/26/72	9:20 AM	Low +2½	24.0	26.0	9.7	9,000	8.1	1.44	0.0	.08	.28	0.0	0.0
8/25/72	8:14 AM	Low +1	25.0	25.2	15.2	12,300	7.9	1.08	.03	.06	.28	0.0	0.0
9/28/72	9:50 AM	Low	20.0	23.0	19.2	16,200	7.9	1.08	0.0	.12	.32	0.0	0.0
10/30/72	12:10 PM	High +5	13.5	13.0	17.4	-	7.8	.60	0.0	.04	.26	0.0	0.0
11/29/72	1:00 PM	High +5½	13.0	6.3	13.7	-	7.8	1.08	0.0	.04	.40	.03	.13

*Ice present

x Blow out tide

TABLE 61. Nutrient Analysis Data Collected at the West Point Island Station. South (NQB-11).

Date	Time E.S.T.	Tide		Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
				Air	Sur.						Ortho	Total		
1/12/72	12:08 PM	High	+3	11.0	6.0	12.7	-	6.8	.24	0.0	.02	.28	0.0	0.0
2/29/72	12:00 N	Low	+6	12.0	5.3	12.7	-	8.1	.84	0.0	.14	.16	0.0	0.0
3/21/72	10:43 AM	High	+6	12.0	7.1	13.9	12,960	8.1	.48	0.0	.16	.24	0.0	0.0
4/28/72	8:50 AM	Low	+2½	14.0	11.0	10.6	12,900	7.0	.60	0.0	.10	.80	.07	.04
5/30/72	12:50 PM	Low	+5	22.0	21.0	12.60	11,880	8.2	.60	0.0	.10	-	0.0	0.0
6/28/72	10:30 AM	Low	+3½	28.0	22.7	11.9	10,920	8.1	1.20	.05	.02	.52	0.0	0.0
7/24/72	10:30 AM	Low	+5½	31.0	28.6	10.1	10,200	7.8	.72	.03	.06	.36	0.0	0.0
8/25/72	9:30 AM	Low	+5	28.0	25.5	15.2	12,060	7.9	1.08	.03	.04	.36	0.0	0.0
9/28/72	11:30 AM	Low	+1½	19.5	23.0	18.0	15,600	8.0	.96	0.0	.18	.34	0.0	0.0
10/30/72	1:30 PM	Low		14.0	13.0	15.5	-	8.0	1.08	0.0	.04	.34	0.0	0.0
11/30/72	9:25 AM	High	+1	8.0	5.5	12.5	-	7.8	1.56	0.0	.06	.22	0.0	0.0

TABLE 62. Nutrient Analysis Data Collected at the Mantoloking Station (NQB-12).

4/30/72	1:00 PM	Low	+4½	19.0	16.0	15.7	14,700	7.7	.84	0.0	.04	.16	0.0	0.0
5/30/72	12:30 PM	Low	+4	23.0	20.0	26.5	15,300	8.2	-	0.0	-	-	0.0	0.0
6/30/72	11:08 AM	Low	+1½	22.0	21.0	14.1	13,440	8.0	1.20	.03	.10	.20	0.0	0.0
7/26/72	9:37 AM	Low	+2½	27.0	25.0	12.7	11,460	8.1	1.08	0.0	.10	.50	0.0	0.0
8/25/72	8:31 AM	Low	+1	27.0	25.0	26.0	13,320	8.0	1.20	.05	.04	.34	0.0	0.0
9/28/72	11:10 AM	Low	+½	20.0	23.0	22.6	18,480	8.0	.84	0.0	.06	.36	0.0	0.0
10/30/72	1:20 PM	Low	+5½	14.0	13.5	19.1	-	8.1	.60	0.0	.12	.28	0.0	0.0
11/30/72	9:05 AM	High		8.0	5.7	19.2	-	7.9	.60	0.0	.06	.20	.17	0.0

TABLE 63. Nutrient Analysis Data Collected at the Herring Island Station, Flashing Red Light #20 (NQB-12).

Date	Time		Tide	Temp. (°C.)		Sal. (°/oo)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter-gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
	E.S.T.			Air	Sur.						Ortho	Total		
1/12/72	11:37 AM		Low +5	11.8	5.3	15.4	-	7.7	.24	0.0	.16	1.80	0.0	0.0
2/29/72	11:30 AM		High +1½	13.8	5.5	17.8	-	8.1	1.32	0.0	.32	.48	.07	.62
3/21/72	10:15 AM		Low +1	14.0	7.3	17.3	15,900	8.0	.60	0.0	.04	.14	0.0	0.0
4/30/72	1:10 PM		High +2½	18.0	15.8	16.7	15,600	7.9	.36	0.0	.04	.26	0.0	0.0
5/30/72	12:20 PM		High +1½	23.5	19.0	17.3	16,260	8.2	.36	0.0	-	-	0.0	0.0
6/30/72	11:20 AM		Low +5	24.2	20.5	16.6	16,200	7.9	.96	.05	.04	.16	0.0	0.0
7/26/72	9:47 AM		High +4½	26.0	25.0	16.3	15,240	8.1	1.08	0.0	.24	.48	0.0	.04
8/25/72	8:40 AM		Low +3½	27.0	24.3	18.6	16,800	8.0	1.44	.03	.04	.60	0.0	0.0
9/28/72	11:00 AM		Low +2½	19.5	23.0	25.1	22,320	7.9	.84	0.0	.20	.60	0.0	0.0
10/30/72	1:10 PM		Low +3	14.3	13.4	20.0	-	8.0	.72	0.0	.12	.32	.03	.09
11/30/72	8:40 AM		High +3	8.0	6.0	23.5	-	8.0	.60	0.0	.18	.32	.26	0.0

TABLE 64. Nutrient Analysis Data Collected at the Metedeconk River Station, Flashing Red Light #2. (NQM-14).

1/12/72	11:25 AM		High +2½	10.0	6.0	14.4	-	8.2	.96	0.0	.04	.48	0.0	1.14
2/29/72	11:14 AM		Low +5	11.0	5.7	11.3	-	7.9	1.32	0.0	.06	.32	.07	1.32
3/21/72	10:05 AM		High +5	15.0	7.5	18.2	16,800	7.4	.24	0.0	.08	3.20	.07	.35
4/30/72	1:20 PM		High +4	18.0	15.5	14.3	12,900	8.3	.84	.05	.04	.32	.07	.44
5/30/72	11:40 AM		Low +3½	24.0	20.5	13.7	13,320	8.6	.60	0.0	.10	-	0.0	0.0
6/30/72	11:40 AM		Low +4	23.4	21.5	7.5	8,520	8.5	1.08	.05	.02	.48	0.0	0.0
7/26/72	9:55 AM		Low +2½	25.0	25.5	14.0	13,200	8.3	1.20	.05	.06	.36	0.0	0.0
8/25/72	8:47 AM		Low +1½	27.0	25.4	16.1	14,700	8.7	.72	.03	.04	.48	0.0	0.0
9/28/72	10:45 AM		Low +1½	19.0	22.0	23.3	19,200	7.9	.72	0.0	.06	.40	0.0	0.0
10/30/72	1:00 PM		Low +1½	13.5	13.5	18.3	-	8.2	.60	0.0	.14	.28	.20	.53
11/29/72	1:10 PM		Low +1½	12.0	7.3	13.5	-	7.7	.60	0.0	.10	.34	.46	.75

TABLE 65. Nutrient Analysis Data Collected at the Metedeconk River Station, Flashing Red Light #6, (NQM-15).

Date	E.S.T. Time	Tide		Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gent (ppm)	Phosphate (ppm)		NO ₂	NO ₃
				Air	Sur.						Ortho	Total		
1/12/72	10:55 AM	High	+1½	11.0	7.0	3.6	-	6.7	.60	0.0	.08	.64	0.0	1.98
2/29/72	10:12 AM	Low	+2½	9.5	5.7	4.9	-	7.1	1.32	.03	.12	.40	.07	2.38
3/21/72	9:30 AM	High	+3½	16.0	8.5	4.1	2,220	6.8	.84	.05	.12	.42	.13	3.17
4/30/72	1:35 PM	Low	+4½	19.0	16.5	14.7	14,400	8.4	.84	.05	.14	.40	.07	0.0
5/30/72	11:30 AM	Low	+2½	24.0	21.5	8.7	8,100	8.7	2.40	0.0	.06	-	0.0	1.50
6/30/72	11:55 AM	Low	+2	23.5	21.2	0.0	900	6.3	1.68	.10	.48	.50	0.0	2.77
7/26/72	10:07 AM	Low	+2½	24.0	26.0	12.5	12,300	7.7	1.32	.15	.20	.56	0.0	1.10
8/25/72	8:58 AM	Low	+1	28.0	26.2	13.6	14,100	8.1	1.08	.15	.04	.76	.13	.44
9/28/72	10:15 AM	High	+5	21.0	23.5	19.2	16,500	8.0	1.32	.05	.24	.60	.40	.79
0/30/72	12:25 PM	High	+4½	13.5	14.0	17.1	-	7.6	1.08	0.0	.10	.40	.10	.44
1/29/72	1:20 PM	High	+4	12.0	8.0	11.0	-	7.5	1.20	0.0	.10	.32	.46	.79

TABLE 66. Nutrient Analysis Data Collected at the Kettle Creek Station, North (NQK-16).

1/20/72	11:20 AM	Low	+1½	10.0	4.5	2.9	-	-	1.68	0.0	.12	.40	0.0	1.94
2/22/72	11:55 AM	High	+5	4.3	2.3	13.0	-	7.6	.36	0.0	.02	.28	0.0	0.0
3/23/72	10:18 AM	High	+2½	8.0	7.7	7.6	7,800	7.2	1.08	0.0	.12	.34	.13	.97
4/30/72	12:35 PM	Low	+4	21.0	17.0	13.0	12,000	7.4	.36	0.0	.06	.20	.03	.62
5/30/72	11:10 AM	Low	+2½	23.0	21.5	12.8	11,700	8.1	.24	0.0	.08	-	0.0	0.0
6/30/72	10:45 AM	Low	+1	22.0	21.8	3.8	7,800	7.6	1.68	.03	.08	.40	0.0	.44
7/26/72	9:10 AM	Low	+2	25.0	26.0	6.3	7,020	7.5	.84	0.0	.06	.44	0.0	.04
8/25/72	8:04 AM	Low	+1½	25.0	26.0	10.0	9,600	7.6	1.20	0.0	.10	.36	0.0	0.0
9/28/72	9:35 AM	Low	+5	20.5	23.0	16.8	14,400	7.7	1.32	0.0	.40	1.00	0.0	0.0
0/30/72	12:00 N	High	+4½	14.0	13.5	15.7	-	7.7	.60	0.0	.16	.46	0.0	0.0
1/29/72	12:50 PM	High	+5	13.0	8.0	11.3	-	7.6	.36	0.0	.02	.34	.07	.35

Ice present
Blow out tide

TABLE 67. Nutrient Analysis Data Collected at the Silver Bay Station, North (NQS-17).

Date	Time E.S.T.		Tide		Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm)	pH	MH ₃ (ppm)	Deter- gents (ppm)	Phosphate (ppm)		NO ₂	NO ₃
					Air	Sur.		Sur.				Ortho	Total		
*1/20/72	11:45	AM	Low	+3	10.0	5.0	-	-	-	.84	0.0	.08	.18	0.0	3.65
x2/22/72	12:15	PM	High	+5 $\frac{1}{2}$	4.5	1.8	-	-	7.7	.48	0.0	.04	.24	0.0	0.0
3/23/72	10:48	AM	High	+3 $\frac{1}{2}$	10.0	8.5	10.9	11,100	6.8	.72	0.0	.08	.20	.17	.62
4/30/72	12:20	PM	Low	+4	22.0	17.0	13.2	12,900	7.2	.36	0.0	.04	.16	.03	.44
5/30/72	10:55	AM	Low	+2 $\frac{1}{2}$	23.0	21.7	12.8	11,700	8.0	1.92	0.0	.08	-	0.0	0.0
6/30/72	10:30	AM	Low	+1	22.0	21.1	10.3	10,800	7.5	.84	.05	.02	.32	0.0	.09
7/26/72	8:55	AM	Low	+2	24.0	26.5	9.6	9,000	7.5	1.20	0.0	.18	.44	0.0	.26
8/25/72	7:52	AM	Low	+2 $\frac{1}{2}$	25.0	25.5	10.6	10,260	7.9	1.08	.03	.04	.34	0.0	.18
9/28/72	9:15	AM	High	+5	20.5	22.0	18.2	15,600	7.9	.96	0.0	.04	.34	0.0	0.0
10/30/72	11:40	AM	High	+4 $\frac{1}{2}$	14.0	14.5	16.1	-	7.7	.96	0.0	.02	.30	0.0	0.0
11/29/72	12:25	PM	High	+4 $\frac{1}{2}$	12.0	6.7	12.1	-	7.6	1.32	0.0	.06	.24	.07	0.0

* Ice present
x Blow out tide

TABLE 68. Nutrient Analysis Data Collected at the Toms
River Station, Flashing Red Light #2 (NQT-18).

*1/20/72	1:00	PM	Low	+4 $\frac{1}{2}$	9.0	2.5	11.6	-	7.4	.24	0.0	.08	.60	0.0	0.0
x2/22/72	1:20	PM	Low	+ $\frac{1}{2}$	4.5	2.0	10.8	-	7.5	.96	.10	.02	.24	0.0	0.0
3/23/72	11:55	AM	High	+5 $\frac{1}{2}$	10.0	8.0	8.6	8,500	7.7	.96	.05	.08	.14	.03	.09
4/28/72	9:45	AM	Low	+3 $\frac{1}{2}$	13.5	11.5	4.4	5,400	7.8	.84	0.0	.14	.28	0.0	.75
5/31/72	11:25	AM	Low	+3	24.0	19.8	12.7	12,000	7.9	.60	0.0	-	-	0.0	0.0
6/28/72	9:12	AM	Low	+2	29.0	20.2	2.9	5,220	6.4	2.04	.20	.02	.22	0.0	0.0
7/24/72	10:50	AM	Low	+6	30.0	29.0	7.6	8,400	7.8	1.56	.05	.06	.24	0.0	0.0
8/25/72	7:02	AM	Low	+ $\frac{1}{2}$	23.5	25.3	10.8	8,700	7.7	.96	.05	.04	.28	0.0	0.0
9/28/72	8:15	AM	High	+4 $\frac{1}{2}$	19.5	20.0	17.0	14,400	7.8	1.20	0.0	.04	.26	0.0	0.0
10/30/72	10:45	AM	High	+4	13.5	12.0	12.6	-	7.5	.48	0.0	0.0	.22	0.0	.04
11/29/72	11:40	AM	High	+4 $\frac{1}{2}$	11.0	6.5	7.9	-	7.6	.96	0.0	.06	.28	.10	.04

* Ice present
x Blow out tide.

TABLE # 69. Nutrient Analysis Data Collected at the Toms River Station, Flashing Green Light #19. (NQT-19).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gents (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Ortho	Total		
*1/20/72	12:33 PM	High +3½	9.0	3.5	1.0	-	6.0	1.68	0.0	.10	.22	.33	1.23
x2/22/72	1:00 PM	Low	5.0	2.5	2.2	-	6.5	1.32	.10	.10	.26	0.0	0.0
3/23/72	11:30 AM	High +4½	10.0	8.5	2.3	6,600	6.8	.84	.05	.12	.34	.03	.70
4/28/72	10:05 AM	Low +4	13.5	11.5	3.2	1,080	6.2	.96	.05	.50	.50	.03	.22
5/31/72	10:50 AM	Low +2	23.0	20.0	2.2	45	6.0	.96	.15	-	-	.13	1.50
6/28/72	9:35 AM	Low +2	28.0	18.5	2.7	1,440	4.5	2.28	.10	.02	2.30	0.0	.53
7/24/72	11:15 AM	High +½	31.0	26.4	1.6	2,400	6.9	2.04	.10	.04	.36	0.0	.88
8/25/72	7:12 AM	Low +2½	23.5	21.6	2.2	6,600	6.5	2.28	.08	.06	.26	0.0	1.76
9/28/72	8:30 AM	High +5	18.5	20.0	-	2,580	6.7	1.80	.10	.10	.22	0.0	2.38
10/30/72	11:00 AM	High +4½	14.0	13.0	4.6	-	7.2	.96	.05	.06	.16	0.0	.35
11/29/72	12:00 N	High +5	12.0	7.5	2.9	-	6.6	.60	.02	.04	.14	.07	.88

* Ice present.

x Blow out tide.

TABLE 70. Nutrient Analysis Data Collected at the Forked River Station, Flashing Red Light #19. (NQF-20).

*1/21/72	11:22 AM	Low +3	10.0	5.0	12.4	-	6.6	.48	0.0	.06	.10	0.0	0.0
*2/23/72	11:45 AM	High +6½	4.0	1.0	20.0	-	7.8	1.08	0.0	.02	.36	0.0	0.0
3/24/72	12:40 PM	High +6½	5.0	7.5	22.8	21,720	7.9	.36	0.0	.08	.32	0.0	0.0
4/27/72	11:20 AM	High +1½	9.5	11.5	20.5	19,500	7.8	.24	0.0	.04	.16	0.0	0.0
5/23/72	12:35 PM	High +5½	24.0	16.0	17.1	15,900	7.8	.60	0.0	.24	.48	0.0	0.0
6/27/72	11:40 AM	High +1	23.0	21.0	20.1	19,800	7.9	.48	0.0	0.0	.24	0.0	0.0
7/21/72	8:05 AM	High +1½	24.0	28.4	17.8	17,880	7.9	1.20	0.0	.02	.24	0.0	0.0
8/22/72	11:15 AM	High +2½	26.0	24.4	23.8	20,280	7.6	.60	0.0	.08	.32	0.0	0.0
9/27/72	11:00 AM	Low +3½	22.0	25.0	25.6	21,780	7.9	.84	0.0	.02	.26	0.0	0.0
10/31/72	1:00 PM	Low +½	7.5	12.0	22.1	-	7.8	.36	0.0	.10	.16	0.0	0.0
11/29/72	10:58 AM	High +5½	10.0	7.3	19.0	-	8.0	.72	.03	.02	.32	0.0	0.0

* Ice present.

TABLE 71. Nutrient Analysis Data Collected at the Oyster Creek Station, Effluent of the Oyster Creek Power Plant (NQ0-21).

Date	Time E.S.T.	Tide	Temp. (°C.)		Sal. (‰)	Diss. Slds. (ppm) Sur.	pH Sur.	NH ₃ (ppm)	Deter- gents (ppm)	Phosphate (ppm)		NO ₂	NO ₃
			Air	Sur.						Ortho	Total		
*1/21/72	11:53 AM	Low +4	9.0	15.0	11.8	-	6.9	1.44	0.0	.10	.10	0.0	0.0
*2/23/72	12:00 N	Low	3.0	7.5	18.5	-	7.7	.24	0.0	.06	.40	0.0	0.0
3/24/72	2:50 PM	Low +2	5.0	12.5	20.6	18,600	8.0	.48	0.0	.08	.26	0.0	0.0
4/27/72	8:45 AM	Low +5	11.5	17.0	18.5	18,000	7.5	.36	0.0	.08	.24	0.0	0.0
5/23/72	10:05 AM	High +3½	21.0	15.5	15.5	13,920	7.4	.60	0.0	.06	.28	0.0	0.0
6/27/72	10:00 AM	Low +5	28.0	27.7	17.9	18,480	7.4	.60	0.0	0.0	.18	0.0	0.0
7/21/72	6:25 AM	High +½	23.5	34.0	16.1	15,660	7.4	.72	.05	.02	.28	0.0	0.0
8/22/72	8:09 AM	High	25.0	29.7	21.2	19,200	8.1	1.92	.05	.14	.28	0.0	.04
9/27/72	8:35 AM	Low +1½	29.0	23.0	24.1	18,000	7.6	.72	0.0	.06	.22	0.0	0.0
10/31/72	10:30 AM	High +5	6.0	17.0	20.6	-	7.9	.48	.20	.04	.32	0.0	0.0
11/29/72	10:52 AM	High +5½	10.0	16.5	15.6	-	7.6	.36	0.0	.06	.36	.07	0.0

* Ice present.

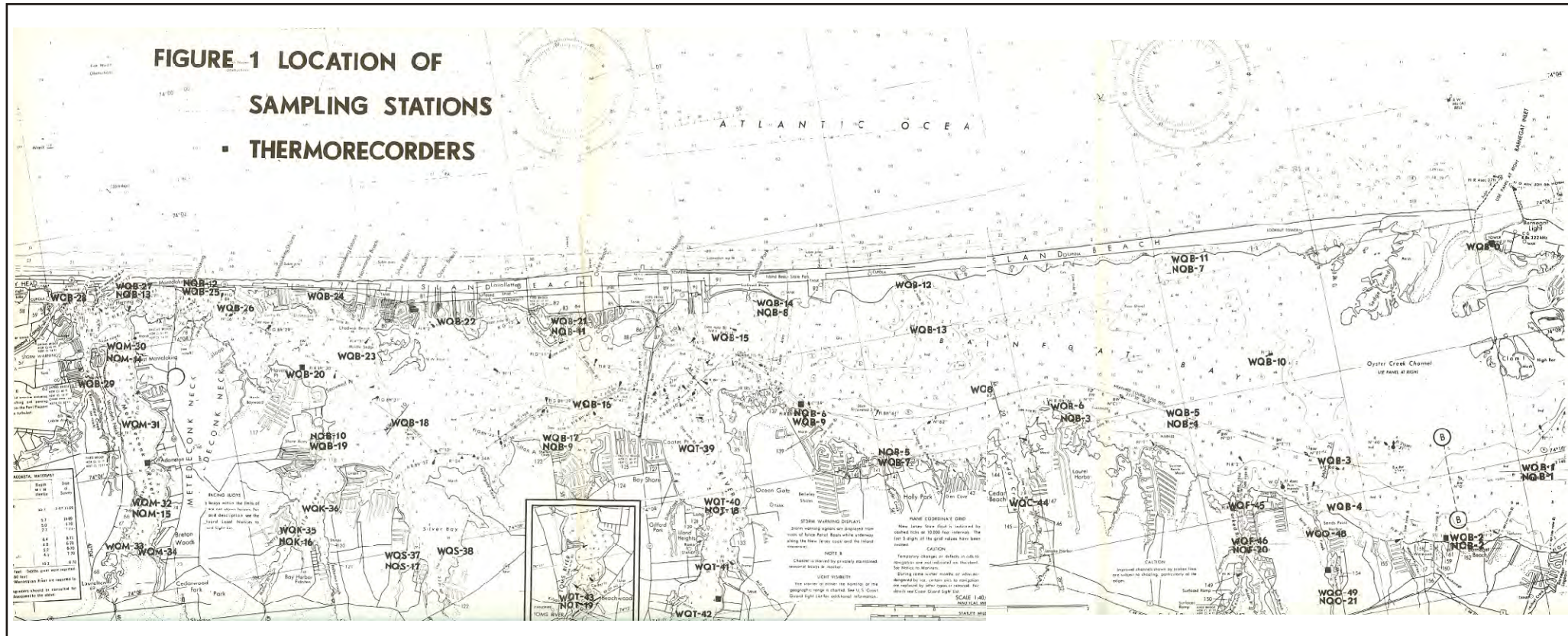
TABLE 72. (Continued)

Station*	Date	** Tissue	BHC	Ald- rin	Chlor- dane	Diel- drin	End- rin	Hepta- chlor	Meth- oxy- chlor	Lin- dane	P,P'DDE (DDE)	P,P'DDT (DDT)	O,P'DDT (TDE)	DDT Total
S-12	8/24/72													
	S.side	WPB	-	-	-	-	-	-	-	-	82	-	114	196
KettleCr.	3/28/72													
T-18	W.flounder	WPB	-	-	-	-	-	-	-	-	49	-	38	87
	4/28/72													
T-18	W.flounder	WPB	-	-	-	-	-	-	-	-	-	-	-	-
	7/20/72													
T-18	W.flounder	WPB	-	-	-	-	-	-	-	-	104	38	86	228
Silver Bay	3/28/72													
T-17	W.flounder	WPB	-	-	-	-	-	34	-	-	-	-	22	22
	5/24/72													
T-17	Bay Anchovy	WPB	-	-	-	-	-	21	-	-	-	-	-	-
Oyster Cr	2/15/72													
T-12	S.Side	WPB	-	-	-	-	-	-	-	-	59	49	78	186
	5/23/72													
T-12	S.side	WPB	-	-	-	-	-	-	-	-	57	-	-	57
	7/10/72													
T-12	Bay Anchovy	WPB	-	-	-	-	-	-	-	-	79	-	24	103
	11/21/72													
T-12	Cunner	WPB	-	-	-	-	-	-	-	-	82	-	-	82

* See Fish Section for exact location.

** Whole Product Basis (ppb)

x No analysis



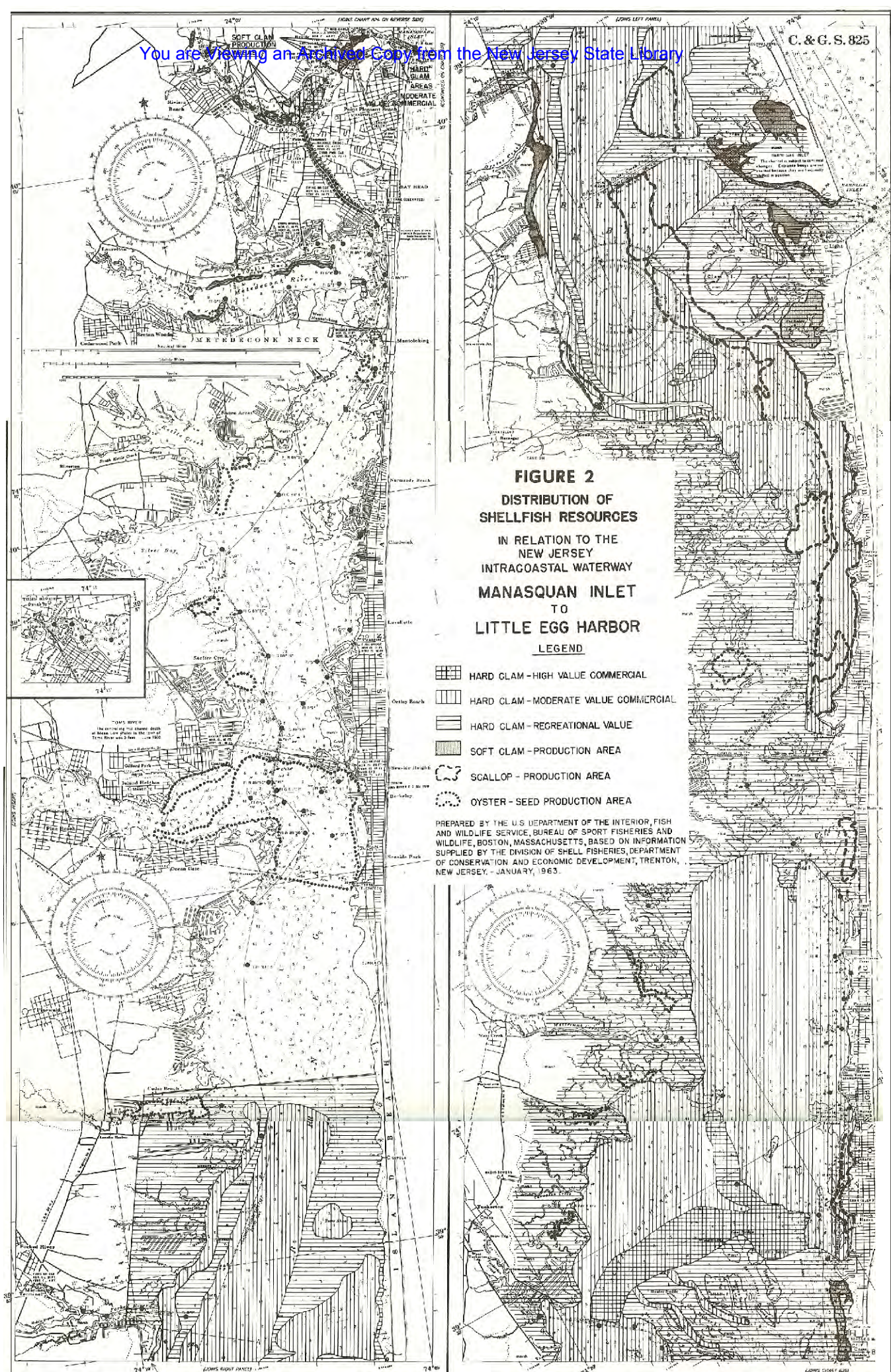


TABLE 72. Chlorinated Hydrocarbon detected in tissues of fish collected in the Upper Barnegat System.

Station*	Date	** Tissue	BHC	Ald- rin	Chlor- dane	Diel- drin	End- rin	Hepta- chlor	Meth- oxy- chlor	Lin- dane	P,p'DDE (DDE)	P,p'DDT (DDT)	O,p'DDT (TDE)	DDT Total
Metede- conk R S-7	3/1/72 Silver- side	WPB	-	-	-	-	-	-	-	-	101	98	101	300
S-7	6/15/72 S.Side	WPB	-	-	-	-	-	-	-	-	69	43	-	112
T-20	11/30/72 W.Flounder	WPB	25	-	-	-	-	-	-	-	12	-	-	12
Toms R. T-16	5/22/72 W.Perch	WPB	-	14	-	-	-	-	-	-	31	-	18	49
T-16	8/72 W.Perch	WPB	-	17	-	-	-	13	-	-	32	-	46	78
T-16	9/18/72 Bay anchovy	WPB	-	-	-	-	-	-	-	-	62	-	-	62
Barn. Bay (Upper) T-5	5/24/72 Winter flounder	WPB	-	-	-	-	-	-	-	-	43	-	47	90
T-6	6/29/72 W.Flounder	WPB	-	-	-	-	-	19	-	-	29	-	25	54
T-5	11/29/72 W.flounder	WPB	-	-	-	-	-	-	-	-	62	67	65	194
Barn. Bay (Lower) T-3	3/27/72 Winter flounder	WPB	-	-	-	-	-	-	-	-	43	-	-	43
T-3	5/18/72 S.side	WPB	x	x	x	x	x	x	x	x	x	x	x	x
T-3	7/13/72 Bay Anchovy	WPB	-	-	-	-	-	-	-	-	111	49	70	230
Isl. Bch. St. Park T-9	3/13/72 Silver- side	WPB	-	-	-	-	-	-	-	-	71	-	63	134
T-9	5/23/72 S.Side	WPB	-	-	-	-	-	12	-	-	32	-	51	83

TABLE 73. Chlorinated Hydrocarbons found in sediment samples collected in the Upper Barnegat System.

[illegible]

TABLE 73. (Continued)

Station	Location	BHC	Ald- rin	Chlor- dane	Diel- drin	End- rin	Hepta- chlor	Lin- dane	Meth- oxy- chlor	P,P'DDE (DDE)	O,P'DDT TDE)	P,PDDT (DDT)	DDT Total
Cedar Crk.	Middle	-	-	-	-	-	-	-	-	-	30.6	624	654.6
Barnegat Bay	Stout's Crk.area	-	-	-	-	-	-	-	-	-	-	-	-
Forked R.	Mouth	-	-	-	-	-	-	-	-	-	-	-	-
Forked R.	Fl. R.#19 (light)	-	-	-	-	-	-	-	-	38.4	68.4	1576	1682.8
Barnegat Bay	Island Bch. State Pk.	-	-	-	-	-	-	-	-	17.7	30.6	1788	1836.3
Barn.Bay	Isl.Bch.St.Pk.	-	-	-	-	-	-	-	-	-	-	-	-
Barnegat Bay	Fl.#2,(Light off Sedge Isl.)	-	-	-	-	-	-	-	-	9.4	14.4	-	23.8
Oyster Crk.	Mouth	-	-	-	-	-	-	-	-	-	-	-	-
Oyster Crk.	Rt.#9Brdge	-	-	-	-	-	-	-	-	-	-	1000	1000
Barnegat Bay	Fl. #39 (Light)	-	-	-	-	-	-	-	-	-	-	424	424
Barnegat Bay	Barnegat Lagoons	-	-	-	-	-	-	-	-	-	-	-	-

x - No Analysis

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TABLE 74. Heavy Metal concentrations detected in fish
whole product collected in the Upper Barnegat
System.

Station*	Date	Zinc (ppm.)	Cadmium (ppm.)	Lead (ppm.)	Chromium (ppm.)	Mercury (ppb.)
Metedeconk R.	3/1/72					
S-7	Silverside	32.5	11.5	14.5	0	250
S-7	6/15/72					
	Silverside	27.5	11.0	10.5	0	200
T-20	11/30/72					
	W. flounder	17.5	11.8	7.5	.25	175
Toms River	5/22/72					
T-16	White perch	18.8	11.0	13.9	0	250
	8/72					
T-16	White perch	23.8	12.8	11.8	0	350
	9/18/72					
T-16	Bay anchovy	35.0	12.5	10.5	0	300
Barnegat Bay (Upper)	5/24/72					
T-5	W. flounder	20.0	10.8	9.5	.12	75
	6/29/72					
T-6	W. flounder	16.2	10.0	15.0	.12	150
	11/29/72					
T-5	W. flounder	12.5	10.0	12.5	.12	50
Barnegat Bay (Lower)	3/27/72					
T-3	W. flounder	17.5	12.8	15.8	.25	100
	5/18/72					
T-3	Silverside	38.8	12.0	11.8	.12	150
	7/13/72					
T-3	Bay anchovy	x	x	x	x	x
Isl. Bch. St. Pk	3/13/72					
T-9	Silverside	x	x	x	x	x
	5/23/72					
T-9	Silverside	25.0	12.8	12.5	0	225
	8/24/72					
S-12	Silverside	22.5	13.2	9.0	0	275
Kettle Crk.	3/28/72					
T-18	W. flounder	22.5	12.0	8.5	.12	200
	4/28/72					
T-18	W. flounder	18.8	11.8	12.8	.12	75
	7/20/72					
T-18	Bay anchovy	25.0	11.0	11.0	0	150
Silver Bay	3/28/72					
T-17	W. flounder	32.5	10.5	10.5	.12	100
	5/24/72					
T-17	Bay anchovy	31.2	9.5	13.0	0	150
Oyster Crk.	2/15/72					
T-12	Silverside	x	x	x	x	x
	5/23/72					
T-12	Silverside	35.0	13.0	12.2	0	175
	7/10/72					
T-12	Bay anchovy	x	x	x	x	x
	11/21/72					
T-12	Cunner	x	x	x	x	x

X - No analysis

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TABLE 75. Heavy metals concentrations found in sediment
samples collected in Upper Barnegat System.

Station		Zinc	Mercury	Cad- mium	Lead	Chro- mium	N mg/hg
Beaverdam Crk	Fl. R#6 light	10	.60	10	40	20	
Metedeconk R.	No. Branch	20	.30	5	10	10	3640
Metedeconk R.	So. Branch	15	.66	10	10	20	8680
Metedeconk R.	Fl. G.#5 Light	10	.65	5	10	5	6006
Metedeconk R.	Fl. #2 light	5	.26	5	70	10	1918
Barnegat Bay	Fl. #29 Light off Curtis Pt.	5	.50	5	10	10	2338
Kettle Creek	Mouth	5	.22	2	20	40	2324
Kettle Creek	Middle	5	.33	5	20	15	
Silver Bay	Middle	10	.20	5	20	50	
Barnegat Bay	Tilton Pt.	20	.10	2	40	20	320
Barnegat Bay	Lavallette area	15	.125	2	10	20	326
Barnegat Bay	Shelter Cove area	15	.52	2	10	20	640
Barnegat Bay	Pelican Island	15	1.00	2	10	10	4256
Toms River	Coates Point	20	.860	2	10	15	
Toms River	Pine Beach	10	1.320	5	30	10	4984
Toms River	Fl. #19, Light	5	1.590	2	20	15	
Barnegat Bay	Seaside Park	25	.20	5	20	10	588
Barnegat Bay	Potter Crk Area	20	.265	10	20	10	840
Barnegat Bay	Holly Park	20	.25	2	10	5	
Cedar Creek	Mouth	25	.44	2	15	15	1736
Cedar Creek	Middle	10	.60	5	40	5	
Barnegat Bay	Stouts Crk Area	15	.32	5	40	10	1260
Forked River	Mouth	10	1.04	2	20	5	3080
Forked River	Fl. R. #19 light	10	.65	2	10	5	3052
Barnegat Bay	Island Beach State Park	15	.38	2	10	5	770
Barnegat Bay	Island Beach State Park	10	.09	5	10	10	
Barnegat Bay	Fl. #1, Light off Sedge Island	5	.29	2	10	10	1463
Oyster Creek	Mouth	15	.20	2	20	5	1284
Oyster Creek	Rt. #9 Bridge	20	.23	2	40	15	
Barnegat Bay	Fl. #39 light	20	.20	5	10	20	434
Barnegat Bay	Barnegat Lagoons	20	.20	2	10	20	1435

TABLE 76. Radioactivity Concentration of Fish Samples
Barnegat Bay Area, 1972.

Specimen	Date of Coll.	Concentration pCi/kg-fresh Radioactive Nuclides													
		Sr ⁹⁰	Ce ¹⁴⁴	I ¹³¹	Ru ¹⁰³	Ru ¹⁰⁶	Ba ¹⁴⁰	Cs ¹³⁴	Cs ¹³⁷	Zr ⁹⁵	Co ⁵⁸	Mn ⁵⁴	Zr ⁶⁵	Co ⁶⁰	K ⁴⁰
Fish from Oyster Crk. kill on 1/29	1/31	11.4 [±] 2.1	170 [±] 160	N.A.	130 [±] 120	<700	<80	56 [±] 42	65 [±] 38	<30	<90	<70	<120	72 [±] 36	4900 [±] 3400
Brevoortia tyrannus	1/11	<1.5	360 [±] 220	<90	340 [±] 260	<700	<80	50 [±] 66	<60	<30	<140	<70	122 [±] 105	29 [±] 42	4000 [±] 3500
Winter flounder	4/28	<5	<300	<30	<110	<700	<80	<40	<40	<20	<100	<50	<90	<70	5330 [±] 290
Silver-sides	4/19		<300	<30	<110	<700	<80	<40	17 [±] 8	<20	<100	<50	<90	22 [±] 7	1700 [±] 120
Winter flounder	4/19	<23	<300	<30	<110	<700	160 [±] 100	<40	<40	<40	100 [±] 100	<50	<200	70 [±] 40	3260 [±] 560
Flounder	4/18		<300	60 [±] 54	<110	<700	65 [±] 40	<40	30 [±] 25	<100	<50	<60	<90	40 [±] 20	1490 [±] 280
Sea Stars (Asterios forbesi)	4/18		<300		<280	<1000				<100	<150	<190	<270	<50	3400 [±] 1600
Sea stars	4/18		<300	110 [±] 80	<110	<700	110 [±] 70	<40	<40	<20	<100	<50	<90	85 [±] 40	1840 [±] 480
Flounder	4/18	2.8 [±] 1.2	190 [±] 80	<30	<110	<700	<80	<40	<40	<20	<100	<50	<90	40 [±] 20	2840 [±] 230
Eels	4/18		<300	<30	<110	<700	<80	<40	35 [±] 20	<20	<100	<50	<90	25 [±] 20	2030 [±] 240

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TABLE 76. Continued

Specimen	Date of Coll.	Concentration pCi/kg-fresh													
		Radioactive Nuclides													
		Sr ⁹⁰	Ce ¹⁴⁴	I ¹³¹	Ru ¹⁰³	Ru ¹⁰⁶	Ba ¹⁴⁰	Cs ¹³⁴	Cs ¹³⁷	Zr ⁹⁵	Co ⁵⁸	Mn ⁵⁴	Zr ⁶⁵	Co ⁶⁰	K ⁴⁰
Silver-sides	7/19		<300	N.A.	<1000	<780	N.A.	<72	45 [±] 30	<110	<240	<70	<120	<60	2100 [±] 300
Fish meat	7/11		230 [±] 160	<35	<100	<430	<53		<56	<22	<75	<55	<100	43 [±] 24	3000 [±] 300
Silver-sides	8/22		<290		<350	<750		91 [±] 44	<60	<64	<180	<81	130 [±] 80	<60	2700 [±] 400
Silver-sides	8/30		<400	N.A.	<315	133 [±] 440	N.A.	<48	28 [±] 29	2 [±] 42	67 [±] 96	<72	<120	<60	32650 [±] 340
Silver-sides	8/30		<400	N.A.	<650	<990	N.A.	<77	<52	<90	<180	<94	89 [±] 81	<47	2000 [±] 400
Silver-sides (Menidia)	8/24		131 [±] 165		<1200	<560		6 [±] 28	36 [±] 26	<160	50 [±] 220	2 [±] 54	<170	10 [±] 26	2400 [±] 300
Silver-sides (Menidia)	8/30		20 [±] 270		1100 [±] 1100	<900		9 [±] 42	45 [±] 36	<210	<440	36 [±] 76	<230	20 [±] 36	1500 [±] 400
Silver-sides	9/15		<400		<380	<720		<75	70 [±] 30	<76	<160	<72	<134	<60	3100 [±] 400
Fish meat	10/25		30 [±] 110		<330	250 [±] 270		17 [±] 21	56 [±] 20	19 [±] 41	41 [±] 92	<53	<120	16 [±] 19	3100 [±] 300
Winter flounder	11/27		100 [±] 130	N.A.	100 [±] 150	<540		9 [±] 23	17 [±] 21	14 [±] 33	7 [±] 74	3 [±] 37	<110	19 [±] 21	2300 [±] 300
Winter flounder	11/28		<400	N.A.	53 [±] 190	<570	N.A.	<45	<50	24 [±] 43	<140	23 [±] 47	<140	<60	2300 [±] 300
White perch	11/28		<400	N.A.	140 [±] 180	<580	N.A.	30 [±] 31	85 [±] 31	<65	<150	<74	<140	<60	1900 [±] 300

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 TABLE 77. Listing of Data Collected During Dredge
 Hole Survey in Upper Barnegat System, 1972.

Hole 8, Chart 2, Barnegat Bay

Area: 2 acres
 Maximum depth: 10 feet
 Date: August 1972

Depth (ft.)	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
3	30.5	6.9	21.8	8.4	
10	26.0	5.2	22.8	8.3	0.0

Bottom sample contained:

6 *Mulinia lateralis*
 3 *Nassarius obsoletus*
 3 *Pectinaria gouldii*

Bottom composition: Sandy

Hole 9, Chart 2, Barnegat Bay

Area: 6 acres
 Maximum depth: 8 feet
 Date: August 1972

Depth (ft.)	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	29.4	5.6	18.1	8.1	
3	29.4	5.6	18.0	8.1	
6	29.0	5.4	18.2	8.1	
8	29.0	4.1	18.2	8.1	0.0

Bottom sample contained no invertebrate organisms.

Hole 10, Chart 2, Barnegat Bay

Area: 24 acres
 Maximum depth: 10 feet
 Date: November 1972.

Depth (ft.)	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	10.5	10.5	17.9	7.4	
3	10.7	10.2	17.7	7.4	
10	11.7	8.9	19.6	7.3	0.0

Bottom sample contained:

1 *Ampelisca* sp.
 1 *Nereis succinea*

Bottom composition: Fine black mud and sand.
 (Detected faint odor of H₂S in mud).

Hole 10, Chart 2, Barnegat Bay

Area: 24 acres; Maximum depth: 10 feet; Date: November 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	10.5	10.5	17.9	7.4	
3	10.7	10.2	17.7	7.4	
10	11.7	8.9	19.6	7.3	0.0

Bottom sample contained: 1 *Ampelisca* sp.; 1 *Nereis succinea*
Bottom composition: Fine black mud and sand. (Detected faint odor of H₂S in mud).

Hole 11, Chart 2, Toms River

Area: 3 acres; Maximum depth: 7.5 feet; Date: August 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	20.7	9.1	14.2	7.7	
3	20.3	7.7	15.5	-	
7.5	20.7	4.8	17.2	7.6	0.0

Bottom sample contained: 1 *Heteromastus filiformis*
Bottom composition: mud.

Hole 12, Chart 2, Toms River

Area: 10 acres; Maximum depth: 20 feet; Date: September 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
3	24.0	8.4	16.4	8.0	
10	23.0	4.3	17.6	7.8	
15	22.0	2.4	17.5	7.5	
20	21.3	.3	17.5	7.3	0.0

Bottom sample contained no invertebrate organisms.

Hole 13, Chart 2, Barnegat Bay

Area: 4 acres; Maximum depth: 7 feet; Date: August 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	28.9	0.0	19.3	7.4	
3	28.7	0.0	19.8	7.4	0.1
7	24.7	0.0	22.5	7.2	> 5.0

Bottom sample contained no invertebrate organisms.
Bottom composition: Decaying eel grass.

Hole 14, Chart 1, Barnegat Bay

Area: 9 acres; Maximum depth: 21 feet; Date: October 1972.

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	18.4	8.5	28.6	7.8	
5	18.3	8.2	28.6	8.0	
10	18.3	8.1	28.8	8.0	
15	18.0	8.2	30.0	8.0	
18	18.0	8.2	29.2	8.0	0.0

Bottom sample contained: 1 *Mulina latcalis*; 3 *Nephtys incisa*

Hole 16, Chart 1, Barnegat Bay

Area: 35 acres; Maximum depth: 16 feet; Date: October 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	18.0	7.8	30.1	7.7	
5	18.0	8.1	30.5	7.8	
10	18.0	8.1	30.5	7.9	
15	17.5	8.1	29.7	8.0	0.0

Bottom sample contained: 3 *Asterias forbesii*, 1 *Mytilus edulis*,
5 *Unciola* sp., 5 *Eumida sanguinea*, 4 *Mya arenaria*, 15 *Gemma gemma*.

Hole 17, Chart 2, Barnegat Bay

Area: 5 acres; Maximum depth: 19 feet; Date: October 1972.

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	13.5	9.5	18.6	7.8	
5	13.6	9.8	18.4	7.8	
10	14.0	9.2	18.6	7.8	0.0
15	15.7	6.8	20.2	7.8	0.4

Bottom sample contained no invertebrate organisms.
Bottom composition: Very fine rich black mud.

Hole 18, Chart 2, Barnegat Bay

Area: 1 acre; Maximum depth: 23 feet; Date: October 1972.

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S
0	13.0	11.2	19.6	7.8	
6	13.0	9.4	19.4	7.8	
12	15.6	7.9	21.4	7.8	0.0
18	16.5	0.0	24.5	7.2	4.5
22	16.5	0.0	24.3	7.2	> 5.0

Bottom sample contained no invertebrate organisms
Bottom composition: Rich black mud.

TABLE 77. (Continued)

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Hole 19, Chart 2, Barnegat Bay.

Area: 4 acres; Maximum depth: 15 feet; Date: October 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(‰)	pH	H ₂ S (ppm)
0	14.0	9.7	17.2	8.1	
4	14.0	9.8	17.0	8.1	
8	14.0	10.1	17.2	8.1	
12	13.5	8.5	16.9	7.8	
14	13.0	8.0	17.0	7.8	0.0

Bottom sample contained no invertebrate organisms.
 Bottom composition: Very fine black mud and sand.

Hole 20, Chart 2, Silver Bay

Area: 8 acres; Maximum depth: 24 feet; Date: October 1972.

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(‰)	pH	H ₂ S(ppm.)
0	13.5	9.6	16.8	7.8	
5	13.5	9.3	17.2	7.7	
10	14.5	7.3	19.2	7.7	
15	15.0	5.0	21.0	7.4	
20	16.5	0.8	23.3	7.4	0.0
23	17.1	0.3	23.4	7.2	0.1

Bottom sample contained no invertebrate organisms.
 Bottom composition: Very fine black mud and sand.

Hole 21, Chart 2, Silver Bay

Area: 4 acres; Maximum depth: 16 feet; Date: October 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(‰)	pH	H ₂ S(ppm.)
0	15.5	9.9	16.2	7.8	
5	15.5	8.7	16.4	7.8	
10	16.3	7.4	17.1	7.6	0.0
15	17.5	1.5	18.6	7.2	0.2

Bottom sample contained no invertebrate organisms
 Bottom Composition: Very fine black mud and sand.

Hole 23, Chart 2, Toms River

Area: 25 acres; Maximum Depth: 32 feet; Date: August 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(‰)	pH	H ₂ S(ppm.)
0	24.4	7.2	6.9	7.6	
6	23.9	5.2	11.3	7.6	
12	17.4	0.0	15.6	7.3	0.3
18	11.1	0.0	19.5	7.3	0.5
24	9.2	0.0	20.3	7.3	1.0
30	9.2	0.0	20.5	7.3	5.0
32	9.2	*	*	*	*

Bottom sample contained no invertebrate organisms.
 Bottom composition: Rich black mud. * Began drifting.

TABLE 77. (Continued)

Hole 28, Chart 2, Toms River

Area: 1 acre; Maximum depth: 25 feet; Date: October 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	12.0	9.7	10.6	7.4	
5	11.5	9.4	13.9	7.4	
10	11.5	7.2	16.5	7.3	
15	11.0	7.0	16.0	7.3	
20	9.5	6.2	17.5	7.3	
25	9.5	5.1	17.1	7.2	0.0

Bottom sample contained no invertebrate organisms. Bottom composition Soupy mud and fine sand mixture. (Detected faint odor of H₂S in mud sample.)

Hole 29, Chart 2, Toms River

Area: 1 acre; Maximum depth: 16 feet; Date: October 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	11.7	9.7	9.3	7.2	
4	11.7	9.3	13.0	7.2	
8	11.5	7.7	14.2	7.2	
12	11.5	5.5	17.7	7.2	
16	11.4	4.2	17.1	7.2	0.0

Bottom sample contained no invertebrate organisms.
Bottom composition: Soupy mud and fine sand mixture.

Hole 31, Chart 1, Metedeconk River

Area: 15 acres; Maximum Depth: 26 feet; Date: October 1972

Depth	Temp.(°C)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	19.0	11.8	21.0	8.1	
4	19.0	14.8	20.8	8.2	
8	18.7	6.7	23.2	7.7	
12	18.7	1.6	27.0	7.4	0.0
16	18.5	.4	27.2	7.2	0.1
20	18.5	0.0	27.4	7.1	3.5
24	*	*	*	*	*

* Began drifting

Bottom sample contained no invertebrate organisms.
Bottom composition: Rich black mud.

Hole 32, Chart 2, Barnegat Bay

Area: 14 acres; Maximum depth: 6 feet; Date: November 1972

Depth	Temp.(°C.)	D.O.(ppm.)	Sal.(°/oo)	pH	H ₂ S(ppm.)
0	11.0	9.4	17.9	7.4	
3	11.0	9.5	18.8	7.4	
6	11.3	9.0	17.0	7.5	0.0

Bottom sample contained: 5 Nassarius obsoletus; 1 Nereis arenaceodon
Bottom composition: Mud and coarse sand

TABLE 78. Comparison of observations on Upper Barnegat Dredge Holes for 1969 and 1972.

No.	Acre- age	Type ^{1/}	Depth Classifi- cation ^{2/}		Dissolved oxygen Classifi- cation ^{3/}		Hydrogen Sulfide Classifi- cation ^{4/}		Presence of Bottom Inverte- brates	
			1969	1972	1969	1972	1969	1972	1969	1972
8	2	I	1	1	3	3	1	1	Yes	Yes
9	6	II	2	1	1	2	3	2	No	No
10	24	I	1	1	3	3	1	1	Yes	Yes
11	3	I	2	1	2	2	1	1	No	Yes
12	10	I	2	2	2	1	1	1	No	No
13	4	II	1	1	1	1	3	3	Yes	No
14	9	II	3	3	3	3	-	1	Yes	Yes
16	35	II	3	2	2	3	1	2	Yes	Yes
17	5	II	3	2	3	3	1	2	No	No
18	1	I	3	3	1	1	3	3	No	No
19	4	I	2	2	3	3	-	1	Yes	No
20	8	I	3	3	1	1	1	2	No	No
21	4	I	2	2	2	2	1	2	No	No
23	2	I	4	4	1	1	3	3	No	No
28	1	I	3	3	1	3	3	1	No	No
29	1	I	3	2	1	2	3	1	No	No
31	15	II	4	3	1	1	3	2	No	No
32	14	I	2	1	2	3	-	1	No	Yes

* Murawski - 1969

1/ Type I - Partially to completely isolated from any channel
Type II - Connected to an existing channel either as a dead end,
an appendix, or as a saddle.

2/ Depth Classification: 1 - \leq 10 feet.
2 - 11 - 20 feet
3 - 21 - 30 feet
4 - 31 - 64 feet

3/ Dissolved Oxygen in bottom waters: 1 - \leq 1 ppm.
2 - 1 - 5 ppm.
3 - $>$ 5 ppm.

4/ Hydrogen Sulfide in bottom waters: 1 - 0 ppm.
2 - 0 - 5 ppm.
3 - $>$ 5 ppm.

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TABLE 79. Classification of all dredge holes observed according to their depth and dissolved oxygen content of their bottom waters.

D.O. Concentration (ppm.)	Depth in feet				Totals
	= 10	11 - 20	21 - 30	> 30	
<1	1	1	3	1	6
1 - 5	2	2	0	0	4
>5	<u>3</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>8</u>
Totals	6	6	5	1	18

TABLE 80. Classification of Type I dredge holes according to their depth and dissolved oxygen content of their bottom waters.

D.O. Concentration (ppm.)	Depth in feet				Totals
	= 10	11 - 20	21 - 30	> 30	
< 1	-	1	2	1	4
1 - 5	1	2	-	-	3
> 5	<u>3</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>5</u>
Totals	4	4	3	1	12

TABLE 81. Classification of Type II dredge holes according to their depth and dissolved oxygen content of their bottom waters.

D.O. Concentration (ppm.)	Depth in feet				TOTALS
	= 10	11 - 20	21 - 30	> 30	
<1	1	-	1	-	2
1 - 5	1	-	-	-	1
> 5	<u>-</u>	<u>2</u>	<u>1</u>	<u>-</u>	<u>3</u>
Totals	2	2	2	0	6

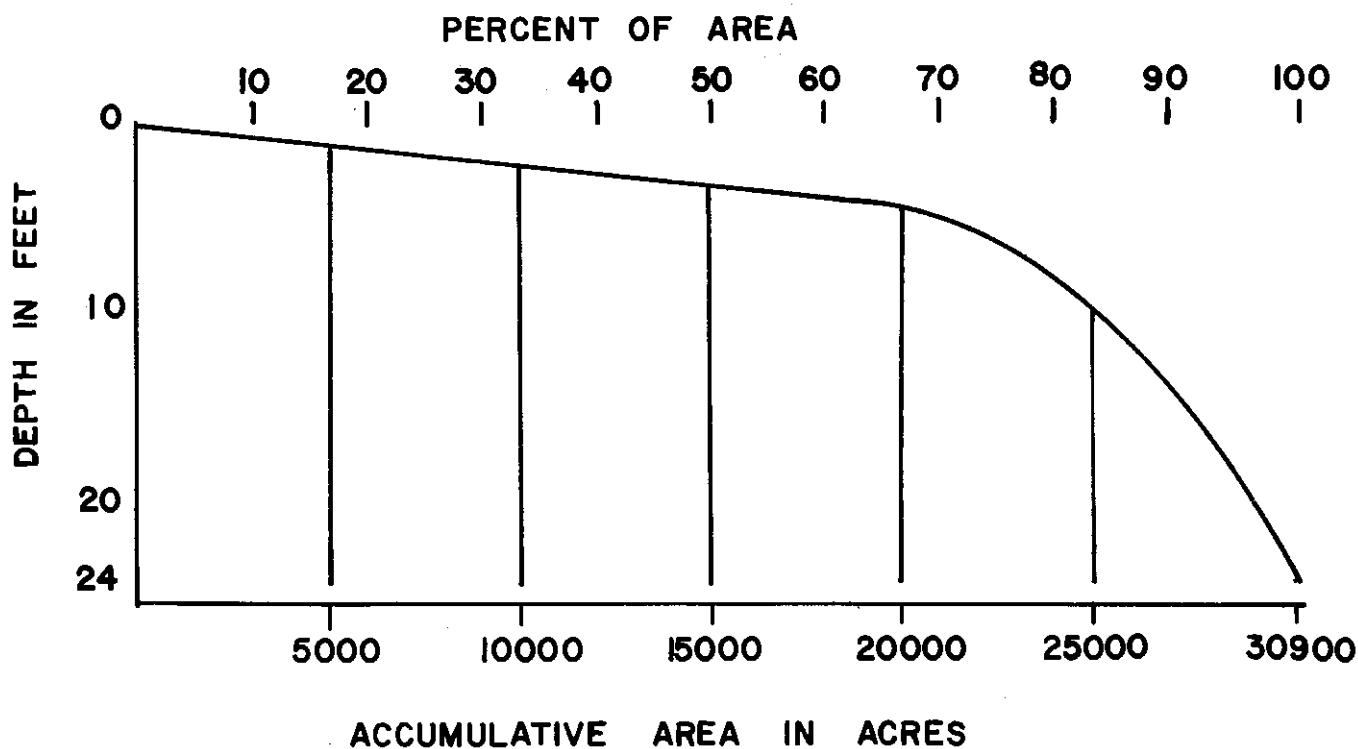
TABLE 82. Summary of the relationship of the dissolved oxygen concentration and the hydrogen sulphide concentration in the bottom waters of 18 dredge holes.

D.O. Concentration (ppm.)	Hydrogen Sulphide Classification (ppm.)			
	> 5	0 - 5	0	Totals
<1	3	2	1	6
1 - 5	-	1	3	4
> 5	<u>-</u>	<u>1</u>	<u>7</u>	<u>8</u>
Totals	3	4	11	18

TABLE 83. Summary of the relationship between the dissolved oxygen concentration in the bottom waters of 18 dredge holes and the presence of bottom invertebrate organisms.

D.O. Concentration (ppm.)	Presence of Bottom Invertebrates		
	Present	Absent	Totals
<1	-	6	6
1 - 5	1	3	4
> 5	<u>5</u>	<u>3</u>	<u>8</u>
Totals	6	12	18

FIGURE 3 THIS HYPSOGRAPHIC CURVE SHOWS THE AREA WITHIN BARNEGAT BAY THAT IS ABOVE OR BELOW ANY GIVEN DEPTH.



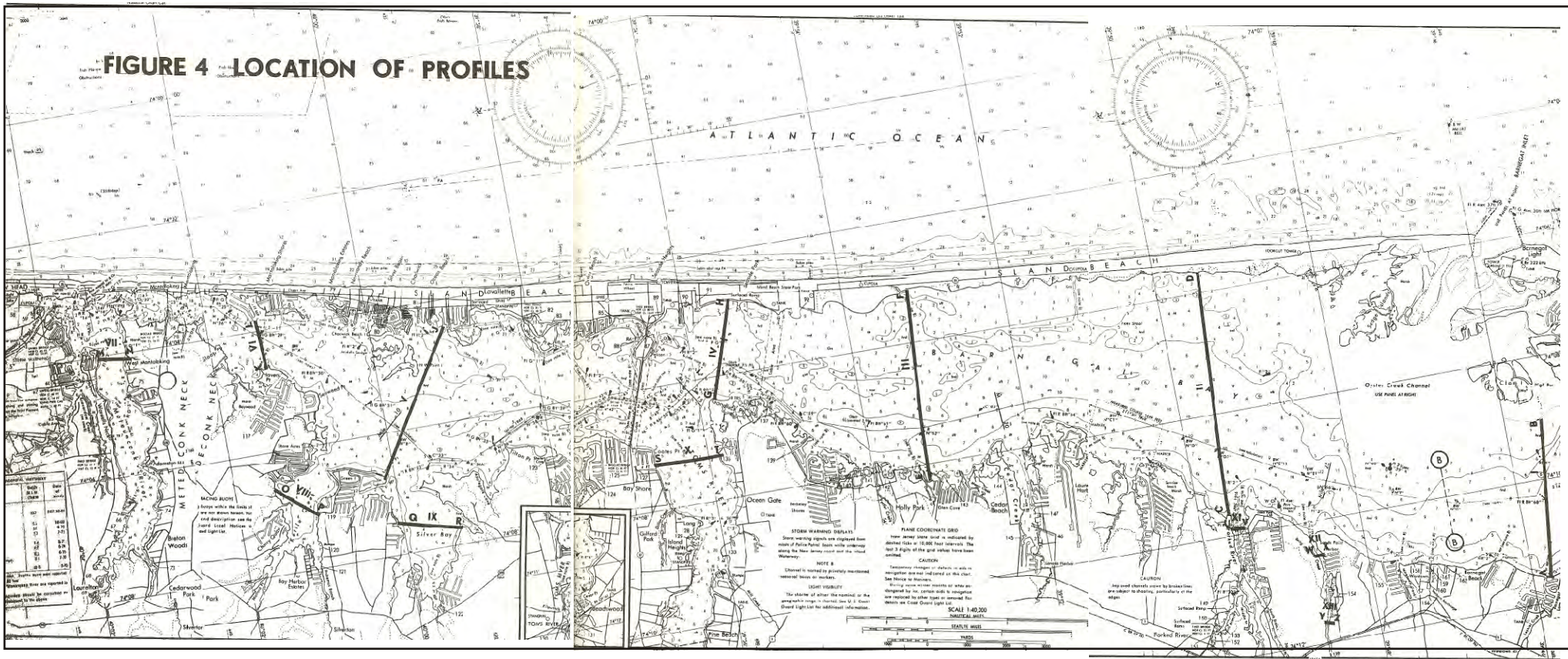


FIGURE 5 PROFILES OF BARNEGAT BAY AT
MEAN HIGH WATER.

I

A

B

II

C

0'
10'
20'

D



I 10'

III

E

F

IV

G

H

V

I

J



I^{0'}
10'

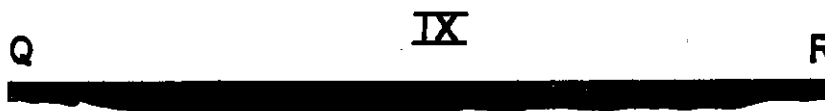
PROFILE OF METEDECONK RIVER



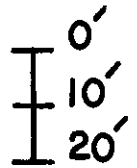
PROFILE OF KETTLE CREEK



PROFILE OF SILVER BAY



PROFILE OF TOMS RIVER



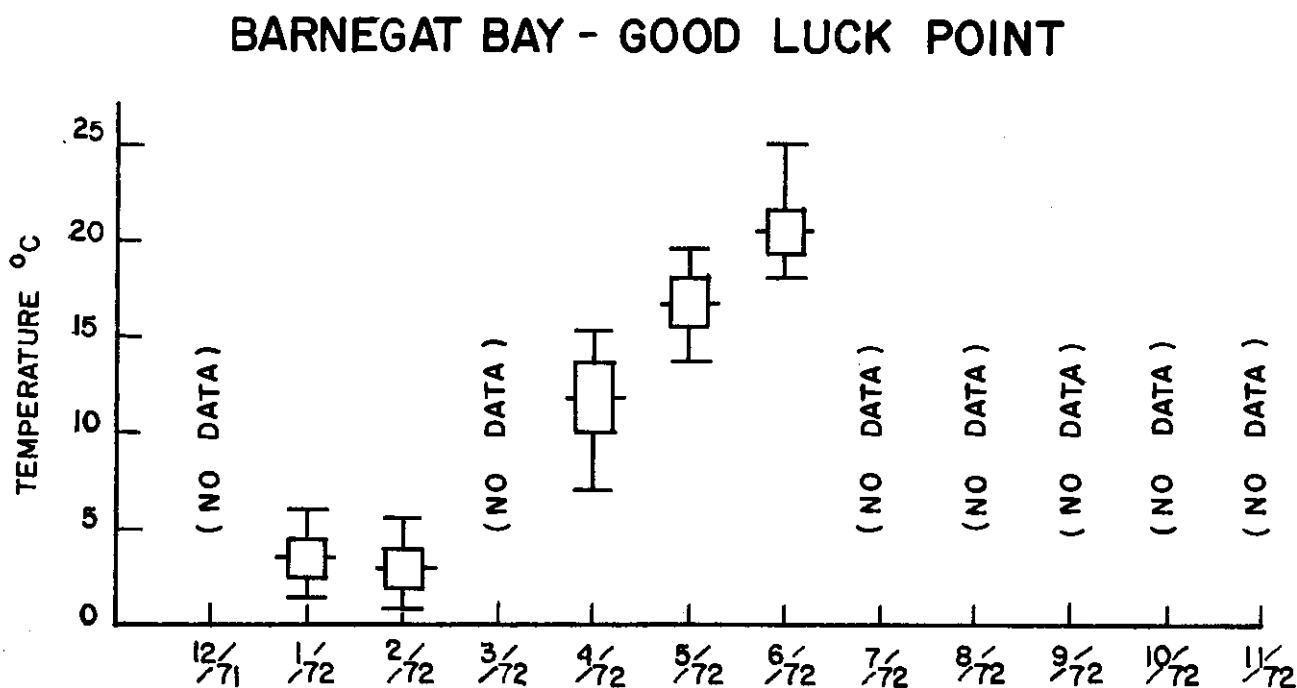
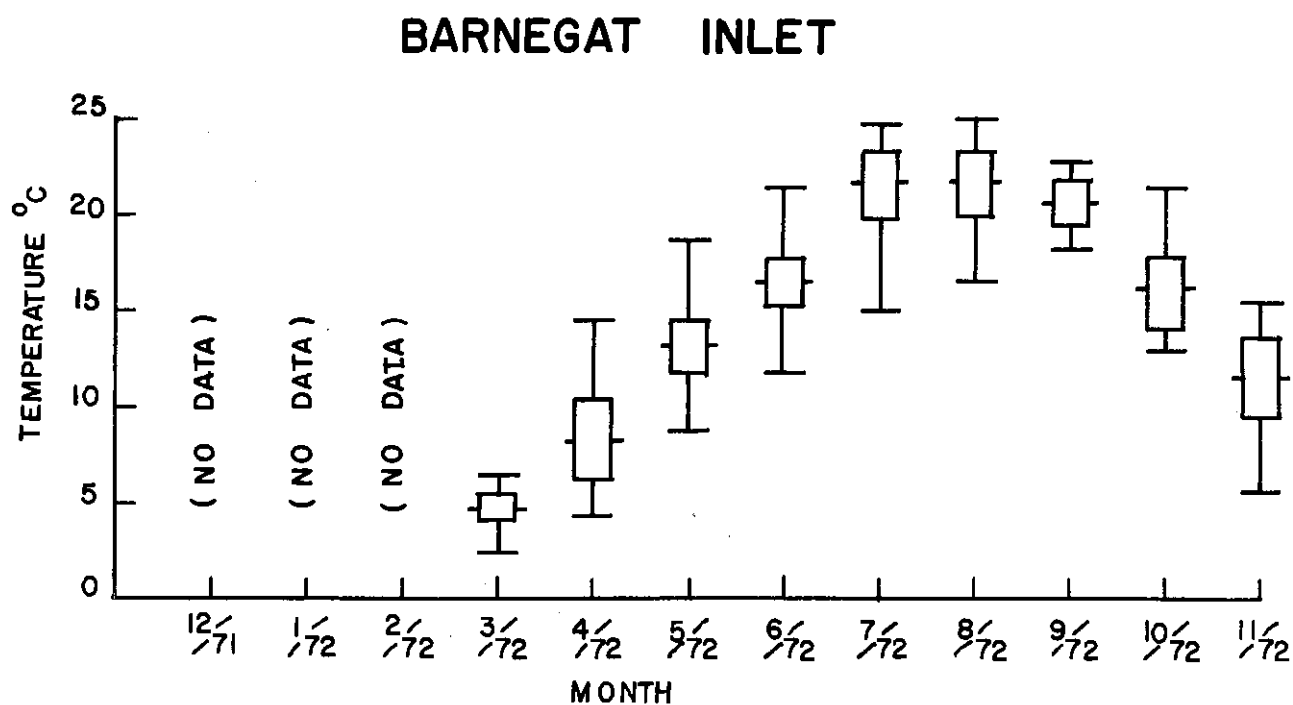
PROFILE OF FORKED RIVER



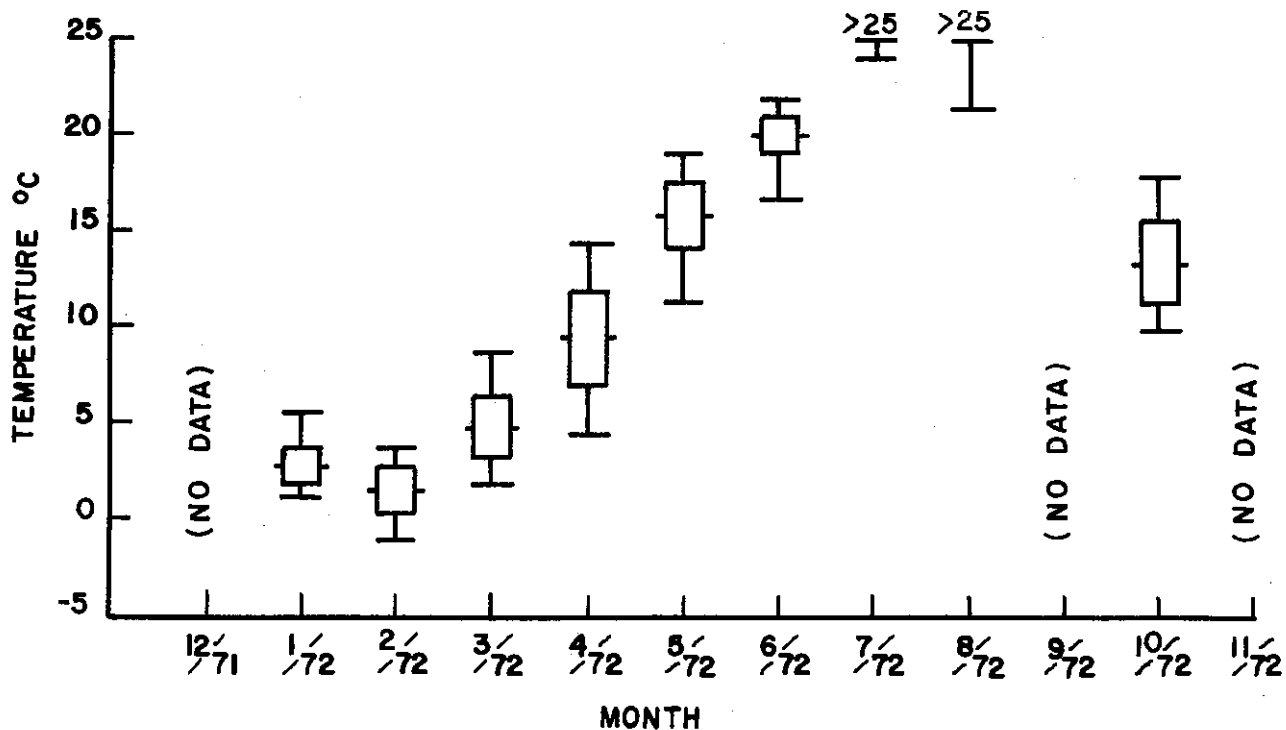
PROFILES OF OYSTER CREEK



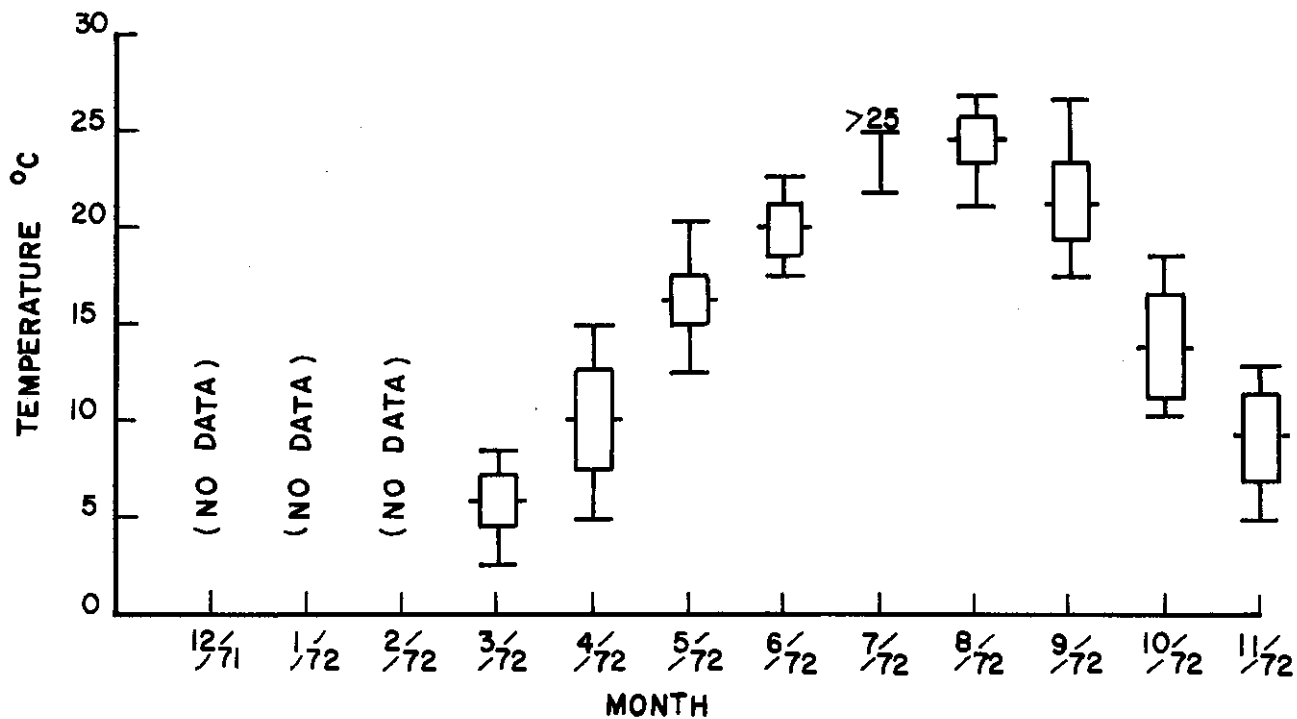
FIGURE 6 MONTHLY MEAN, STANDARD DEVIATION AND RANGE OF TEMPERATURES IN THE UPPER BARNEGAT SYSTEM, 1971-72.



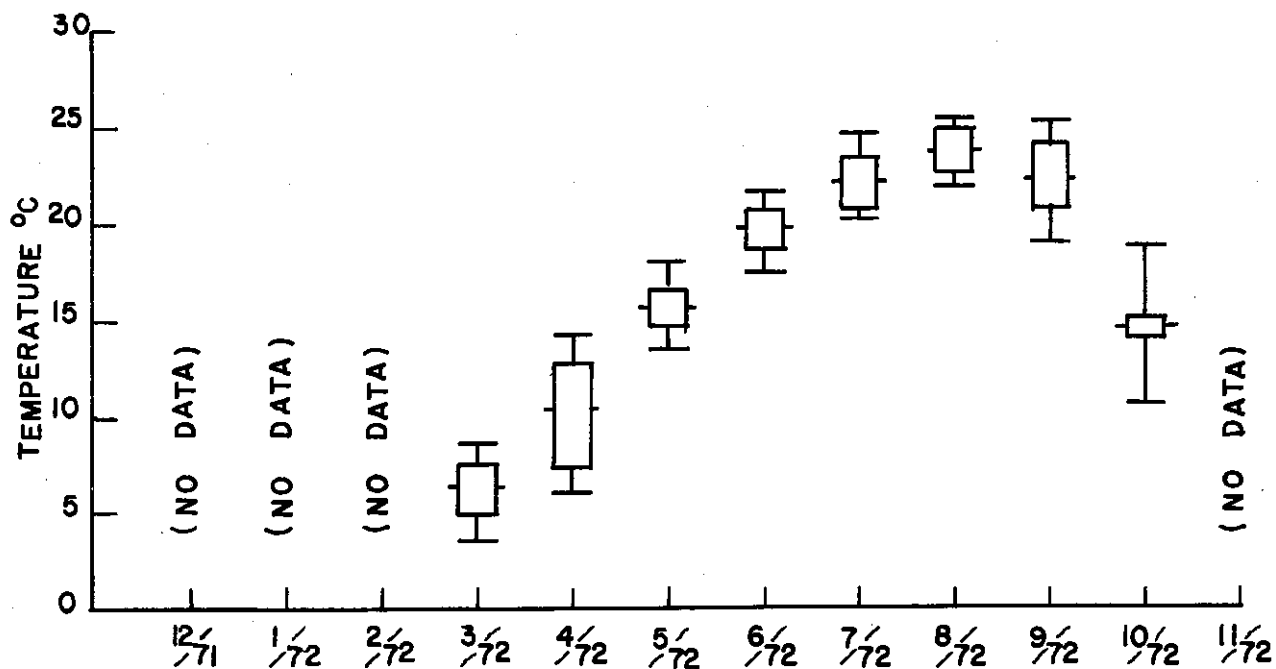
METEDECONK RIVER



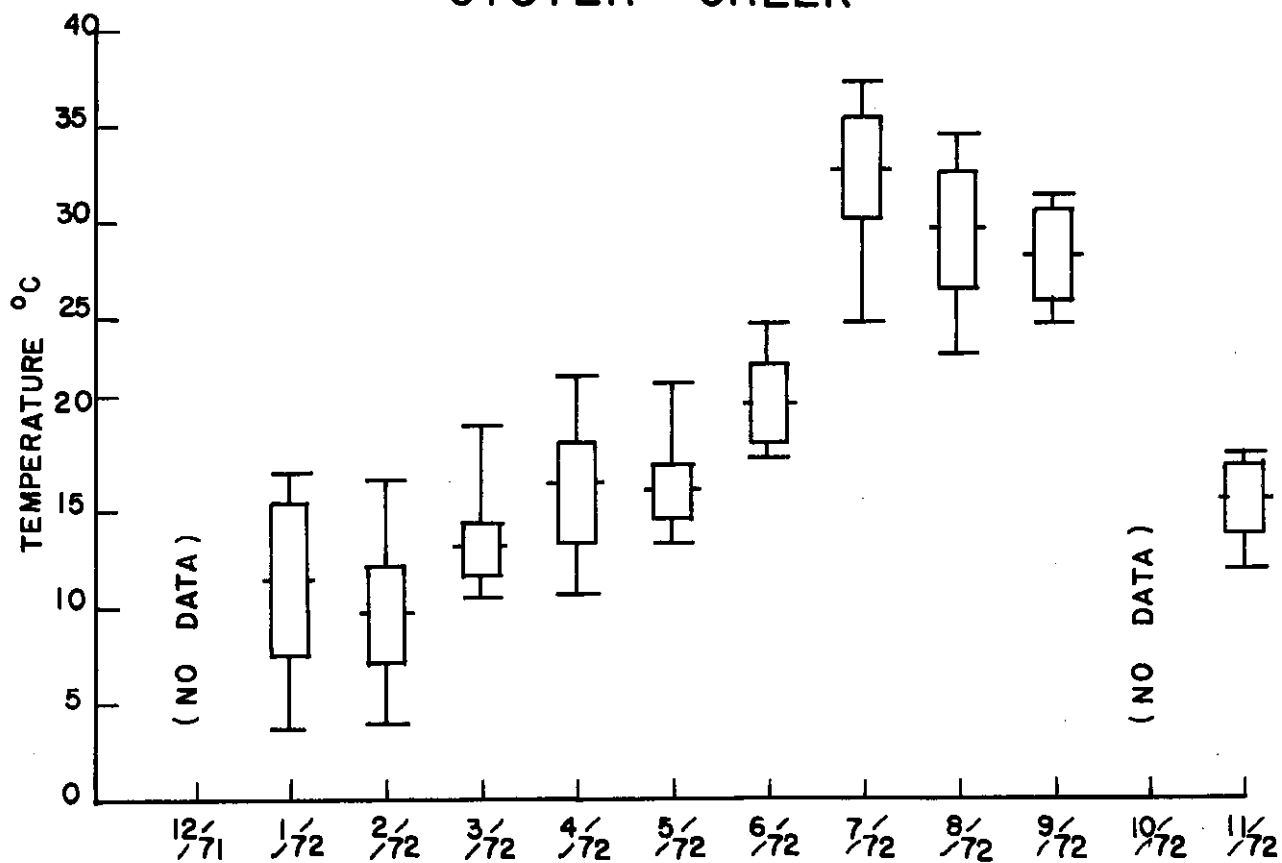
BARNEGAT BAY - HAVENS POINT



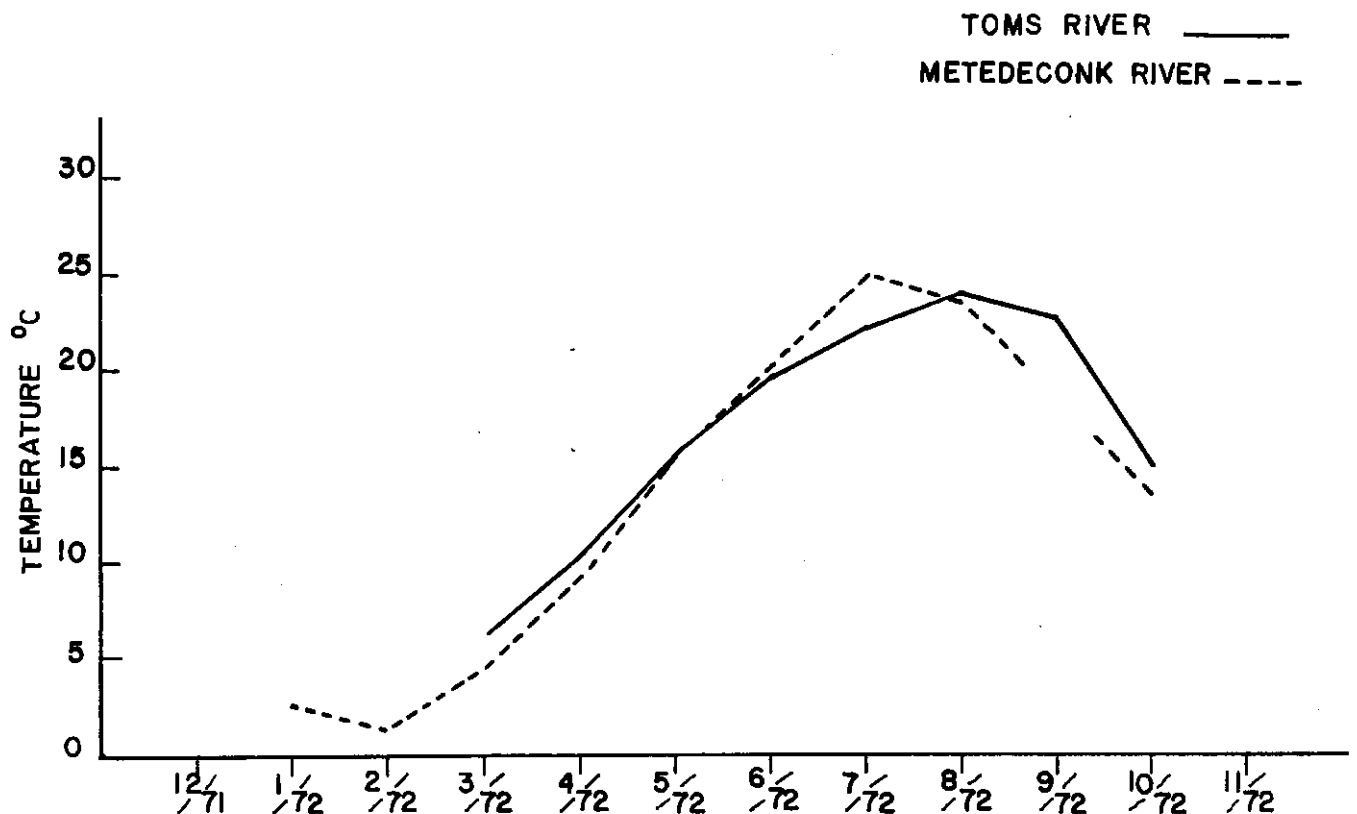
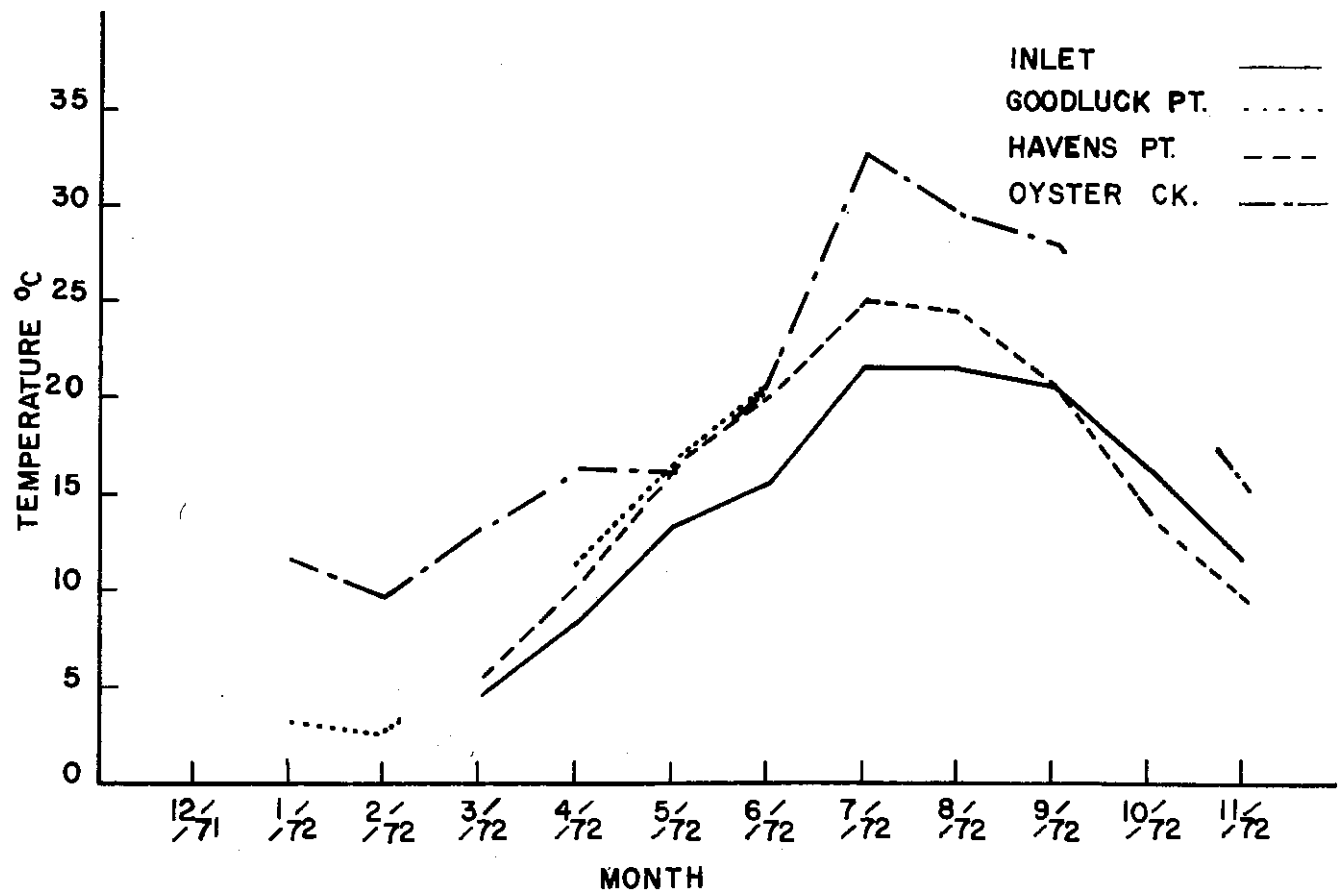
TOMS RIVER



OYSTER CREEK



**FIGURE 7 COMPARISON OF MONTHLY MEAN
WATER TEMPERATURES RECORDED
AT THERMOGRAPH STATIONS IN
THE UPPER BARNEGAT SYSTEM.**



**FIGURE 8. SEASONAL MEAN CHLORINATED
HYDROCARBON LEVELS DETECTED IN
WHOLE FISH COLLECTED IN UPPER
BARNEGAT**

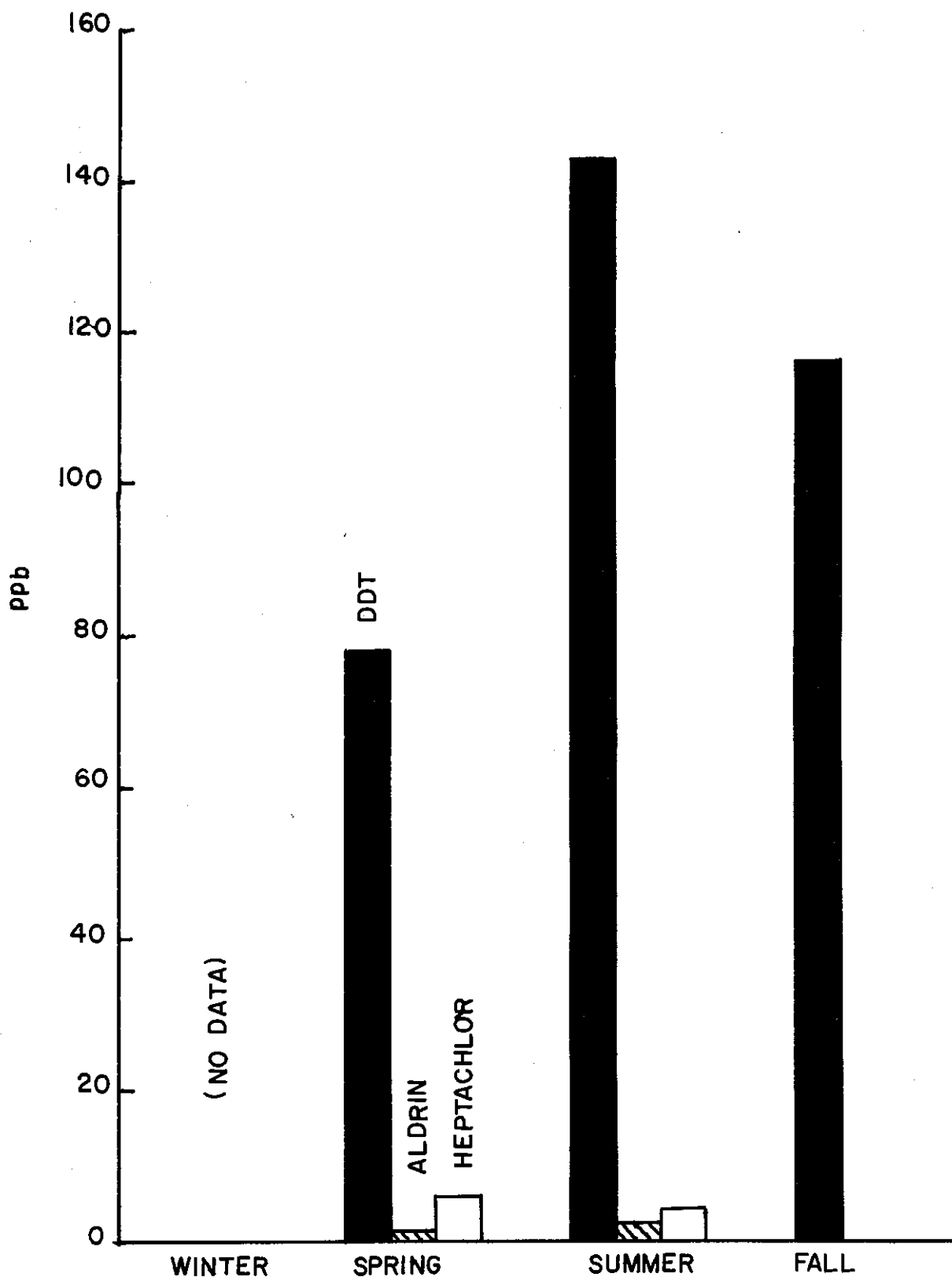


FIGURE 9. MEAN CHLORINATED HYDROCARBON LEVELS BY SPECIES

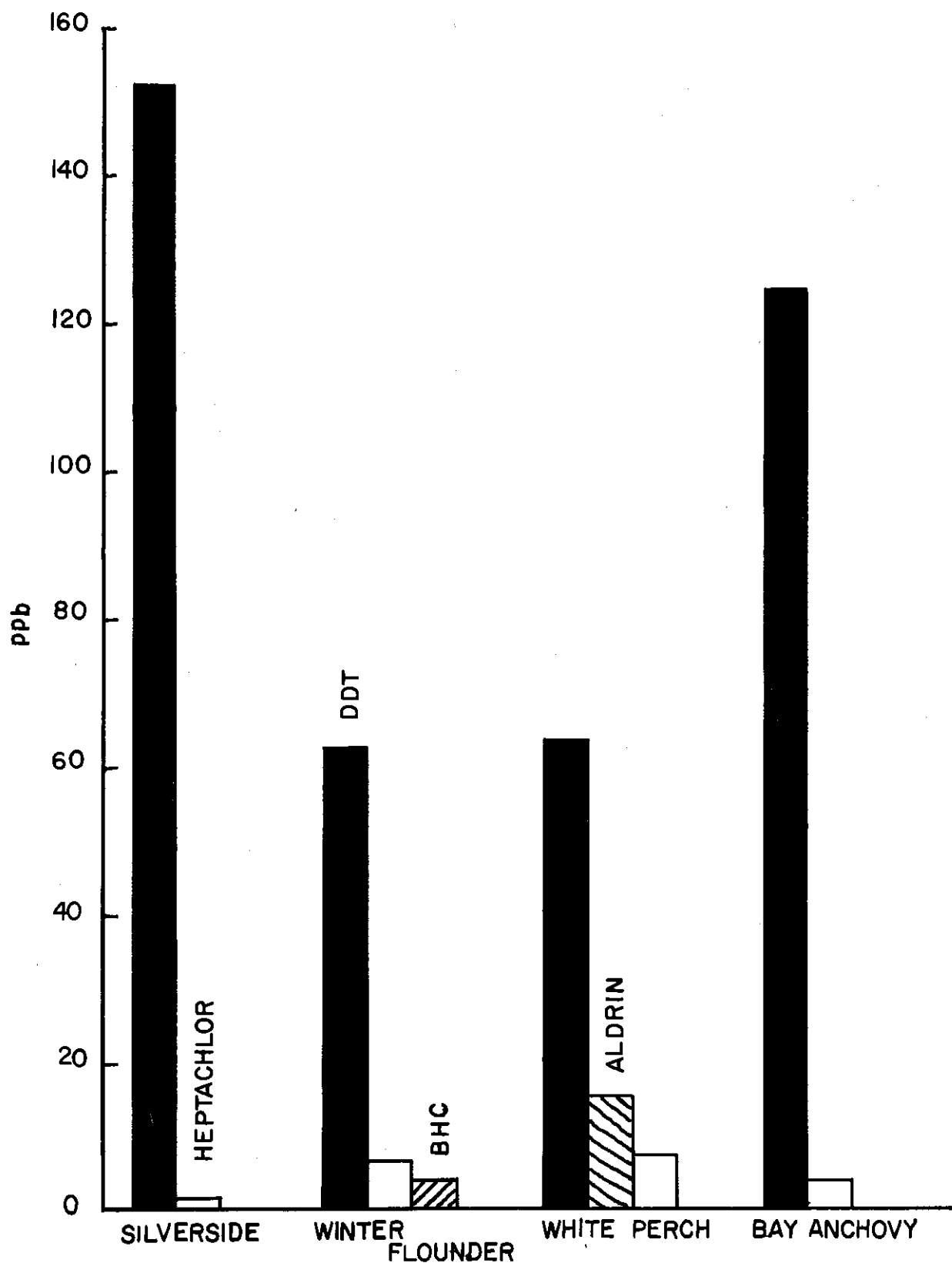


FIGURE 10. MEAN CHLORINATED HYDROCARBON LEVELS DETECTED IN WHOLE FISH TISSUE ACCORDING TO AREA NETTED.

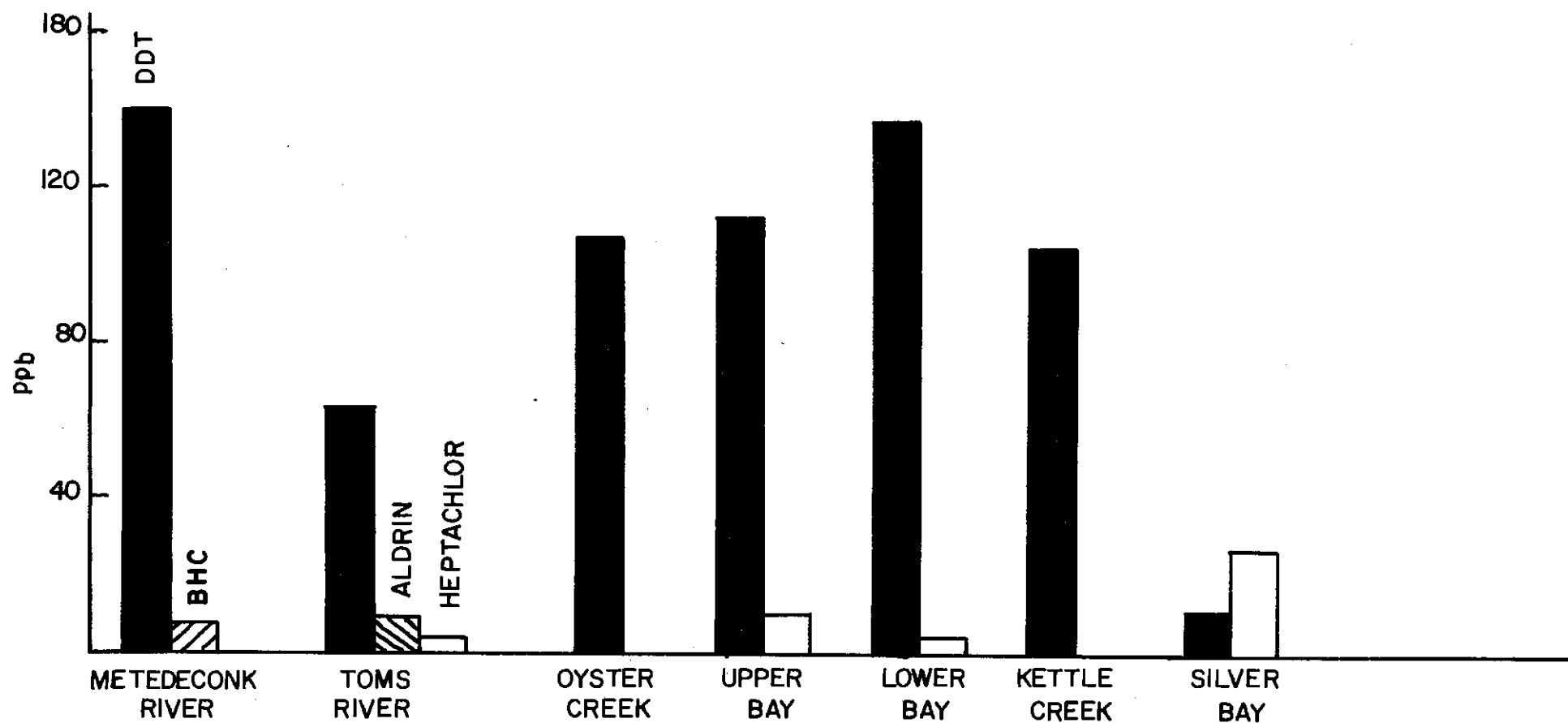


FIGURE 11. SEASONAL MEAN HEAVY METAL CONCENTRATIONS DETECTED IN WHOLE FISH COLLECTED IN UPPER BARNEGAT SYSTEM

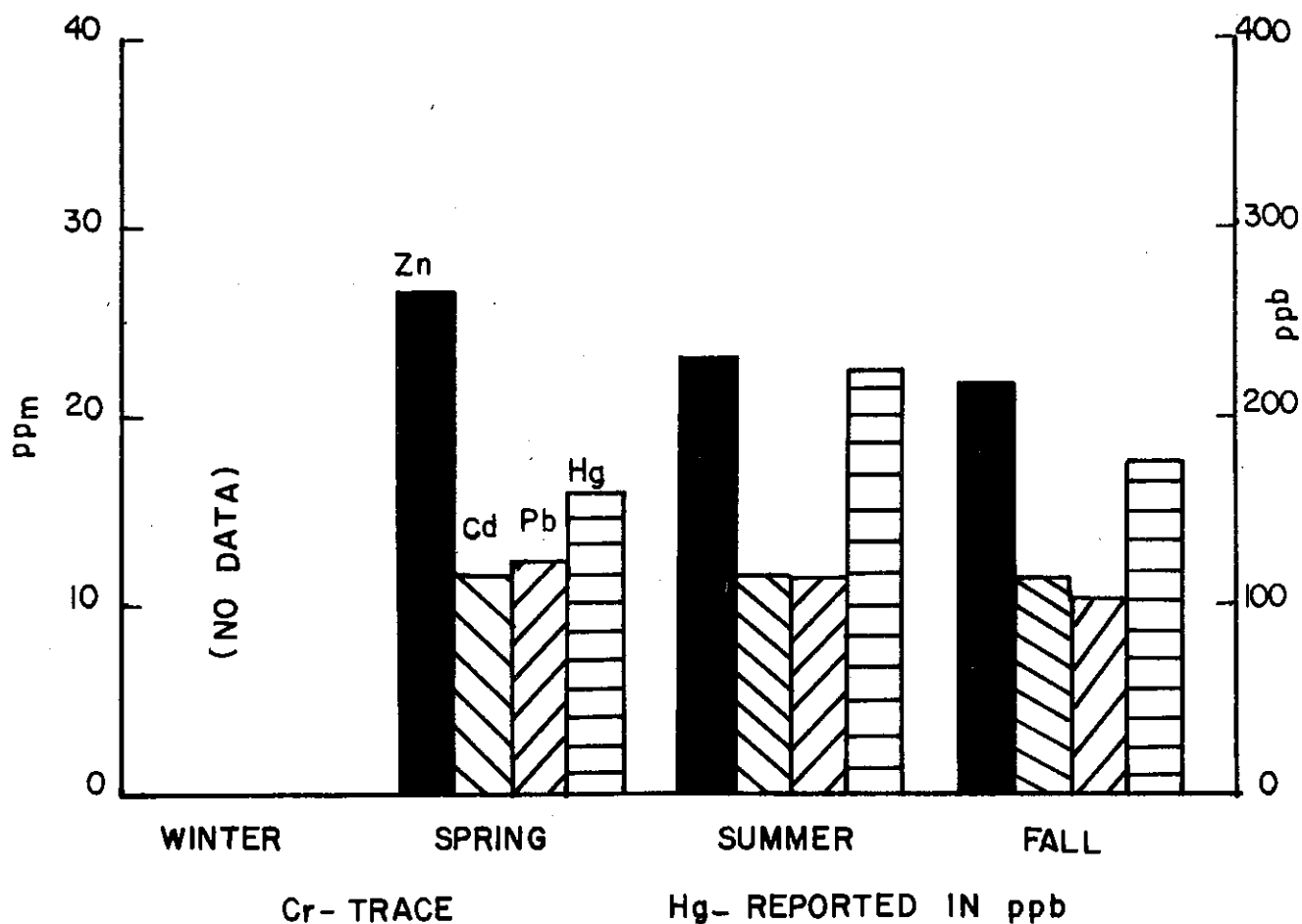
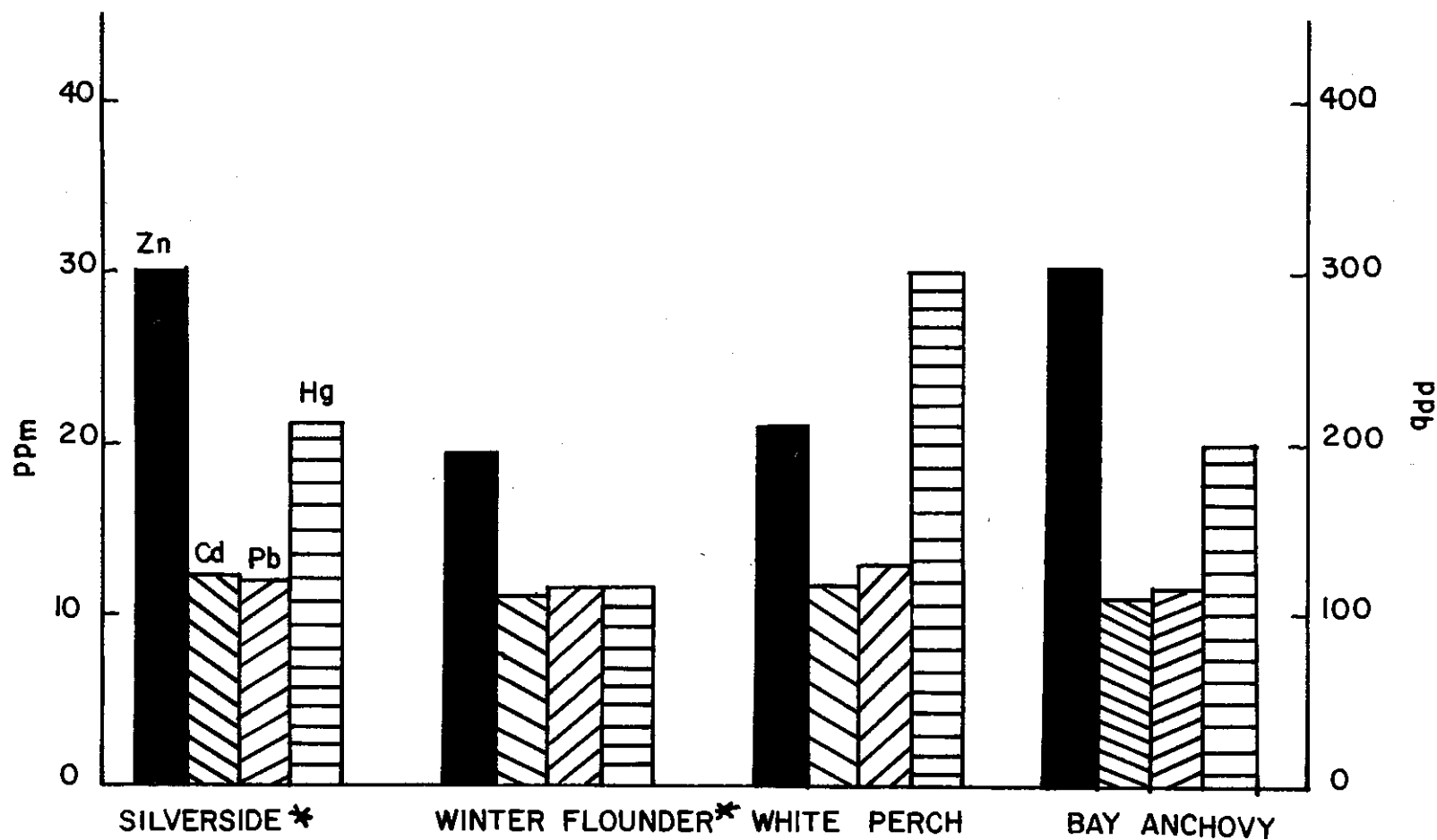


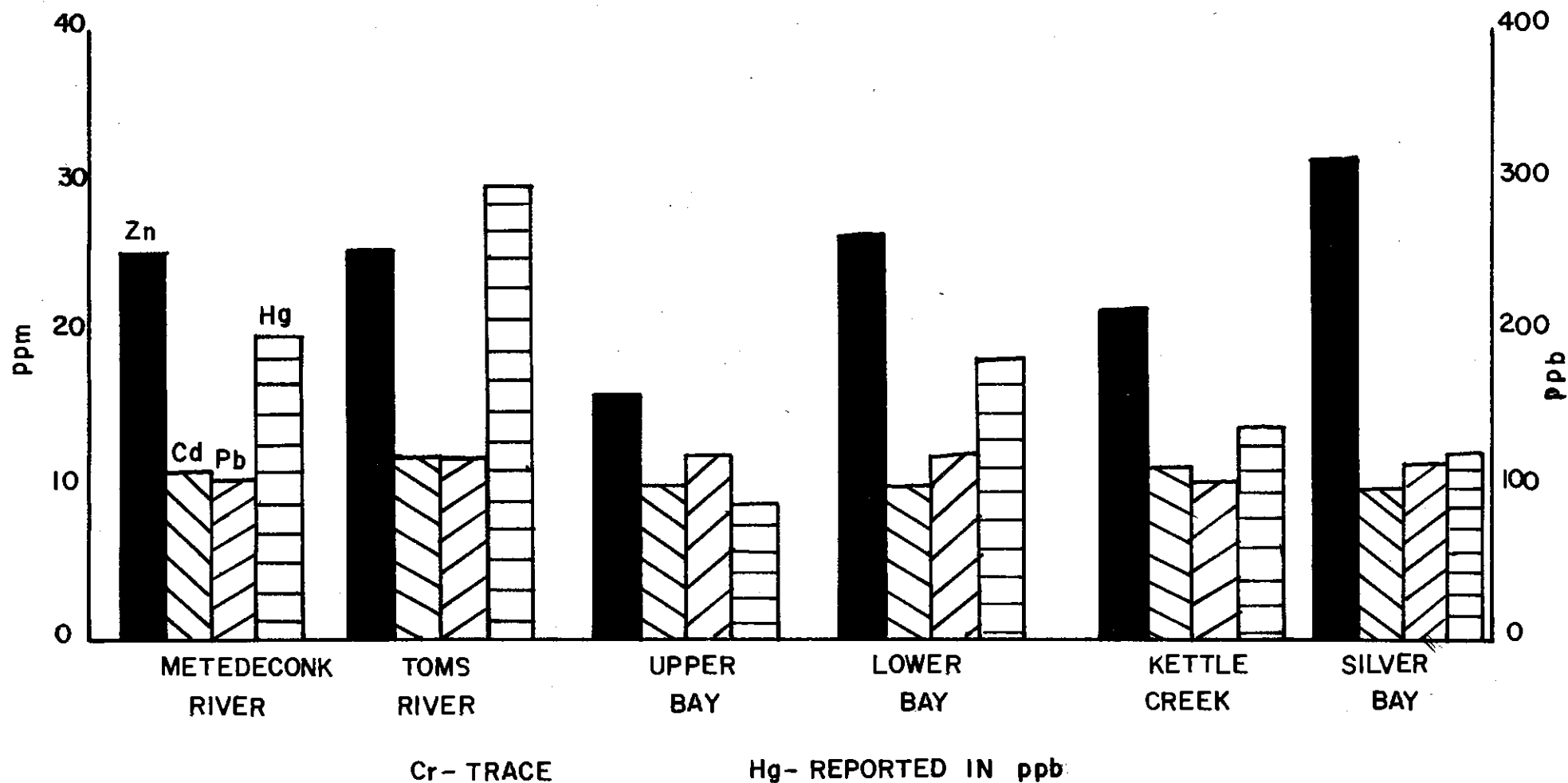
FIGURE 12. MEAN HEAVY METAL CONCENTRATIONS
BY SPECIES

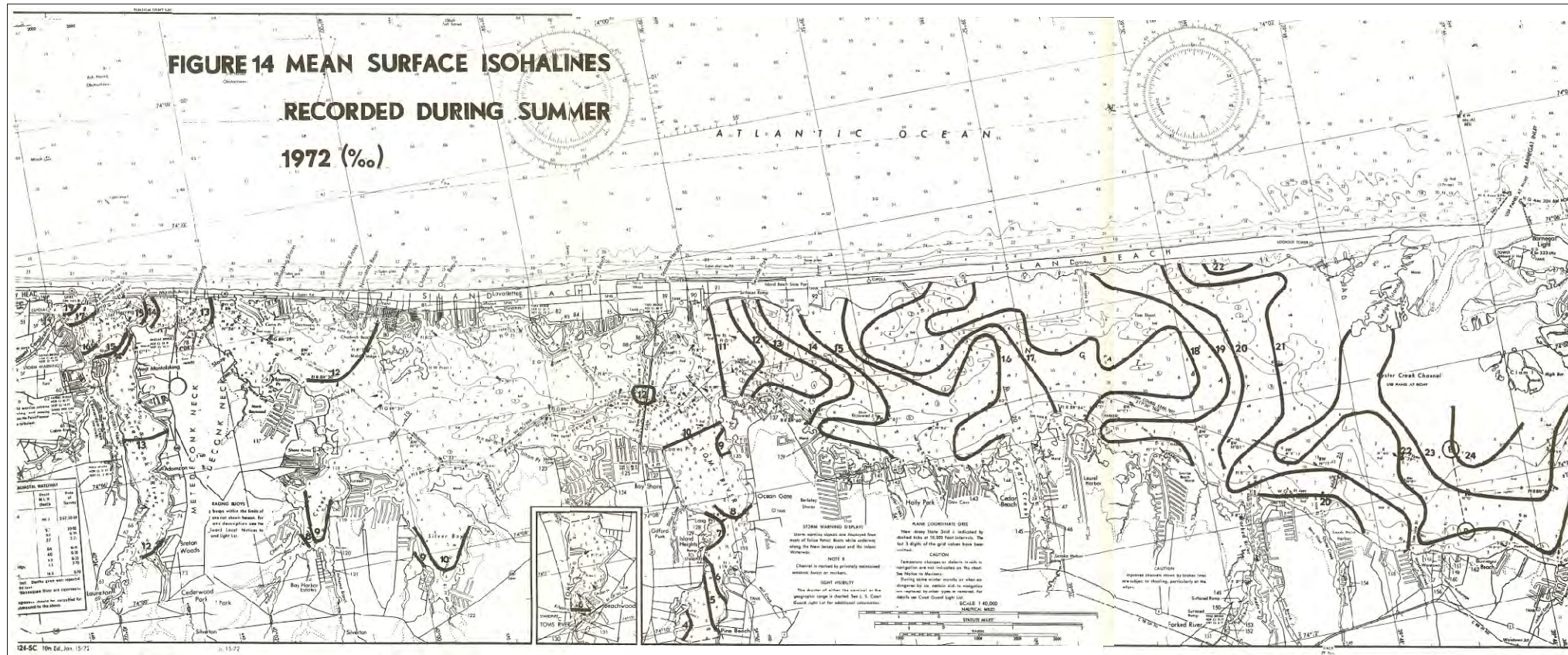


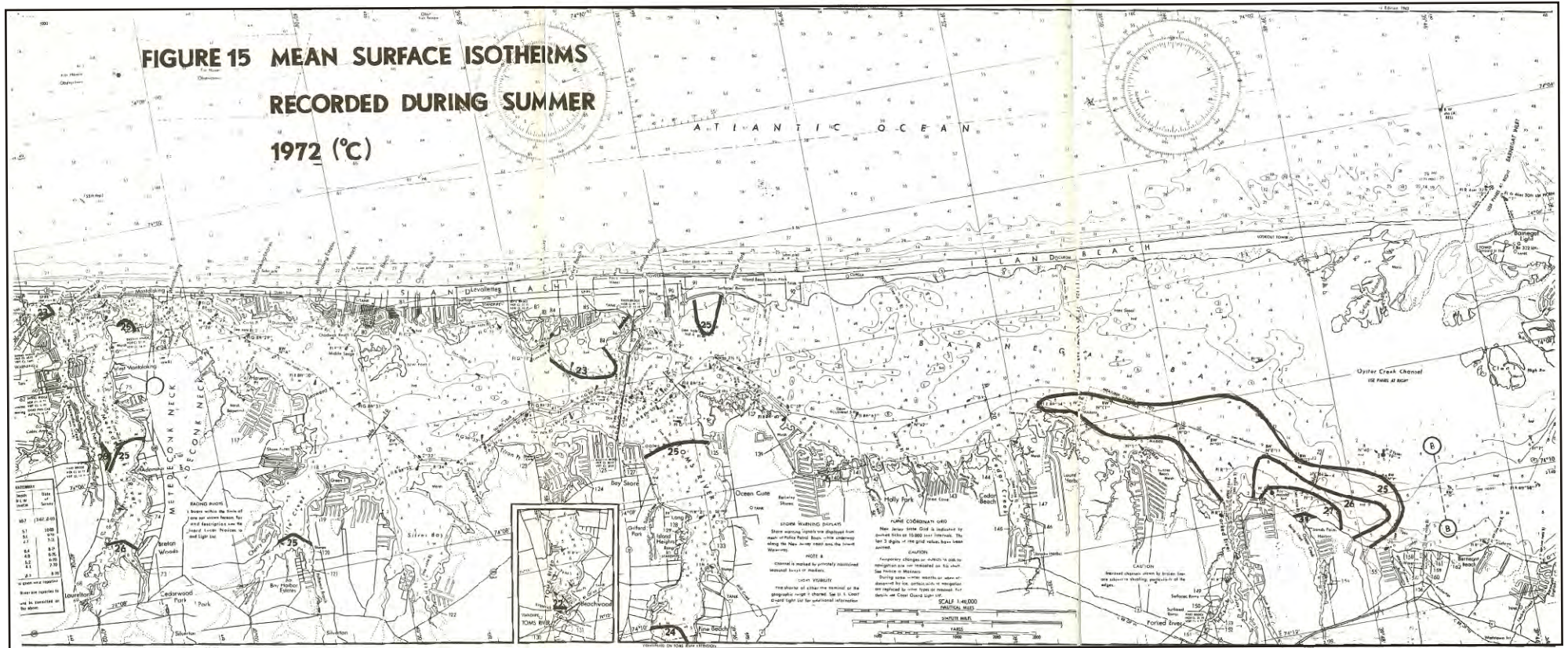
* Cr. - TRACE

Hg - REPORTED IN ppb.

FIGURE 13. MEAN HEAVY METAL CONCENTRATION DETECTED IN WHOLE FISH ACCORDING TO AREA NETTED







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**FIGURE 16. COMPARISON OF WATER QUALITY
DATA COLLECTED IN THE INTAKE
AND DISCHARGE CANALS OF THE
OYSTER CREEK NUCLEAR PLANT.**

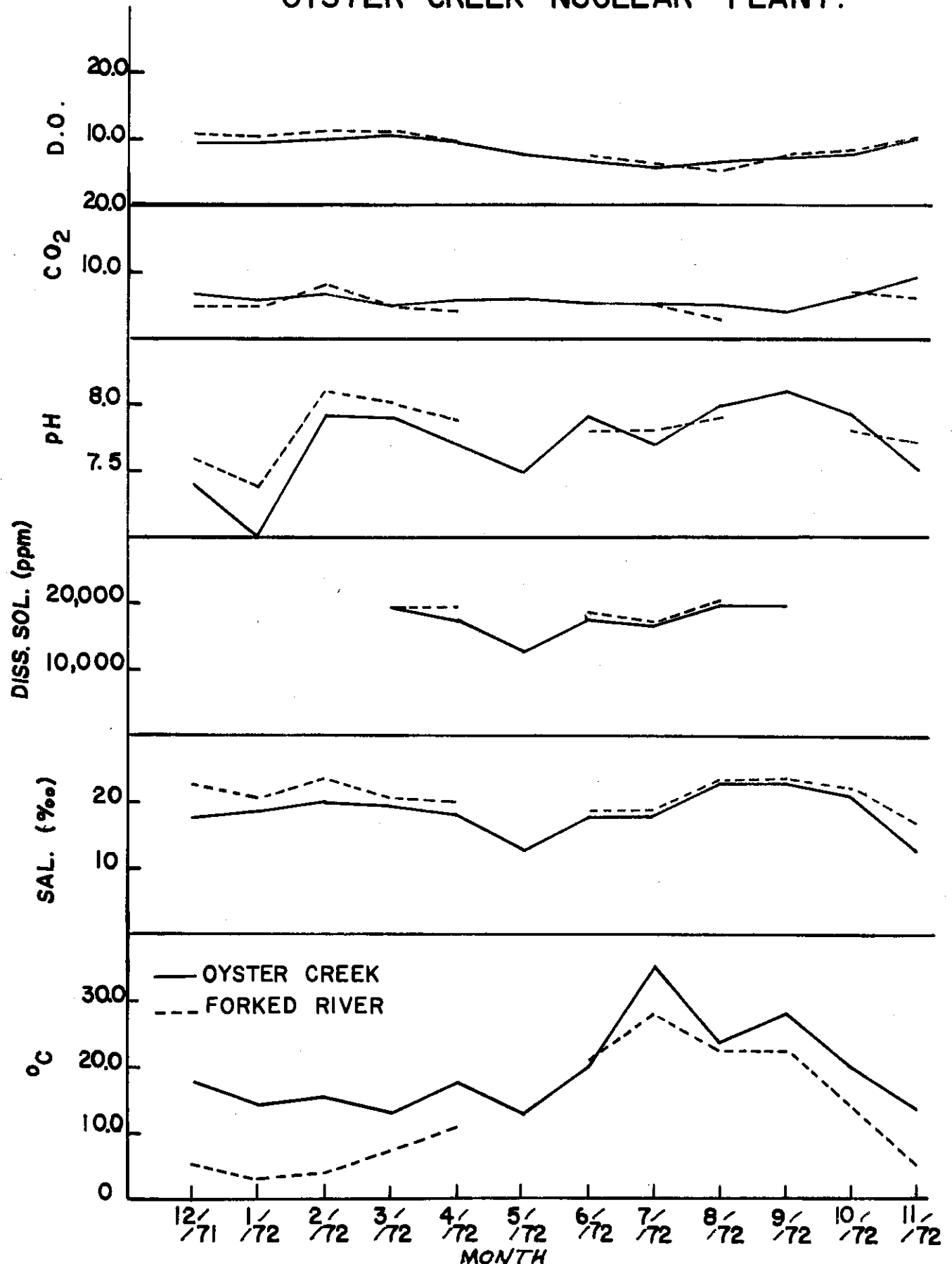


FIGURE 17. MONTHLY MEAN WATER QUALITY DATA
COLLECTED IN UPPER BARNEGAT SYSTEM.

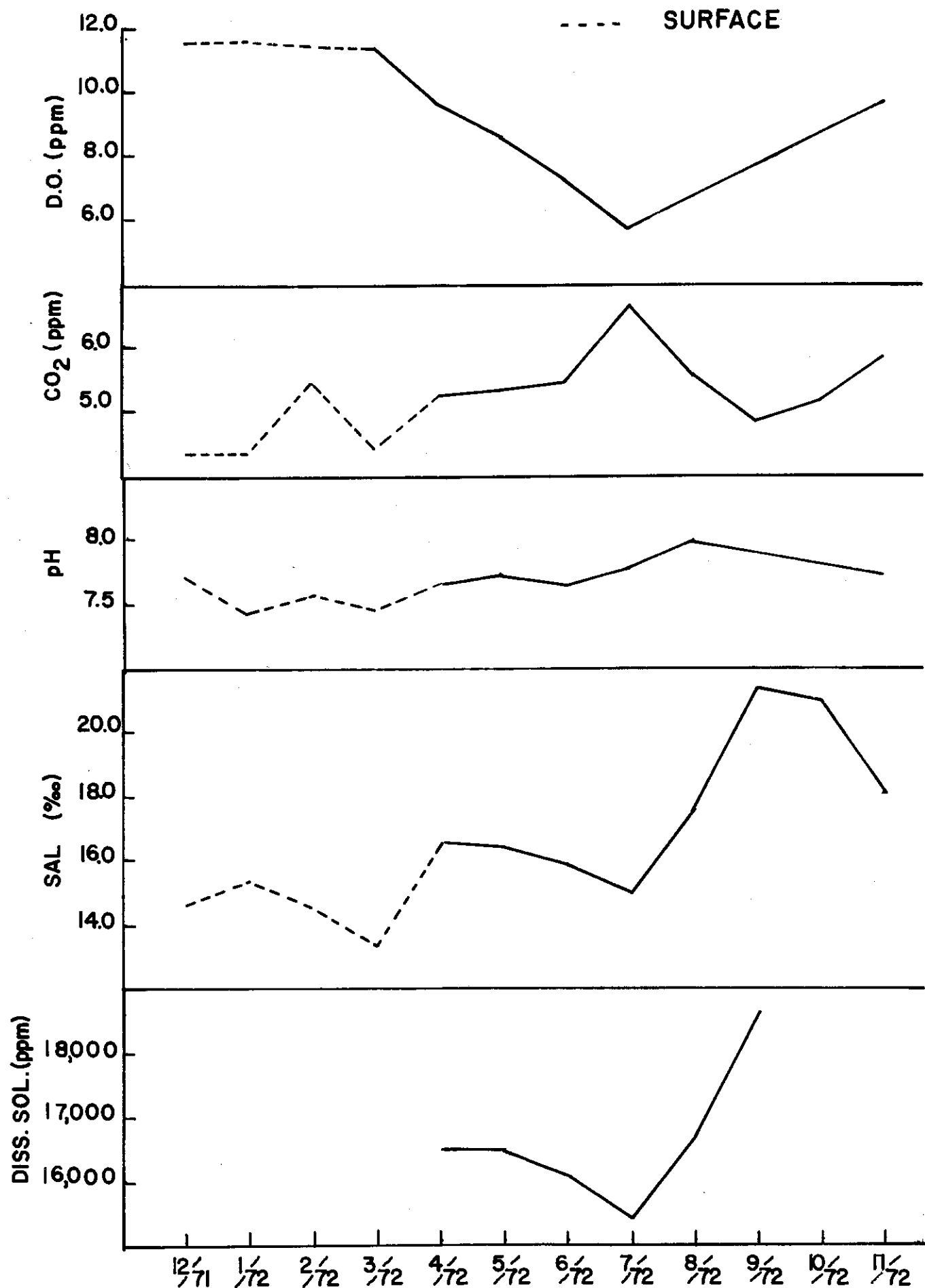


FIGURE 18 COMPARISON OF SURFACE AND
 BOTTOM MEAN DISSOLVED OXYGEN
 LEVELS OBSERVED IN BARNEGAT
 BAY, TOMS AND METEDECONK RIVERS

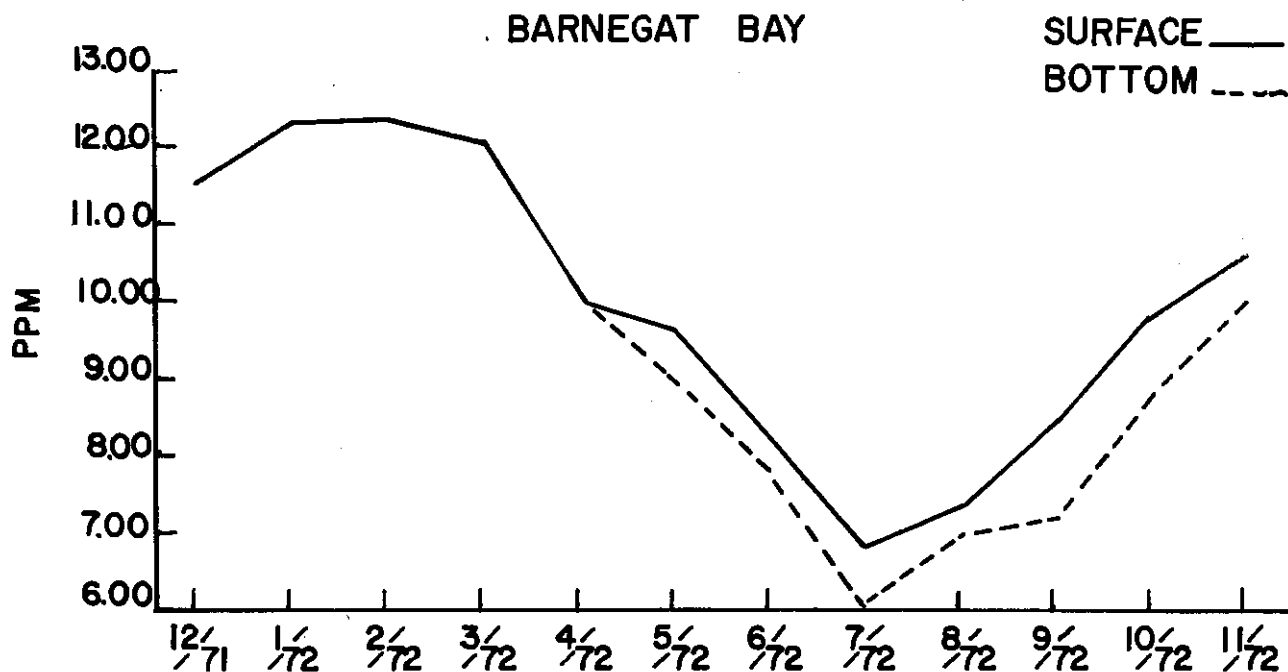
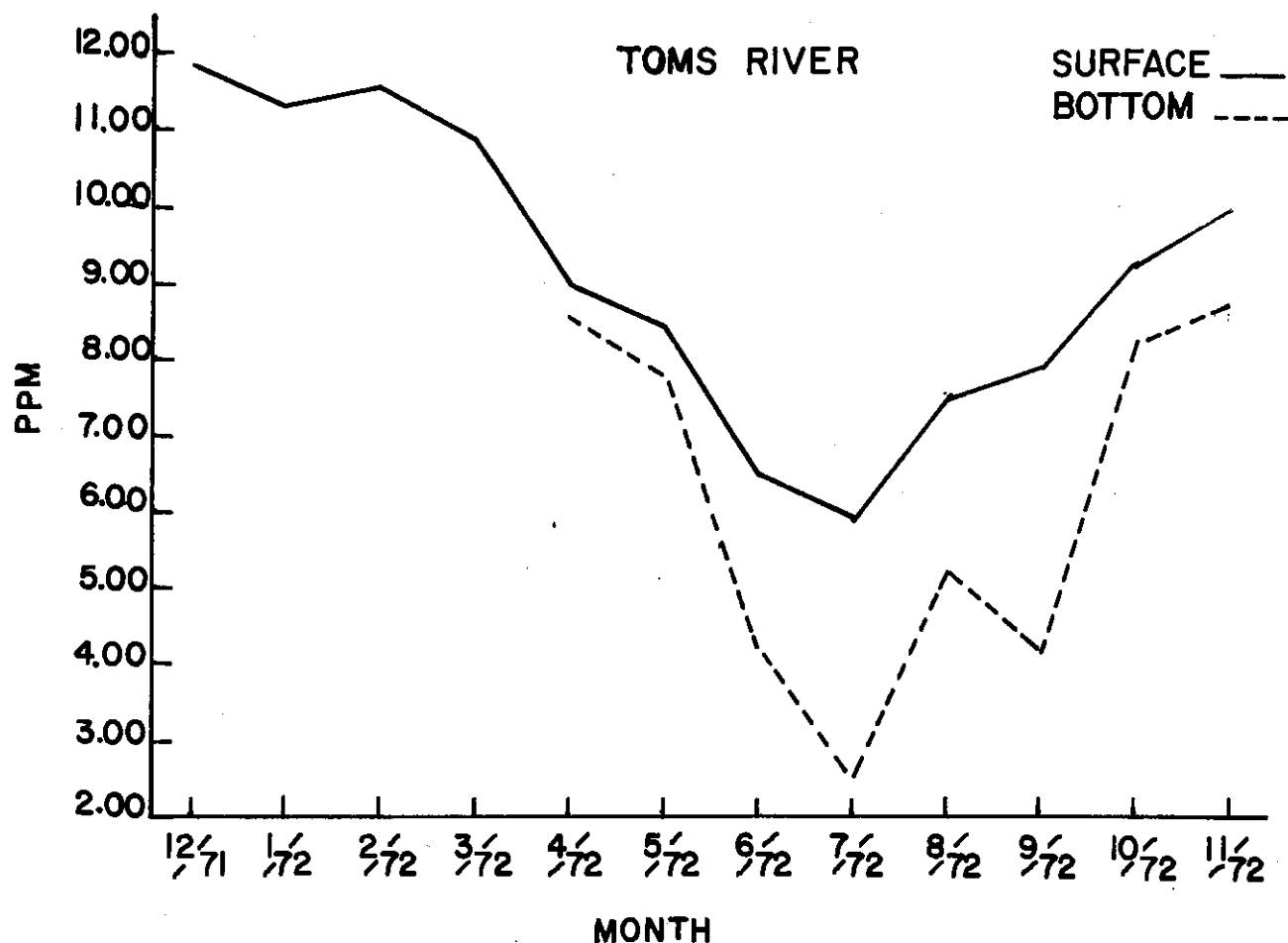


FIGURE 18. CONTINUED

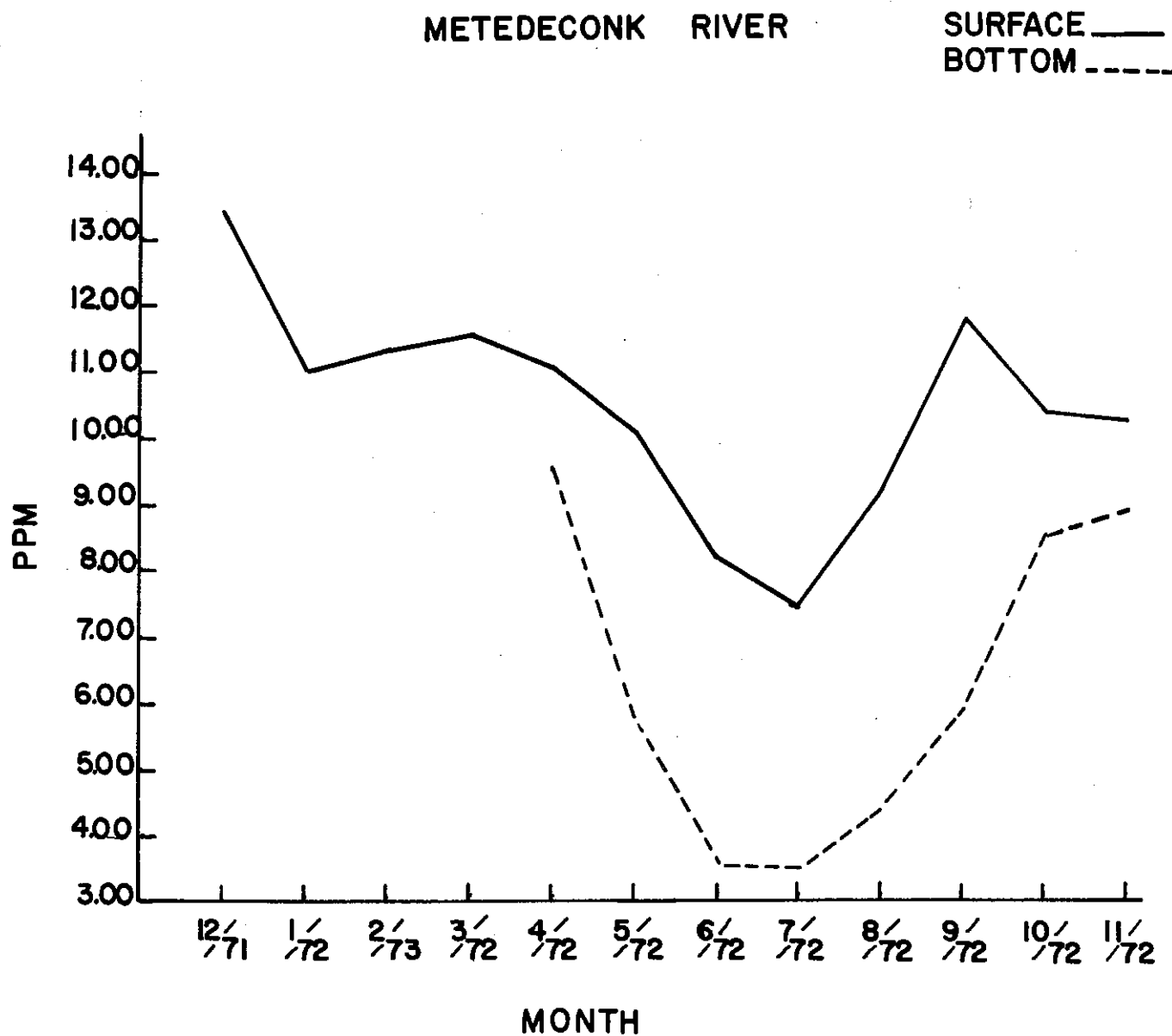


FIGURE 19. MONTHLY MEAN NITRATE AND AMMONIA LEVELS OBSERVED IN BARNEGAT BAY, TOMS AND METEDECONK RIVERS.

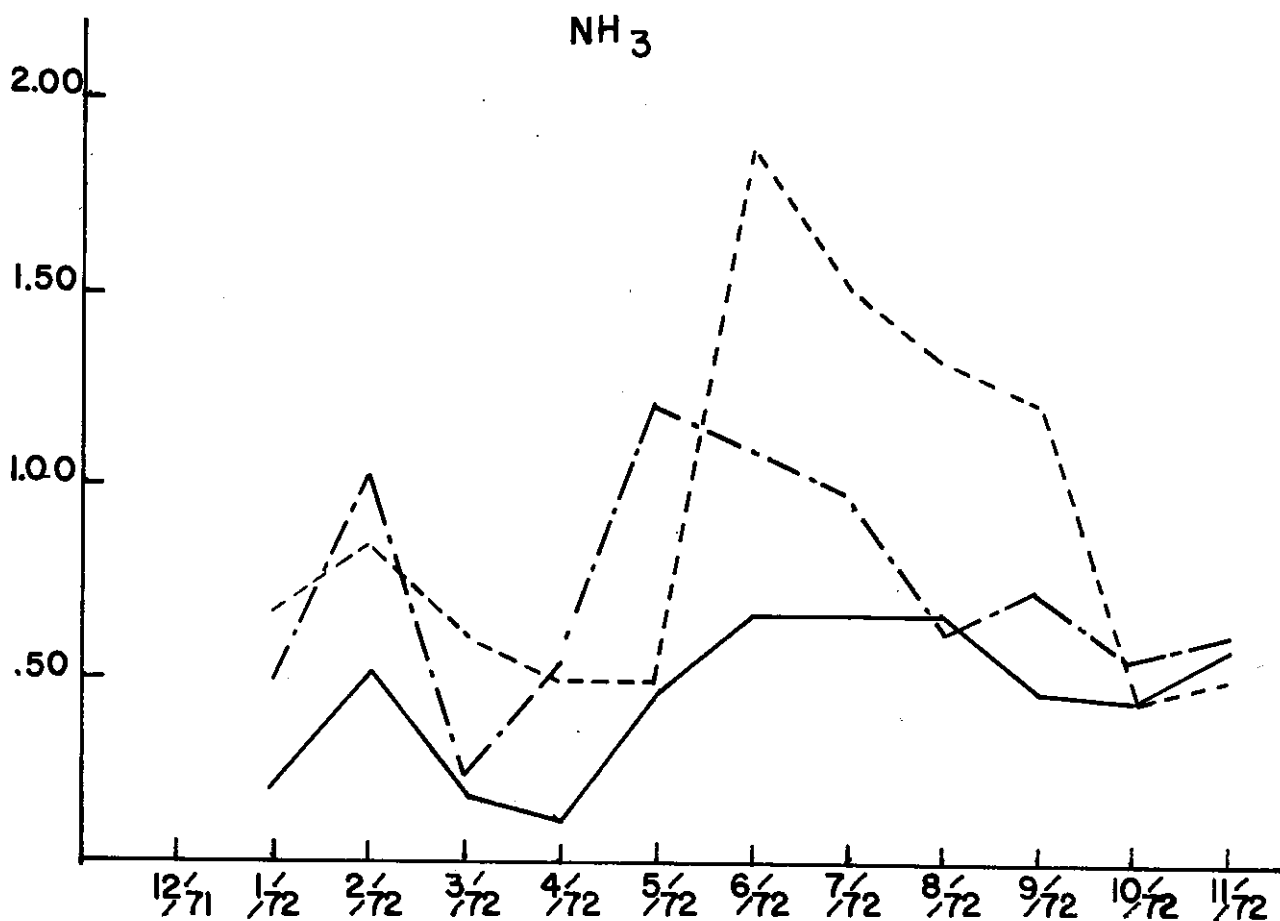
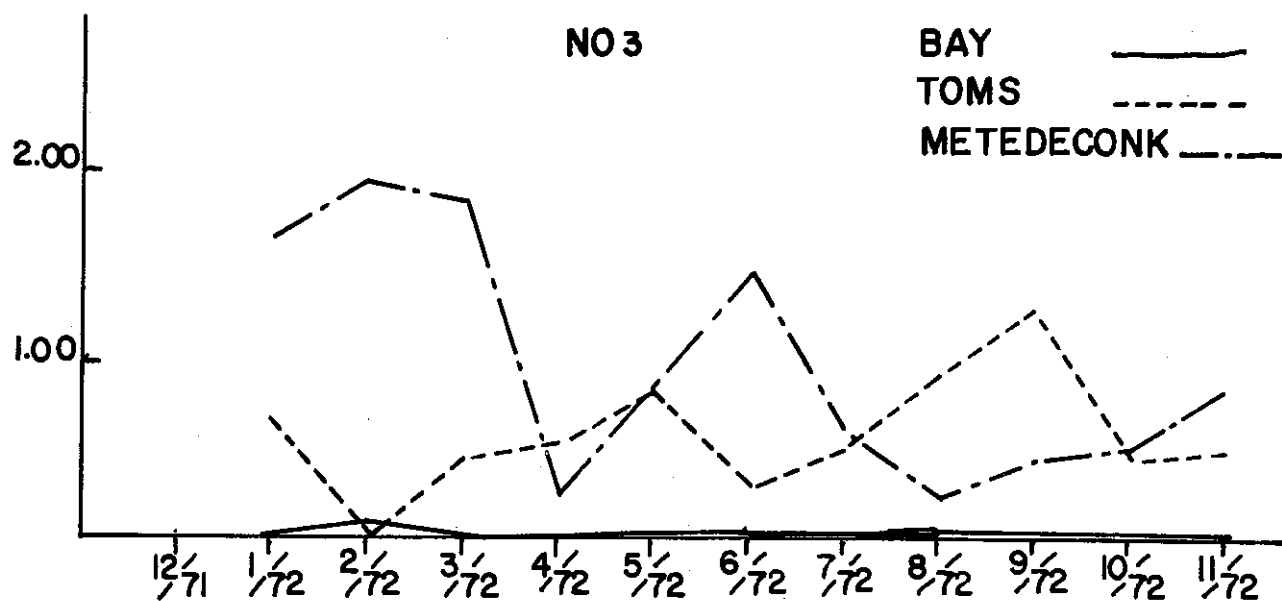


FIGURE 20. MONTHLY MEAN ORTHO- AND
TOTAL PHOSPHATE LEVELS OBSERVED
IN BARNEGAT BAY, TOMS AND
METEDECONK RIVERS.

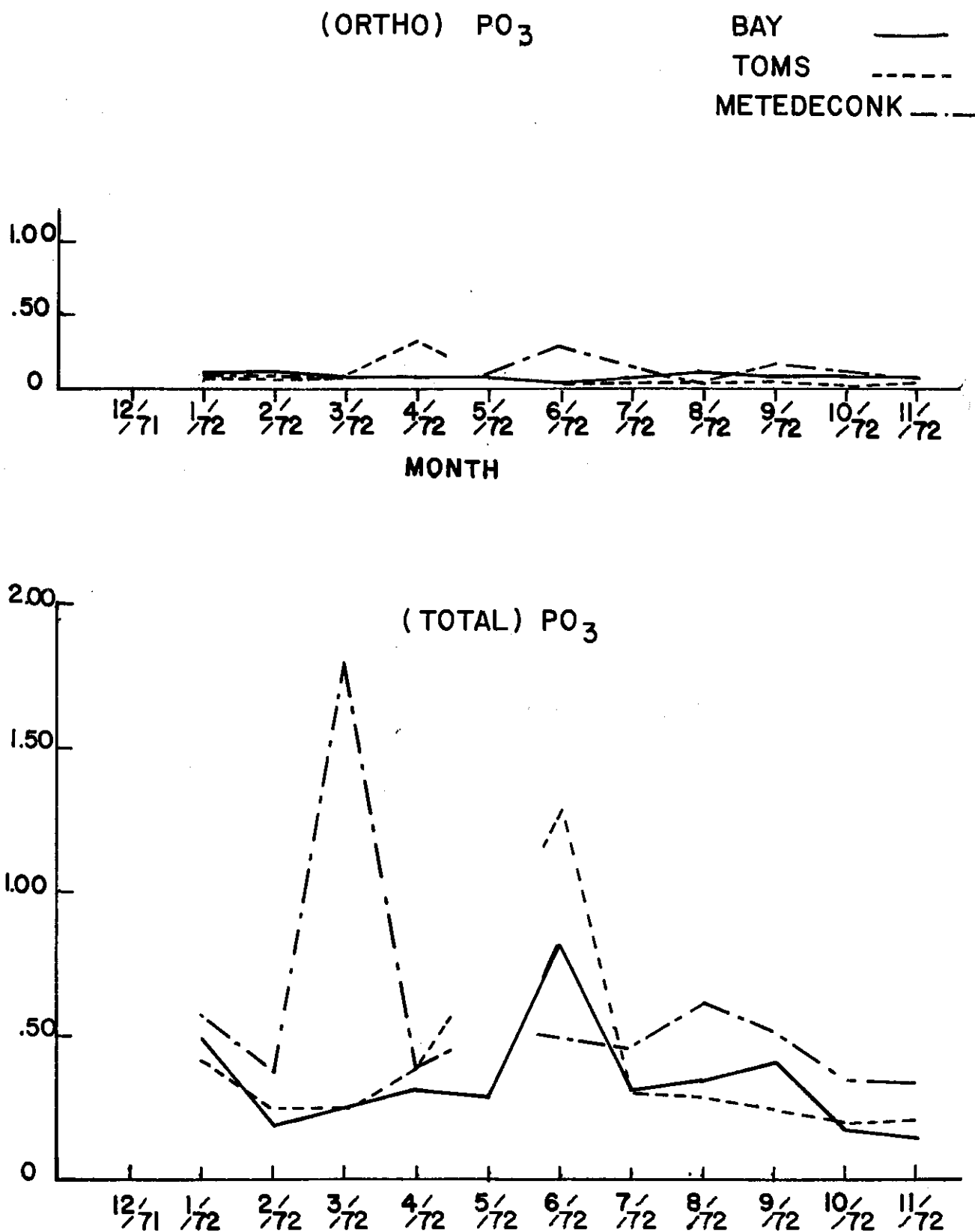


FIGURE 21. COMPARISON OF MONTHLY MEAN VALUES FOR AMMONIA, NITRITE AND NITRATE RECORDED IN UPPER BARNEGAT SYSTEM.

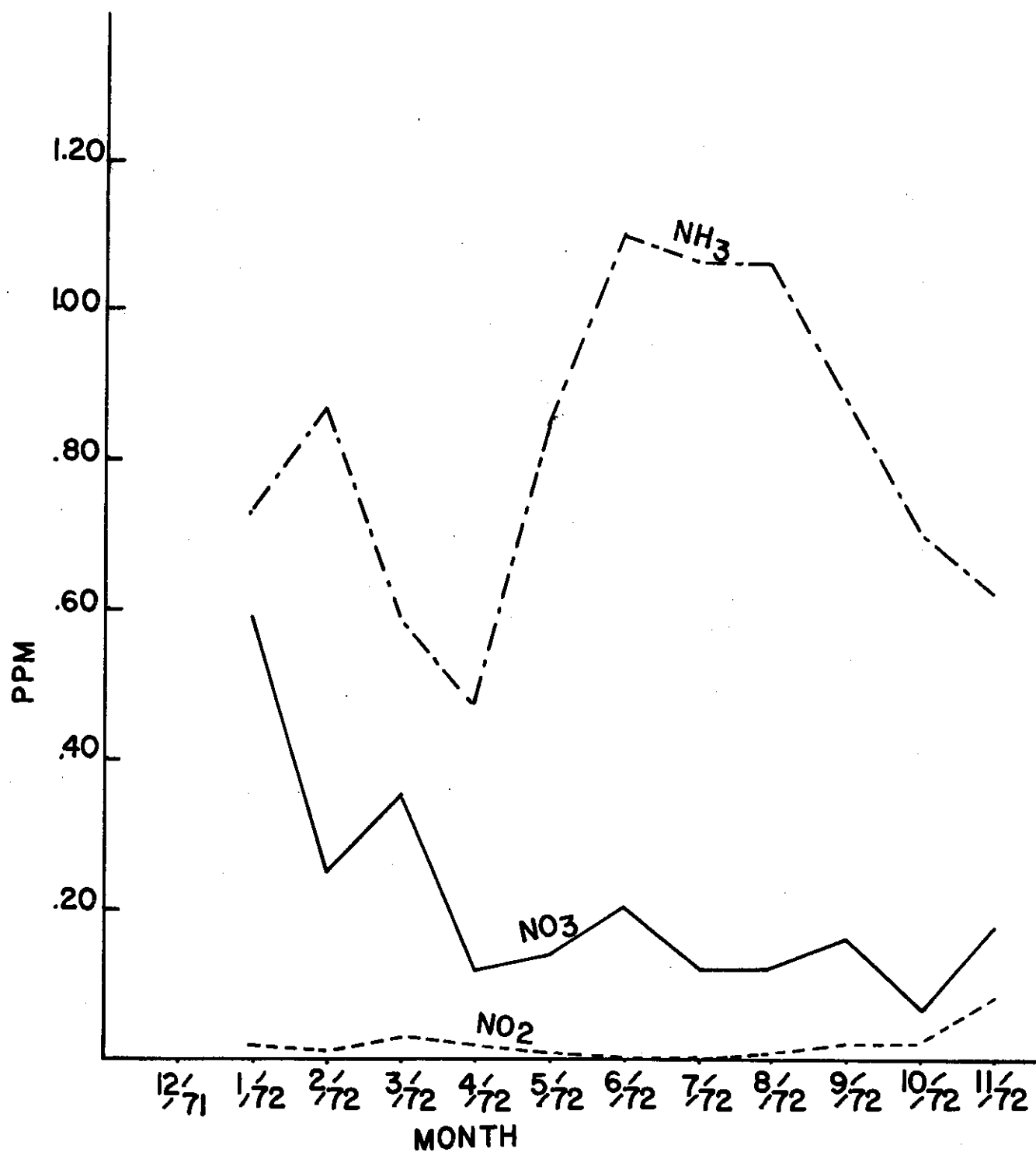
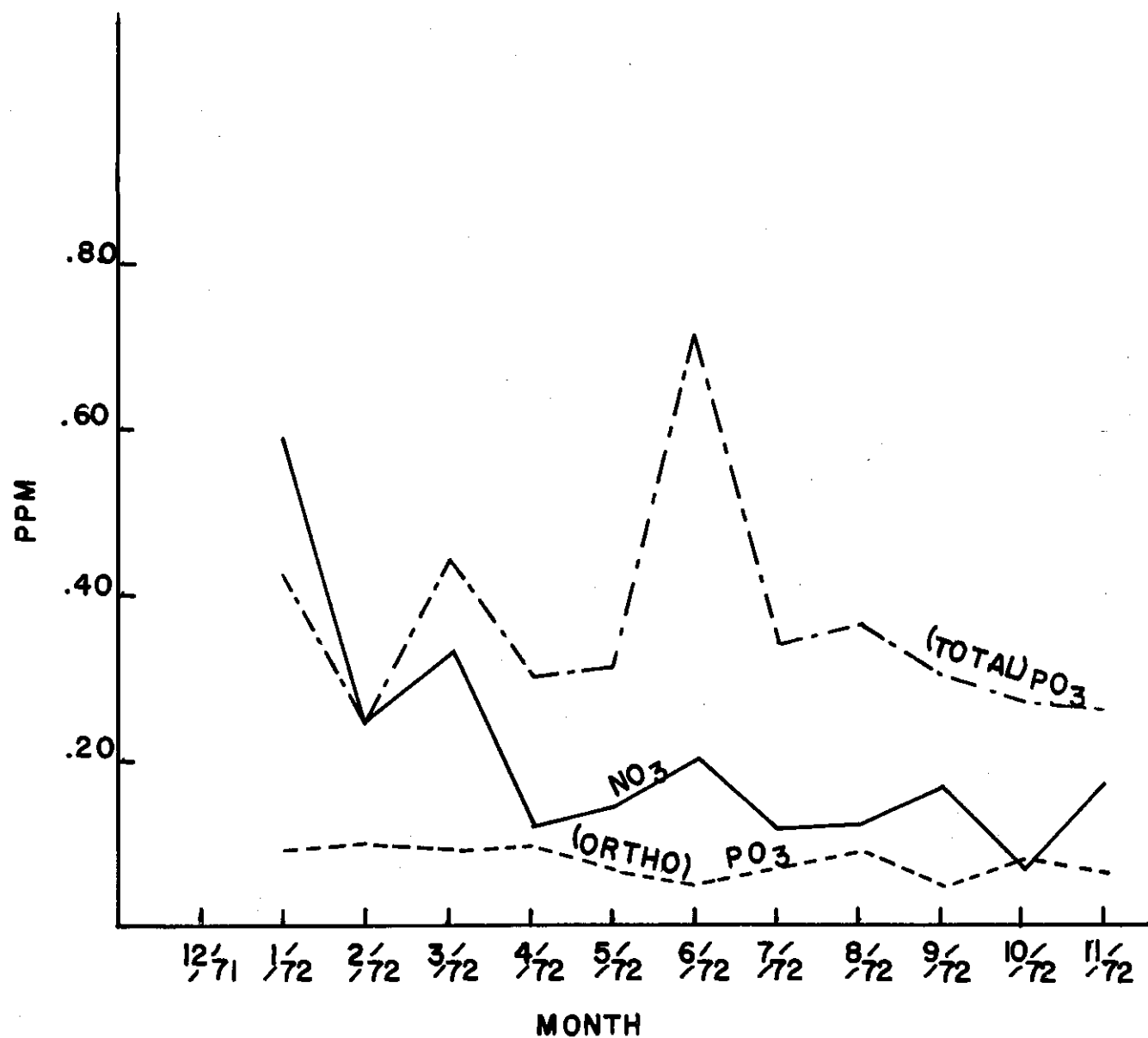
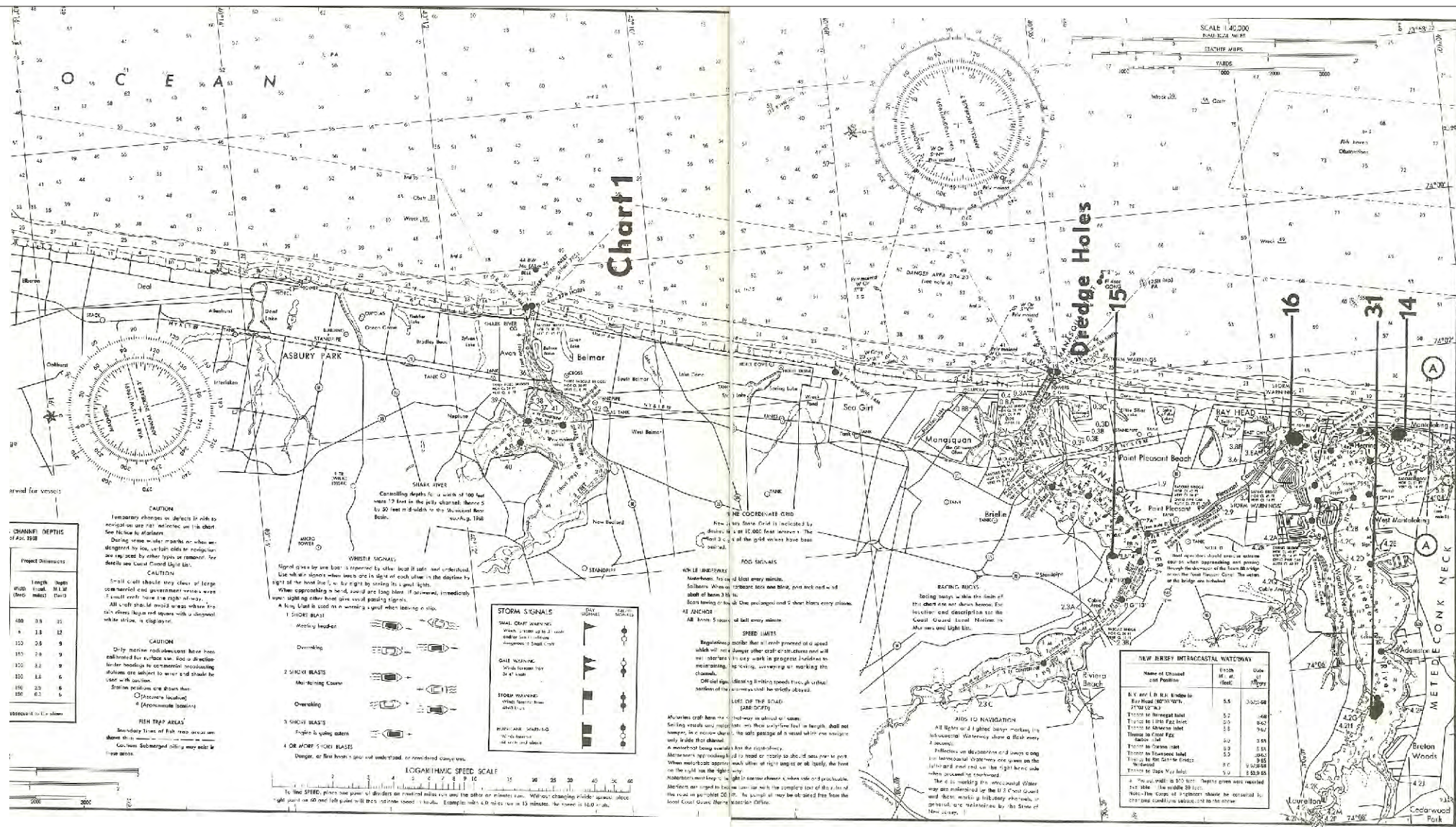
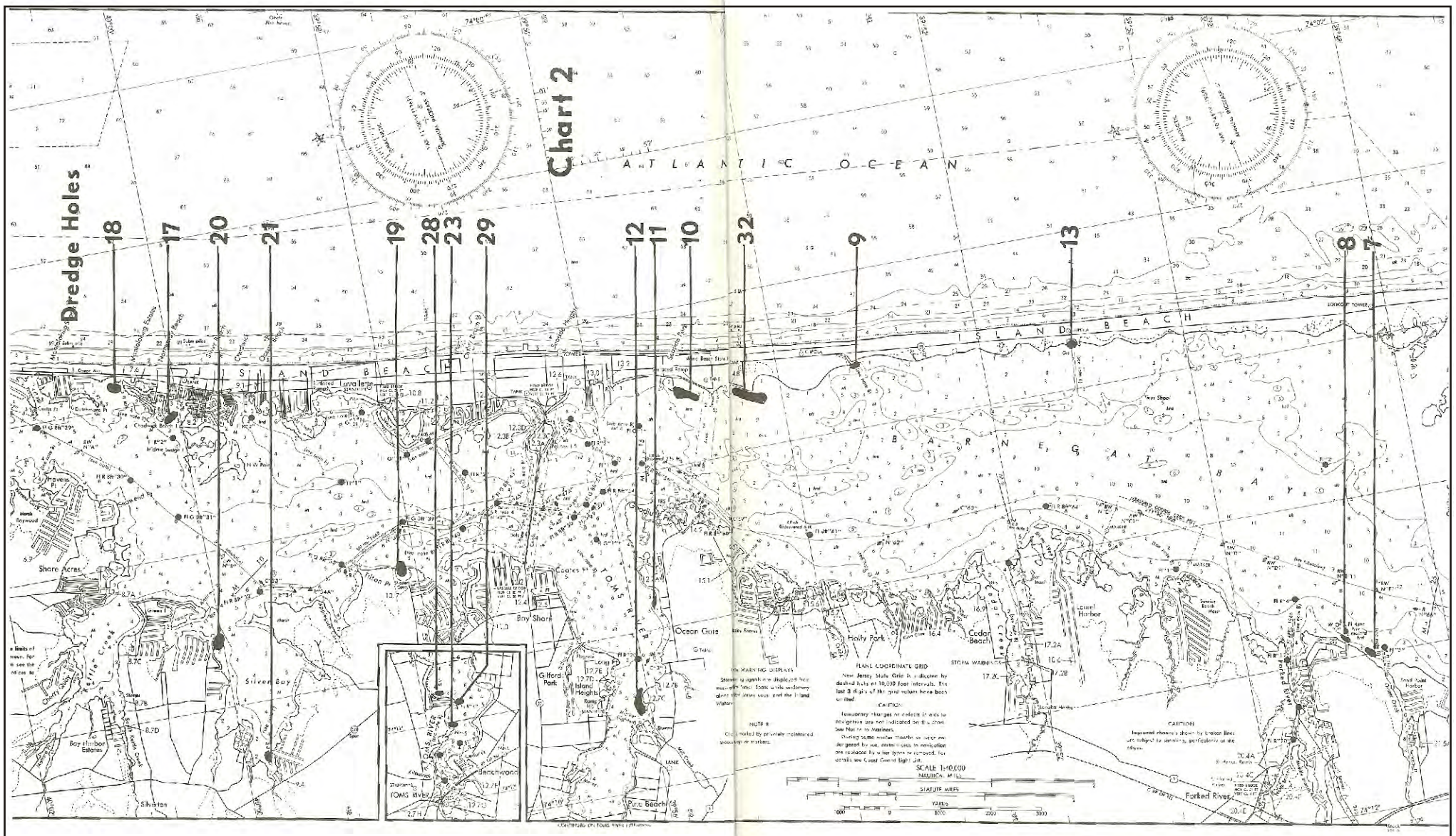


FIGURE 22. COMPARISON OF MONTHLY MEAN VALUES FOR NITRATE, ORTHO- AND TOTAL PHOSPHATE RECORDED IN UPPER BARNEGAT SYSTEM







PHASE III - USE STUDIES

Bruce A. Halgren

ABSTRACT

The Use Study of the Upper Barnegat Estuarine System was designed to determine the ways in which the estuarine system is used, the estimated total of man-days of activity for each type of user-group, expenditure estimates of user-groups and an estimated harvest of resources figure for the system.

Aerial flight count surveys, bag and creel surveys and expenditure surveys were the three integrated survey methods used to make the above determinations.

Resultant tabulations show that an estimated 213,838 man-days of activity had occurred within the study area during the year-long project, while an estimated 700,993 fish (including crabs) and an estimated 935 waterfowl were taken by sportsmen at an estimated cost to the sportsman of \$340,724.58.

INTRODUCTION

The Use Study of the Upper Barnegat Estuarine System is the third such study in a continuing project that has been focused on obtaining a comprehensive measurement of estuarine use in the State of New Jersey. The project was initiated in 1968 with the study of the Mullica River-Great Bay Estuary and continued with the 1970-71 study of the Great Egg Harbor Estuary.

The Barnegat study was mainly limited to the tidal waters and their adjoining marshland. A survey of the entire watershed, although an attractive proposition, was considered unfeasable because of the prohibitive cost of man-power. Limiting the study to the tidal waters and adjoining marshland does, however, lend itself nicely to the establishment of boundaries within the watershed. The upland tree line is a clear cut natural boundary, easily observable from an aircraft, as are all of the tidal waters and marshland within that boundary. It is also that area that is most closely related to, and which has the greatest effect upon, the estuarine resources. The one exception to this type of natural boundary was along the barrier beach area comprising Island Beach State Park. The boundary here was the Island Beach State Park road, with all of the land west of the road being encompassed as part of the survey area. This area is mainly composed of sand dunes with bayberry, poison ivy, dune grasses and other associated vegetation.

The basic objectives of the study herein described were to determine the ways in which the estuarine system is used, the relative importance of the various user-groups, the estimation of total man-days of activity for each user group, expenditure estimate of user-groups and an estimated harvest of resources figure within the

estuarine system.

ACKNOWLEDGMENTS

Several individuals must be noted for their valuable assistance in this program phase. The study was begun and led for several months by Gregory Vennell, after which time his services were lost by the Division. Fisheries Worker Russell Tilton is commended for his study-long assistance with field sampling. Fisheries Worker Jeffery Carlson and summer worker Frederick Bubeck also aided in the collection of field data. Paul Hamer was especially helpful with suggestions on the improvement of data collection and compilation techniques.

DEFINITIONS

For clarity and understanding, the following list of terms used in this study is given along with their definitions.

Bank fisherman - any individual fishing without a boat.

Boat fisherman - any individual fishing from a boat of any type size or description.

Boating - any boat, the occupants of which were not obviously engaged in, or had engaged in fishing, shellfishing, water skiing or hunting.

Catch/Effort - the average number of fish caught per hour spent fishing; fish per man-hour.

Cedar Creek - see Chart #1; section 7 - that portion of the estuary bordered by a line from Sunset Beach to Cedar Creek Point on the east and U. S. Route 9 on the west.

Fish/Angler - the average number of fish caught per fishing trip; fish per man-day.

Forked River - see Chart #1; section 8 - that portion of the estuary bordered by a line across the baywardmost portion

of the mouth of Forked River, as illustrated in Chart #1, on the east and U. S. Route 9 on the west.

Hours/Angler - the average number of hours spent per fishing trip; hours per man-day.

Kettle Creek - see Chart #1; section 4 - that portion of the estuary bordered by a line from Seaweed Point to Andrew Point on the east and Hooper Avenue on the west.

Lower Bay - see Chart #1; section 2 - that portion of the estuary bordered by the Thomas A. Mathis bridge on the north and the end of the survey area on the south, not to include Toms River, Cedar Creek, Forked River and Oyster Creek, as defined in this section.

Man-day - an indeterminate length of time an individual spends on the study area during any day.

Metedeconk River - see Chart #1; section 3 - that portion of estuary bordered by the southern end of the Bay Head-Manasquan Canal to the north, the Mantoloking Bridge to the south and the Garden State Parkway to the west.

Others - any activity that was either unknown or which did not fit in the listed categories. This would include, but is not limited to, sightseers, bird watchers, hikers, other naturalists, picnickers and non-fishermen with parties of bank fishermen.

Oyster Creek - see Chart #1; section 9 - that portion of the estuary bordered by a line across the baywardmost portion of the mouth of Oyster Creek, as illustrated in Chart #1, on the east and U. S. Route 9 on the west.

Shellfisherman - any individual harvesting clams, oysters, scallops or mussels.

Silver Bay - see Chart #1; section 5 - that portion of the estuary bordered by a line from Andrew Point to Cattus Island on the east and Hooper Avenue on the west.

Toms River - see Chart #1; section 6 - that portion of the estuary bordered by a line from Coates Point to Goodluck Point on the east and U. S. Route 9 on the west.

Upper Bay - see Chart #1; section 1 - that portion of the estuary bordered by the Mantoloking Bridge on the north and the Thomas A. Mathis bridge on the south, not to include Kettle Creek and Silver Bay as defined in this section.

The following sub-section of this definitions list concerns itself with giving common and scientific names for those fish mentioned in this report or the charts accompanying it.

Blackfish (Tautog) - Tautoga onitis
Blowfish (Northern puffer) - Sphaeroides maculatus
Blue crab (Blue claw) - Callinectes sapidus
Bluefish - Pomatomus saltatrix
Eel (American eel) - Anguilla nostrata
Flounder (Winter flounder) - Pseudopleuronectes americanus
Fluke (Summer flounder) - Paralichthys dentatus
Horseshoe crab - Limulus polyphemus
Kingfish (Northern kingfish) - Menticirrhus saxatilis
Northern sea robin - Prionatus carolinus
Oyster toadfish - Opsanus tau
Porgy (scup) - Stenotomus chrysops
Sea bass (black sea bass) - Centropristes striatus
Smooth dogfish - Mustelus canis
Spotted seahorse - Hippocampus erectus
Striped bass - Morone saxatilis
Weakfish - Cynoscion regalis
White perch - Morone americana

METHODS

Three integrated surveys were utilized in the gathering of data for the use phase of this project. The aerial survey, bag and creel checks and the expenditure survey are mentioned in the order in which they will be discussed in the following text.

The aerial survey was basically used in estimating man-days of activity on the Upper Barnegat Estuarine System. It was composed of three scheduled aerial census survey flights each week, except for January and February. Each week was stratified into weekdays and weekend days due to the greater recreational pressure on weekends, with holidays being considered as weekend days in this stratification because of similar high recreational pressures. One weekend day and two weekdays were randomly selected as flight days for each week of the yearlong (December 1971 to November 1972) survey. The exceptions of January and February were made because of the limited use made of the estuary after the end of the duck hunting season, January 8, 1972. After this date, only one weekend day and two weekday flights were scheduled for the remainder of January and the same for the month of February. The starting time for each scheduled flight was randomly chosen between the hours of 10 A.M. and 3 P.M., as this was shown to be the greatest activity period of the day (Hamer, 1970).

For a more accurate look at the "use picture" of the estuary the survey area was broken down into readily definable sectors. These sectors were classified as Upper Bay, Lower Bay, Metedeconk River, Kettle Creek, Silver Bay, Toms River, Cedar Creek, Forked River and Oyster Creek and are more accurately defined in a preceding section. To further clarify this picture, user groups were also divided into various categories. These activity categories were bank fishing, boat

fishing, boating, shellfishing, bathers, water skiers, hunters and others.

During each flight a total count was made of each activity in each sector of the estuary and recorded on field data sheets. This data was then summarized on a monthly basis to determine mean counts for weekend days and weekdays of that month. These stratified means then were multiplied by the number of such days in the month when no flights were made. The resulting figure was then added to the actual flight totals to arrive at total use estimates of each activity in each sector and totally. In the case of boat fishing and boating, the estimated number of boats were multiplied by the average number of anglers per boat for the month involved. Average angler per boat numbers are calculated from creel and bag census information (Briggs, 1962). Whenever possible, all individuals towed by or aboard a boat involved in water skiing were counted during aerial survey flights. These figures were used to calculate monthly means for individuals per water skiing boat. Total water skiing boat estimates were then multiplied by this figure for the appropriate month to yield man-days of activity figures.

The estimated man-days of use of the study area determined in the above method is considered to be a minimal one, representing only the number of man-days during the peak activity period. There is no doubt that individuals entered and left the area both before and after the peak use period, or to be more precise, before and after the aerial flight counts. There was, however, no practical method available to us of estimating this minor fraction of the total use figure.

All flights followed a predetermined path unless it was necessary to deviate from this path to obtain complete counts. This occurred when one pass was insufficient to count large numbers of

users, when closer observation was necessary to determine activity type or to try to locate waterfowl hunters. The flight path basically adhered to a pattern starting in the northwestern-most corner of the estuary and following the shoreline in a counter-clockwise direction back to the origin of the flight. A more detailed description of the flight pattern is contained in the following paragraph and is illustrated on Chart #1.

With the airport being located in Lakewood, the survey flight started at the nearby western end of the Metedeconk River and proceeded down the southern shoreline to Herring Island. At this point the flight pattern made a turn to the south to follow the western shore of the bay past the Mantoloking Bridge to Seaweed Point where a side flight into Kettle Creek and Silver Bay began. This side flight headed westward along the northern shore of Kettle Creek, circled the western end and headed back toward the bay along the southern shoreline, around Andrew Point and into Silver Bay. Silver Bay was covered in a similar counter-clockwise pattern starting at Andrew Point and terminating at Cattus Island. The flight then continued southward along the western shore of Upper Bay to the Thomas A. Mathis Bridge into Lower Bay and to Coates Point. The western shore of Lower Bay was flown over in a similar manner as that of Upper Bay, with side flights into Toms River, Cedar Creek, Forked River and Oyster Creek. From Oyster Creek the flight continued south to the town of Barnegat Beach, then across the bay toward Barnegat Light. The eastern side of the study area was covered by an uninterrupted flight northward along the bayside shoreline of the barrier beaches up to the Manasquan-Bay Head Canal. Here the last leg of the flight turned westward along the northern shore of the Metedeconk River and Beaverdam Creek to terminate at the point of origin.

Flight time generally ranged from 50 minutes to one hour with slight deviation on occasion. The flight path was usually just waterward of the shoreline at an altitude that ranged from 500 to 1,000 feet. This allowed complete observation of shoreline and boating activities over the entire survey area with minimum flight time. Lower altitudes, down to about the 200 foot level, were used on occasion for activity identification or to locate waterfowl hunters, but were not maintained over high population density areas.

Creel and bag checks were basically used to determine estimated total harvests of fishermen, hunters and shellfishermen. They were composed of three weekday creel and bag interview checks and one weekend interview check. The weekday interviews were scheduled on the same days as the aerial survey flights, with one additional randomly chosen interview day. The weekend interview day was also scheduled on the weekend flight day. One of the weekday flights was randomly selected for bank interviews, while the remaining weekday flight and the non-flight day were delegated to boat interviews. An exception to this was made during waterfowl hunting season when one-half of the interview days were assigned to bank fishermen and hunters. This was done because of the importance of the hunters' harvest and the decline of fishing during this period. Also, from the end of the duck hunting season through the end of March, all non-flight interview days were scheduled as bank surveys due to the decline of boat fishing during the colder weather. The weekend flight day was always alternately scheduled between boat and bank interviews.

Bank and hunter interview surveys were scheduled by randomly choosing a starting point for the daylong survey. The entire study area was surveyed on each scheduled interview day by a single interviewer, except during the peak activity periods of the summer.

At this time the study area was divided in half with an interviewer for each half. For each party interviewed, data was recorded on field data sheets regarding the time of the interview, the number of anglers in the party, the number of hours fished, and the number of fish of each species taken. Data was recorded only from those anglers who had been fishing for at least one hour at the time of the interview, since this was considered the minimum angler trip to represent a true catch per effort ratio. Enough parties were contacted at the time of their departure to provide a significant estimate of the average number of hours fished per angler-day for the month involved.

Boat fishermen were interviewed for the same information as the bank fishermen. The interviewing was conducted at randomly chosen access points throughout the survey area including marinas, public and private boat ramps, and liveries. This provided complete trip data, which is believed to represent true species composition data (Miller and Gotshall, 1965).

Hunters were interviewed for the same basic information as fishermen, with one obvious difference being that all questions were related to waterfowl rather than fish. In this case, interviewing was conducted at randomly chosen access points only in those segments of the study area exposed to relatively high hunting pressures (see Table 14).

The data gathered on the creel and bag census was summarized on a monthly basis for bank fishermen, boat fishermen and hunters. Monthly means were computed for the number of fish caught per angler, hours fished per angler, catch per effort, length of a completed trip and for the boat fishermen the number of anglers per boat. For the hunter, these means were computed for waterfowl per hunter, hours hunted per hunter, catch per effort and length of a

completed trip. To obtain total harvest estimates, the catch (or kill) per effort is multiplied by the number of hours per trip. This figure is then multiplied by the appropriate activity man-day estimate obtained from the aerial survey flight counts.

The expenditure survey made up the third segment of the use study and was designed to yield an estimated total expenditure figure for fishermen and hunters. The survey was conducted along with the creel and bag census where one out of every four bank fishermen, boat fishermen and hunters interviewed under that census were also interviewed for the expenditure survey. Data was collected and recorded concerning the following items: date and time of interview, number of individuals in the party, type of bait used (natural or artificial) value of equipment being used, miles travelled and the amount of money expended on bait, gas and oil for boats, equipment rental, food, lodging, fees and other expenses.

Results of the expenditure survey were also summarized on a monthly basis to yield expenditure means for each expense category, for value of equipment used and for miles travelled. For the mileage category, only those miles travelled by a party whose primary purpose was to fish or hunt was used in the survey data. If, for example, a party made a long trip to go to the beach and went fishing as a side trip, only that mileage from the beach to the point where the fishing took place was used. This figure was then divided by the number of anglers in that party to compute miles per angler figures from which the monthly means were obtained. Monthly mean expenditure and miles travelled figures were then multiplied by appropriate activity man-day estimates calculated from the aerial survey flight counts to yield estimated total expenditures for each user group and expenditure

category involved. Expenditures on automobile transportation were computed at 5 cents a mile (Bureau of Sport Fisheries and Wildlife, 1972).

Values of individual equipment used for the sport involved were used to produce individual equipment values for each user group by the month and for the year. Since there was no available information as to how long various types of equipment last, or how often the same individuals may have been observed on the study area by the aerial survey flight counts, these figures were not expanded to try to estimate total annual equipment expenditures.

RESULTS

Use Estimates

The findings of this study are presented here mainly as tables with commentary. During the study, a total of 94 aerial surveys, of the 140 scheduled, were completed. The remaining 46 flights were cancelled because of unfavorable weather conditions for flying. No adjustments for these cancellations were attempted in compiling the data. If flight counts had been made on these days, it would be reasonable to conclude that they would have a tendency to be lower than average due to the weather conditions. Their elimination no doubt caused a slight increase of the estimates of the remaining data. Since our estimates were lowered by our inability to measure early morning, evening and night activity, any increase resulting from the elimination of the lower counts would be negligible.

The estuarine system in question was under study for a one year period, starting December 1, 1971 and ending November 30, 1972.

During this period, an estimated 213,838 man-days of activity were

spent on the study area (Table 1). Combined boat and bank fishing activities made up a substantial 45.69% of that total. Even this figure is considered minimal since we know that a substantial portion of boaters, the second largest single category, were actually fishermen under way from one fishing ground to another, or between fishing grounds and a landing.

Boat fishing (37.47%) was the most popular single activity, with boating (34.47%), bathing (9.03%), bank fishing (8.22%), sail boating (5.76%), others (2.49%), water skiing (1.51%), shellfishing (0.71%), and hunting (0.33%) following in the order of their popularity.

The warm summer months proved to put, by far, the greatest activity demands on the estuarine system. July (32.00%) and August (29.59%) combined to account for 61.59% of the entire annual estimated man-days of use. Either of these months accounted for over twice the estimated man-days of activity of September (14.75%), which was the third highest activity month. The activity categories of boating, shellfishing, bathing, water skiing, sail boating and others all had their highest estimated levels of activity during the month of July. Boat and bank fishermen had their highest estimated activity levels during August, leaving only one activity category that did not have its peak activity level during these two summer months. The remaining category was that of hunting, which had the highest level of estimated activity during December. It also must be realized that this activity is confined to the legal waterfowl hunting season, which extends into only a four month period.

Monthly summaries of the aerial survey flight counts, on which the survey estimates are based, are presented in Tables 2 through 13, while Table 14 gives yearly totals. These tables also present

figures for that percent of user group activity that occurs in each area sector (this figure appears as the upper percentage figure on the tables and is totalled across) and for that percent of total sector activity that each user group represents (this figure appears as the lower percentage figure in the tables and is totaled down). The flight count summary tables use original flight count statistics, not man-days of use or estimated figures.

Lower Bay accommodated the greatest activity demands of the study area (36.80%). It contributed the greatest percentage of boat fishermen (65.32%), boaters (34.39%), and others (39.00%), along with an overwhelming 98.19% of the shellfishermen. It also ranked second in the activities of bank fishermen and hunters. Private boats fished most heavily around Barnegat Inlet and Oyster Creek Channel, taking good catches of fluke and weakfish as the most sought after species. Some very successful blowfish trips were also reported during September. Livery boat fishing was most concentrated along the western shore of the bay from Goodluck Point to Cedar Creek. The blue crab was the most sought after and successfully taken species of this fishery with some sea bass, kingfish and weakfish also being taken. Shellfishing was most predominant in the Clam and Sedge Islands area.

Upper Bay ranked second in overall activity and accounted for the greatest percentage of water skiers (34.25%) and hunters (36.89%), and the second greatest percentage of boaters, sailboats and bathers. Bathing took place mainly along the barrier beach bay-shore while hunting was concentrated along the mainland shoreline and islands.

Toms River was next in overall activity and accounted for the greatest percentage of bathers (34.75%) and sailboats (27.51%).

Bathers were found on the numerous beaches along both shorelines of the area and accounted for 46.79% of all activity in that sector, with sailboats accounting for 19.48% of the sector activities. Bank fishermen had the most success with snapper bluefish in the fall, and white perch all year long.

Boating and boat fishing were the two most active user groups in the Metedeconk River. Bank and boat fishing were mainly found congregated in the Bay Head Harbor area, with winter flounder being the most sought after species.

While Oyster Creek only ranked fifth in overall usage, it did account for the greatest percentage of bank fishermen (34.07%) within the study area. Blue crabs were the most sought after species, with snapper blues, kingfish, blackfish and flounder also being taken. Bank fishing accounted for 78.13% of all the activity within the Oyster Creek area.

Our estimates of shellfishermen and waterfowl hunters are probably low. Much of the shellfishermen's activity takes place during the lower half of the tidal cycle. It is assumed then that only about one-half of our flights fell during this period of greater activity. Waterfowl hunters are successful by being inconspicuous and staying out of sight of their prey. Thus, the skillful hunter may also have escaped observation by aerial survey. It is likely that waterfowl hunters also entered and left the study area before or after the peak activity periods. Low estimates, such as these, are not considered serious shortcomings in our overall study. It is felt that a system designed to measure all user activities must be a compromise and expected to fall short in some areas. Every effort will be made to improve techniques in future surveys.

A minor amount of commercial fishing also was conducted in the study area. Estimates of man-days of activity, harvest and expenditures were not attempted for this category because of the low percentage of total activity that it represented. There were a total of thirty-three licenses issued to fish with nets in Barnegat Bay for the study period. These were comprised of the following types: bait seines (11); miniature fykes (11); fykes (5); special fykes (3); and haul seines (3).

Harvest Estimates

Bag and creel interviews of over 2,300 anglers and hunters, expanded to the extent of our use estimates, indicate that over seven hundred thousand fish (including crabs) and over nine hundred waterfowl were taken by sportsmen from the study area during the one year period from December 1971 through November 1972 (Tables 21 and 24). Catch compositions and percentages, in terms of the number of fish actually censused and in expanded form, are given in Tables 18 through 21 for bank and boat fishermen, in that order. Estimated catch is deemed a more accurate reflection of total catch percentages because it takes into consideration the man-days of effort put forth during the time period in question.

The boat fisherman accounted for 88.90% of the total estimated catch. The highest estimated monthly boat catch occurred in August, while the best catch per effort was recorded in September. Blue crabs dominated the catch (65.48%) with flounder (6.66%), weakfish (6.60%), bluefish (5.86%), fluke (5.07%), and blowfish (4.79%) representing the bulk of the remaining catch. The "others" category which comprised 1.49% of the estimated catch was made up mainly of the oyster toadfish (oyster cracker) and northern sea robins, in that

order. During the actual creel census one example each of smooth dogfish, spotted seahorse and horseshoe crab were also noted.

Blue crabs accounted for the majority (63.55%) of the bank fishermen's estimated catch. White perch (13.80%), flounder (12.78%) and bluefish (7.17%) followed the blue crab in numerical order in the bank fishermen's creel. The "others" category for bank fishermen comprised 0.45% of the total estimated catch, with the northern sea robin and oyster toadfish again representing the bulk of this category, but in reverse order. During the actual creel census, one example of the smooth dogfish was noted. The highest estimated monthly bank catch occurred in August, with the best catch per effort coming in June. It is interesting to note here that both boat and bank anglers compiled their highest estimated monthly catch in August, which was the highest activity month for both angler categories, rather than in those months when the angler had the best success ratios.

Waterfowl hunters averaged about 1.3 birds per trip over the season. Their highest catch per effort ratios were recorded in December with 0.49 birds per hour and the lowest was in November with a 0.05 catch per effort. The total estimated take was 935 birds with teal, brant and mallards being the most taken (Table 24).

The clamming population is divided into two categories, sport clammers and commercial clammers. Although commercial clammers were interviewed on several occasions, no harvest information was available. Therefore, the total estimate was based on personal interviews with three sport clammers, which is an insignificantly small figure to begin with. It must also be noted that sport clammers harvest only for their own needs and there is little doubt that commercial clammers would produce a significantly higher harvest total.

It is obvious, therefore, that the following estimate will be quite low, will be based entirely on sport clamming and is intended only to give some rough idea of the harvest potential of the study area.

The three clammers interviewed were clamming for a total of 11 hours and produced 850 clams. Their average trip time of 3.67 hours times the 1.5 clammers per boat figure times a catch per effort of 77.27 clams per hour times the 1521 estimated boats involved in clamming during the year yields a total estimated harvest figure of 646,990 clams.

Expenditure Estimates

An estimated total of 97,706 angler days were spent on the study area with an accompanying estimated \$338,564.32 expenditure by the anglers involved. This works out to be \$3.47 per angler per fishing trip, to include all expenses except equipment expenditures. The estimated 700,993 fish (including crabs) caught by anglers on the study area during the year long survey cost an average of 48¢ per fish. Total expenditure figures, along with monthly and major expense category breakdowns can be found on Tables 25 through 27.

Boat fishermen spent an estimated \$299,906.71 on an estimated 80,118 angler days for an average of \$3.74 per angler trip. Bank fishermen spent an estimated \$38,657.61 on an estimated 17,588 angler days for an average of only \$2.20 per angler trip. The interesting facet here is that although the boat fishermen spent more money per trip, he spent only an average 48¢ per fish while the bank fishermen spent an average 50¢ per fish. This is due mainly to the fact that the boat angler had a better catch per effort ratio and a longer average fishing trip than did the bank fishermen. Average individual equipment values (the value of the equipment being used by an angler

at the time of interview to participate in the activity involved) are \$19.07 for bank fishermen and \$281.29 for boat fishermen.

The 1970 National Survey of Fishing and Hunting put out by the United States Department of the Interior, Bureau of Sport Fisheries and Wildlife, presents a figure of \$10.43 per angler per salt water fishing trip on the Atlantic coast and \$6.30 per angler per fresh water fishing trip. When expenditures for equipment purchases are removed from the national survey figures to be comparable in scope with the figures of this survey, they total \$6.96 per angler for a salt water fishing trip and \$3.77 per angler for a fresh water fishing trip. The \$3.77 fresh water trip figure from the national survey comes very close to the \$3.47 per angler trip figure from this estuarine survey, and there is some good reason to believe that this closely corresponding figure is not accidental. Fresh water and estuarine daily fishing expenditures should logically be lower than that of daily coastal salt water fishing. One major reason for this would be the greatly reduced amount of head boat and charter boat excursion fees. There should be very little variance for individual equipment rental costs between fresh water and estuarine fish. As a matter of record, the national survey shows that there is very little variance in individual equipment rental costs between Atlantic coast salt water anglers (\$3.38) and fresh water anglers (\$3.21). Other expenditure categories such as food, bait and transportation should not differ in large proportions.

The one difference that might exist would be in equipment purchases, which were excluded from the above figures and calculations. The estuarine fishermen would have a tendency to purchase heavier gauge and larger equipment to cope with the potentially larger fish

and rougher waters that the estuarine environment could produce. If, however, estuarine equipment purchases were similar to that of the fresh water angler, an overall increase of 166.945% (computed from the national survey figures) would be evident in the total and individual trip estuarine estimates given above. This increase would yield a total expenditure figure of \$565,216.20 and an individual trip expenditure of \$5.79. These figures are strictly comparison related and not an attempt on the part of this report to give an estimated total expenditure figure (including equipment purchases) for the survey area.

An estimated 707 waterfowl hunter-days were spent on the survey area with an accompanying estimated \$2,160.26 expenditure on the part of the hunters involved. This works out to be \$3.06 per hunter per day, to include all expenses except equipment purchase expenditures. The estimated 935 birds taken by hunters on the study area during the year long survey cost the hunter an average of \$2.31 per bird. Total expenditure figures, along with monthly and major expense category breakdowns and average individual equipment values can be found in Table 27. The 1970 National Survey of Fishing and Hunting figures indicate an expenditure of \$6.86 (equipment purchase expenditures excluded) per hunter per day. No attempt to justify the variance of figures has been made.

SUMMARY

The Use Study of the Upper Barnegat Estuarine System was the third such study in a continuing project focused on obtaining a comprehensive measurement of estuarine use in the State of New Jersey. The study was designed to determine the ways in which the estuarine system is used, the relative importance of the various user-groups, the estimation of total man-days of activity for each user-group,

expenditure estimates of user-groups and an estimated harvest of resources figure for the system. Aerial flight count surveys, bag and creel surveys and expenditure surveys were the three integrated survey methods used to make these determinations.

The aerial survey was used in estimating man-days of activity and was basically composed of three randomly chosen survey flight each week. These flights were stratified into week days and weekend days due to recreational pressure differences, with two flights scheduled for week days and one for weekend days (to include holidays).

Creel and bag surveys were used to determine estimated total harvests of fishermen, shellfishermen and hunters. They were basically composed of three weekday surveys and one weekend day survey each week. Expenditure survey data was collected along with bag and creel data and was used in determining estimated expenditures on the part of bank fishermen, boat fishermen and hunters.

It was estimated that a total of 213,838 man-days of activity were spent on the study area during the year-long project. Boat fishing was the most popular singular past-time, making up 37.47% of the total activity. Boating (34.47%), Bathing (9.03%), bank fishing (8.22%), sail boating (5.76%), others (2.49%), water skiing (1.51%), shellfishing (0.71%), and hunting (0.33%) followed boat fishing in the order of their popularity.

The warm summer months of July and August proved to put the greatest activity demands on the estuarine system accounting for 32.00% and 29.59% of the total activity demands respectively. The only activity category that did not have its highest activity period during these two months was that of waterfowl hunting. Winter activity declined so drastically (except for waterfowl hunting) that

the months of December, January and February combined contributed only 1.43% of the total estimated yearly activity.

Lower Bay accommodated the greatest activity demands of the study area (36.80%), followed by Upper Bay (20.17%), Toms River (14.96%), Metedeconk River (10.02%), Oyster Creek (5.89%), Forked River (3.88%), Cedar Creek (2.87%), Silver Bay (2.86%), and Kettle Creek (2.55%).

Bag and creel interviews of over 2,300 anglers and hunters, expended to the extent of our use estimates, indicate that an estimate 700,933 fish (including crabs) and an estimated 935 waterfowl were taken by sportsmen within the study area during the year-long survey. Blue crabs dominated the boat fishermen's estimated catch (65.48%), with flounder (6.66%), weakfish (6.60%), bluefish (5.86%), fluke (5.07%), and blowfish (4.79%) representing the bulk of the remaining catch.

The blue crab also accounted for the majority of the bank fishermen's estimated catch (63.55%) with white perch (13.80%), Flounder (12.78%), and bluefish (7.17%) following in that order. It is interesting to note here that the highest estimated monthly catches occurred in August for both the boat and bank angler, with 38.73% and 33.69% of the estimated total catch respectively, while the highest catch per effort ratios were recorded in June for the bank angler and in September for the boat angler.

An estimated total of 97,706 angler-days were spent on the study area with an accompanying estimated \$338,564.32 expenditure by the anglers involved. Boat fishermen averaged \$3.74 per angler trip and 48¢ per fish. Bank fishermen averaged \$2.20 per angler trip and 50¢ per fish. The 1970 National Survey of Fishing and Hunting

presented a figure of \$3.77 per fresh water angler trip (not including equipment purchase expenditures), which came relatively close to the \$3.47 average estuarine angler trip expenditure arrived at by this survey.

An estimated 707 waterfowl hunter-days were spent on the study area with an accompanying \$2,106.26 expenditure on the part of the hunters involved. This works out to be \$3.06 per hunter day and an average of \$2.31 per bird.

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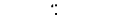
TABLE 1. Estimated Total Man-days by Activity and Month.

Month	Fishermen		Boat- ing	Shell- fisher- men	Bath- ing	Water Skiing	Sail Boat- ing	Hunters	Others	Totals	Percent
	Bank	Boat									
September	756	267	275	43	-	-	-	269	77	1,687	0.79
October	518	58	238	26	-	-	-	106	71	1,017	0.48
November	145	58	29	15	-	-	-	-	102	349	0.16
December	1,346	1,074	724	58	-	-	4	-	116	3,322	1.55
January	1,462	3,132	5,733	63	-	-	275	-	329	10,994	5.14
February	924	2,763	7,593	69	37	68	992	-	457	12,903	6.03
March	1,059	1,456	3,462	121	168	112	435	-	162	6,975	3.26
April	3,417	22,946	22,613	420	11,076	1,559	3,979	-	2,411	68,421	32.00
May	3,828	27,827	17,744	385	7,762	1,230	3,362	-	1,133	63,271	29.59
June	2,895	15,622	9,894	228	274	250	2,035	-	353	31,551	14.75
July	891	3,600	4,098	70	-	12	900	223	94	9,888	4.62
August	347	1,315	1,317	23	-	-	325	109	24	3,460	1.62
Totals	17,588	80,118	73,720	1,521	19,317	3,231	12,307	707	5,329	213,838	99.99
Percent	8.22	37.47	34.47	0.71	9.03	1.51	5.76	0.33	2.49	99.99	
Ranking	4	1	2	8	3	7	5	9	6		

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TABLE 2. Monthly Flight Count

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	3	2.46 9.38	47	38.52 53.41	-		-		1	0.82 25.00
Boat Fishermen	3	15.79 9.38	12	63.16 13.64	-		-		-	
Boating	4	20.00 12.50	6	30.00 6.82	1	5.00 11.11	2	10.00 40.00	2	10.00 50.00
Shell Fishermen	-		7	100.00 7.95	-		-		-	
Bathers	-		-		-		-		-	
Water Skiers	-		-		-		-		-	
Sail Boats	-		-		-		-		-	
Hunters	21	50.00 65.63	13	30.95 14.77	7	16.67 77.78	1	2.38 20.00	-	
Others	1	7.69 3.13	3	23.08 3.41	1	7.69 11.11	2	15.38 40.00	1	7.69 25.00
Totals	32	14.35 100.02	88	39.46 100.00	9	4.04 100.00	5	2.24 100.00	4	1.7 100.0

Key: No. Counted Percent (%) 

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
8	6.56 53.33	-		3	2.46 60.00	60	49.18 96.77	122	100.00 54.71
1	5.26 6.67	1	5.26 33.33	1	5.26 20.00	1	5.26 1.61	19	99.99 8.52
2	10.00 13.33	1	5.00 33.33	1	5.00 20.00	1	5.00 1.61	20	100.00 8.97
-		-		-		-		7	100.00 3.14
-		-		-		-		-	
-		-		-		-		-	
-		-		-		-		-	
-		-		-		-		42	100.00 18.83
4	30.77 26.67	1	7.69 33.33	-		-		13	99.99 5.83
15	6.73 100.00	3	1.35 99.99	5	2.24 100.00	62	27.80 99.99	223	100.00 100.00

TABLE 3. Monthly Flight Count Summary

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	2	2.67 8.33	15	20.00 36.59	-		-		-	
Boat Fishermen	1	20.00 4.17	2	40.00 4.89	-		1	20.00 10.00	-	
Boating	1	7.69 4.17	5	38.46 12.20	1	7.69 20.00	-		2	15.38 40.00
Shell Fishermen	-		4	100.00 9.76	-		-		-	
Bathers	-		-		-		-		-	
Water Skiers	-		-		-		-		-	
Sail Boats	-		-		-		-		-	
Hunters	17	38.64 70.83	12	27.27 29.27	4	9.09 80.00	6	13.64 60.00	3	6.82 60.00
Others	3	23.08 12.50	3	23.08 7.32	-		3	23.08 30.00	-	
Totals	24	15.58 100.00	41	26.62 100.03	5	3.25 100.00	10	6.49 100.00	5	3.25 100.00

Percent (%)

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TABLE 4. Monthly Flight Count

	Upper Bay		Lower Bay		Metedeconk River	Kettle Creek	Silver Bay
Bank Fisher- men	1	10.00 33.33	1	10.00 25.00	-	-	-
Boat Fisher- men	-		1	50.00 25.00	-	-	-
Boating	-		-		-	-	-
Shell Fisher- men	-		1	100.00 25.00	-	-	-
Bathers	-		-		-	-	-
Water Skiers	-		-		-	-	-
Sail Boats	-		-		-	-	-
Hunters	-		-		-	-	-
Others	2	28.57 66.67	1	14.29 25.00	-	-	-
Totals	3	14.29 100.00	4	19.05 100.00	0	0	0

Summary -- February 1972.

KEY: No. Counted



Percent (%) →

Percent (%) ↓

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
1	10.00 33.33	-		1	10.00 33.33	6	60.00 85.71	10	100.00 47.62
-		-		-		1	50.00 14.29	2	100.00 9.52
-		-		1	100.00 33.33	-		1	100.00 4.76
-		-		-		-		1	100.00 4.76
-		-		-		-		-	
-		-		-		-		-	
-		-		-		-		-	
-		-		-		-		-	
2	28.57 66.67	1	14.29 100.00	1	14.29 33.33	-		7	100.01 33.33
3	14.29 100.00	1	4.76 100.00	3	14.29 99.99	7	33.33 100.00	21	100.01 99.99

TABLE 5. Monthly Flight Count

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	18	5.98 36.73	66	21.93 30.28	1	0.33 9.09	-	-	1	0.33 11.11
Boat Fishermen	14	11.67 28.57	93	77.50 42.66	1	0.83 9.09	-	-	1	0.83 11.11
Boating	11	13.58 22.45	40	49.38 18.35	9	11.11 81.82	2	2.47 66.67	4	4.94 44.44
Shell Fishermen	-	-	13	100.00 5.96	-	-	-	-	-	-
Bathers	-	-	-	-	-	-	-	-	-	-
Water Skiers	-	-	-	-	-	-	-	-	-	-
Sail Boats	1	100.00 2.04	-	-	-	-	-	-	-	-
Hunters	-	-	-	-	-	-	-	-	-	-
Others	5	19.23 10.20	6	23.08 2.75	-	-	1	3.85 33.33	3	11.54 33.33
Totals	49	9.04 99.99	218	40.22 100.00	11	2.03 100.00	3	0.55 100.00	9	1.66 99.99

Percent (%) 
Percent (%) 

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TABLE 6. Monthly Flight Count Summary

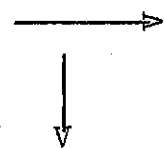
	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	49	14.89 21.12	35	10.64 8.56	4	1.22 6.67	-	-	1	0.30 7.14
Boat Fishermen	51	20.40 21.98	170	68.00 41.56	7	2.80 11.67	-	-	1	0.40 7.14
Boating	101	22.60 43.53	161	36.02 39.36	45	10.07 75.00	14	3.13 82.35	12	2.68 85.71
Shell Fishermen	-	-	14	100.00 3.42	-	-	-	-	-	-
Bathers	-	-	-	-	-	-	-	-	-	-
Water Skiers	-	-	-	-	-	-	-	-	-	-
Sail Boats	21	38.18 9.05	4	7.27 0.98	-	-	-	-	-	-
Hunters	-	-	-	-	-	-	-	-	-	-
Other	10	13.51 4.31	25	33.78 6.11	4	5.41 6.67	3	4.05 17.65	-	-
Totals	232	19.85 99.99	409	34.99 99.99	60	5.13 100.01	17	1.45 100.00	14	1.20 99.99

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
85	25.84 37.12	2	0.61 12.50	45	13.68 60.81	108	32.83 91.53	329	100.01 28.14
8	3.20 3.49	3	1.20 18.75	7	2.80 9.46	3	1.20 2.54	250	100.00 21.39
77	17.23 33.62	8	1.79 50.00	22	4.92 29.73	7	1.57 5.93	447	100.01 38.24
-	-	-	-	-	-	-	-	14	100.00 1.20
-	-	-	-	-	-	-	-	0	-
-	-	-	-	-	-	-	-	0	-
30	54.54 13.10	-	-	-	-	-	-	55	99.99 4.70
-	-	-	-	-	-	-	-	0	-
29	39.19 12.66	3	4.05 18.75	-	-	-	-	74	99.99 6.33
229	19.59 99.99	16	1.37 100.00	74	6.33 100.00	118	10.09 100.00	1169	100.00 100.00

TABLE 7. Monthly Flight Count Summary

	<u>Upper Bay</u>		<u>Lower Bay</u>		<u>Hetedeconk River</u>		<u>Kettle Creek</u>		<u>Silver Bay</u>	
Bank Fishermen	44	19.47 12.22	59	26.11 9.37	1	0.44 0.44	-	-	-	-
Boat Fishermen	61	20.54 16.94	193	64.98 30.63	32	10.77 14.22	-	-	2	0.67 4.76
Boating	187	23.17 51.94	267	33.09 42.38	122	15.12 54.22	18	2.23 78.26	33	4.09 78.57
Shell Fishermen	-	-	17	94.44 2.70	-	-	-	-	-	-
Bathers	2	20.00 0.56	-	-	-	-	-	-	-	-
Water Skiers	3	37.50 0.83	-	-	2	25.00 0.89	-	-	-	-
Sail Boats	45	19.91 12.50	52	23.01 8.25	58	25.66 25.78	3	1.33 13.04	6	2.65 14.29
Hunters	-	-	-	-	-	-	-	-	-	-
Others	18	16.63 5.00	42	38.18 6.67	10	9.09 4.44	2	1.82 8.70	1	0.91 2.38
Totals	360	21.15 99.99	630	37.02 100.00	225	13.22 99.99	23	1.35 100.00	42	2.47 100.00

Percent (%)



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TABLE 8. Monthly Flight Count Summary

	<u>Upper Bay</u>		<u>Lower Bay</u>		<u>Metedeconk River</u>		<u>Kettle Creek</u>		<u>Silver Bay</u>	
Bank Fishermen	15	8.98 10.20	36	21.56 17.22	-		-		-	
Boat Fishermen	20	15.27 13.61	48	36.64 22.97	31	23.66 31.96	1	0.76 6.67	8	6.11 38.10
Boating	68	25.09 46.26	73	26.94 34.93	44	16.24 45.36	6	2.21 40.00	12	4.43 57.14
Shell Fishermen	-		20	90.91 9.57	2	9.09 2.06	-		-	
Bathers	13	50.00 8.84	3	11.54 1.44	4	15.38 4.12	-		-	
Water Skiers	2	28.57 1.36	-		2	28.57 2.06	1	14.29 6.67	1	14.29 4.76
Sail Boats	27	36.00 18.37	12	16.00 5.74	14	18.67 14.43	7	9.33 46.67	-	
Hunters	-		-		-		-		-	
Others	2	7.14 1.36	17	60.71 8.13	-		-		-	
TOTALS	147	20.22 100.00	209	28.75 100.00	97	13.34 99.99	15	2.06 100.01	21	2.89 100.00

KEY: No. Counted Percent (%)


 Percent (%) 

TABLE 9. Monthly Flight Count Summary

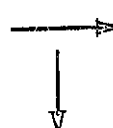
	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	103	7.88 3.19	400	30.60 8.70	44	3.13 3.37	-		17	1.30 3.76
Boat Fishermen	310	10.99 9.59	1702	60.31 37.02	290	10.28 20.60	48	1.70 10.53	85	3.01 18.81
Boating	636	23.75 19.68	882	32.94 19.19	370	13.82 26.29	117	4.37 25.66	215	8.03 47.57
Shell Fishermen	1	0.60 0.03	161	96.41 3.50	-		1	0.60 0.22	-	
Bathers	1718	40.10 53.16	675	15.76 14.68	361	8.43 25.64	167	3.90 36.62	25	0.58 5.53
Water Skiers	50	28.90 1.55	22	12.72 0.48	36	20.81 2.56	13	7.51 2.85	15	8.67 3.32
Sail Boats	302	21.16 9.34	282	19.76 6.13	280	19.62 19.89	88	6.17 19.30	35	2.41 7.71
Hunters	-		-		-		-		-	
Others	112	11.57 3.47	473	48.86 10.29	27	2.79 1.92	22	2.27 4.82	60	6.20 13.27
Totals	3232	23.38 100.01	4597	33.25 99.99	1408	10.18 100.03	456	3.30 100.00	452	3.27 100.00

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
38	2.91 1.69	142	10.86 36.60	201	15.38 42.86	362	27.70 63.29	1307	100.00 9.45
183	6.48 8.13	41	1.45 10.57	78	2.76 16.63	85	3.01 14.86	2822	99.99 20.41
239	8.92 10.61	42	1.57 10.82	128	4.78 27.29	49	1.83 8.57	2678	100.01 19.37
-	-	-	-	4	2.40 0.85	-	-	167	100.01 1.21
1259	29.39 55.91	78	1.82 20.10	1	0.21 0.02	-	-	4284	100.00 30.99
27	15.61 1.20	3	1.73 0.77	6	3.47 1.28	1	0.58 0.17	173	100.00 1.25
391	27.40 17.36	22	1.54 5.67	23	1.61 4.90	4	0.28 0.70	1427	99.99 10.32
-	-	-	-	-	-	-	-	0	-
115	11.88 5.11	60	6.20 15.46	28	2.89 5.97	71	7.33 12.41	968	99.99 7.00
2252	16.29 100.01	388	2.81 99.99	469	3.39 99.99	572	4.14 100.00	13826	100.01 100.00

TABLE 10. Flight Count Summary

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	105	6.38 3.62	417	25.32 7.99	67	4.07 4.74	-	-	5	0.30 1.12
Boat Fishermen	637	14.66 21.97	2825	65.03 54.10	356	8.20 25.19	79	1.82 20.52	134	3.08 29.91
Boating	682	25.01 23.53	828	30.63 15.86	360	13.20 25.48	103	3.78 26.75	182	6.67 40.62
Shell Fishermen	-	-	166	100.00 3.18	-	-	-	-	-	-
Bathers	855	24.39 29.49	625	17.83 11.97	355	10.13 25.12	92	2.62 23.90	50	1.45 11.16
Water Skiers	65	41.14 2.24	4	2.53 0.08	30	18.99 2.12	13	8.23 3.38	14	8.86 3.13
Sail Boats	446	29.77 15.38	237	15.82 4.54	230	15.35 16.28	85	5.67 22.08	42	2.80 9.38
Hunters	-	-	-	-	-	-	-	-	-	-
Others	109	21.93 3.76	120	24.14 2.30	15	3.02 1.06	13	2.62 3.38	21	4.21 4.69
Totals	2899	19.94 99.99	5222	35.91 100.02	1413	9.72 99.99	385	2.65 100.01	448	3.08 100.02

August 1972.

KEY: No. Counted Percent (%) 

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
100	6.07 4.07	213	12.93 44.75	270	16.39 44.33	470	28.54 74.60	1647	100.00 11.33
129	2.97 5.24	29	0.67 6.09	97	2.23 15.93	58	1.34 9.21	4344	100.00 29.87
297	10.89 12.07	48	1.76 10.08	182	6.67 29.89	45	1.65 7.14	2727	99.99 18.75
-	-	-	-	-	-	-	-	166	100.00 1.14
1443	41.17 58.56	60	1.71 12.61	20	0.57 3.28	5	0.14 0.79	3505	99.99 24.10
25	15.82 1.02	4	2.53 0.84	3	1.90 0.49	-	-	158	100.00 1.09
420	28.04 17.07	23	1.54 4.83	8	0.53 1.31	7	0.47 1.11	1498	99.99 10.30
-	-	-	-	-	-	-	-	-	-
46	9.26 1.87	99	19.92 20.80	29	5.84 4.76	45	9.05 7.14	497	100.01 3.42
2460	16.92 100.00	476	3.27 100.00	609	4.19 99.99	630	4.33 99.99	14542	100.01 100.00

TABLE 11. Monthly Flight Count Summary

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	63	9.75 11.17	237	36.69 13.75	18	2.79 5.39	-	-	1	0.15 1.45
Boat Fishermen	108	8.26 19.15	951	72.76 55.16	155	11.86 46.41	18	1.38 45.00	21	1.61 30.43
Boating	199	24.00 35.28	361	43.55 20.94	90	10.86 26.95	12	1.45 30.00	36	4.34 52.17
Shell Fishermen	-	-	50	100.00 2.90	-	-	-	-	-	-
Bathers	27	42.86 4.79	-	-	7	11.11 2.10	-	-	4	6.35 5.80
Water Skiers	5	27.78 0.89	3	16.67 0.17	2	11.11 0.60	3	16.67 7.50	-	-
Sail Boats	129	30.07 22.87	102	23.78 5.92	60	13.99 17.96	7	1.63 17.50	7	1.63 10.14
Hunters	-	-	-	-	-	-	-	-	-	-
Others	33	44.00 5.85	20	26.67 1.16	2	2.67 0.60	-	-	-	-
Totals	564	16.51 100.00	1724	50.45 100.00	334	9.77 100.01	40	1.17 100.00	69	2.02 99.99

-- September 1972

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KEY: No. Counted

Percent (%)

Percent (%)

→

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Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
49	7.59 18.63	49	7.59 50.52	53	8.20 43.44	176	27.24 36.27	646	100.00 18.91
23	1.76 8.75	3	0.23 3.09	20	1.53 16.39	8	0.61 3.92	1307	100.00 38.25
64	7.72 24.33	13	1.57 13.40	36	4.34 29.51	18	2.17 8.82	829	100.00 24.26
-	-	-	-	-	-	-	-	50	100.00 1.46
25	39.68 9.51	-	-	-	-	-	-	63	100.00 1.84
4	22.22 1.52	1	5.56 1.03	-	-	-	-	18	100.01 0.53
94	21.91 35.74	15	3.50 15.46	13	3.03 10.66	2	0.47 0.98	429	100.01 12.55
-	-	-	-	-	-	-	-	0	-
4	5.33 1.52	16	21.33 16.49	-	-	-	-	75	100.00 2.19
263	7.70 100.00	97	2.84 99.99	122	3.57 100.00	204	5.97 99.99	3417	100.00 99.99

TABLE 12. Monthly Flight Count Summary

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	10	3.15 3.62	55	17.35 5.83	16	5.05 5.82	-	-	-	-
Boat Fishermen	33	5.45 11.96	437	72.23 46.34	74	12.23 26.91	8	1.32 28.57	1	0.17 2.38
Boating	137	19.80 49.64	298	43.06 31.60	92	13.29 33.45	10	1.45 35.71	36	5.20 85.71
Shell Fishermen	-	-	25	100.00 2.65	-	-	-	-	-	-
Bathers	-	-	-	-	-	-	-	-	-	-
Water Skiers	-	-	-	-	-	-	-	-	1	100.00 2.38
Sail Boats	66	20.31 23.91	89	27.38 9.44	70	21.54 25.45	4	1.23 14.29	4	1.23 9.52
Hunters	29	36.71 10.51	29	36.71 3.08	19	24.05 6.91	2	2.53 7.14	-	-
Others	1	2.94 0.36	10	29.41 1.06	4	11.76 1.45	4	11.76 14.29	-	-
Totals	276	13.28 100.00	943	45.38 100.00	275	13.23 99.99	28	1.35 100.00	42	2.02 99.99

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TABLE 13. Monthly Flight Count Summary

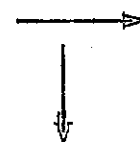
	<u>Upper Bay</u>		<u>Lower Bay</u>		<u>Metedeconk River</u>		<u>Kettle Creek</u>		<u>Silver Bay</u>	
Bank Fishermen	2	1.47 2.56	3	2.21 0.93	11	8.09 12.94	-	-	1	0.74 7.69
Boat Fishermen	6	3.00 7.69	165	82.50 51.24	20	10.00 23.53	2	1.00 11.76	2	1.00 15.38
Boating	33	16.42 42.31	94	46.77 29.19	21	10.45 24.71	5	2.49 29.41	5	2.49 38.46
Shell Fishermen	-	-	9	100.00 2.80	-	-	-	-	-	-
Bathers	-	-	-	-	-	-	-	-	-	-
Water Skiers	-	-	-	-	-	-	-	-	-	-
Sail Boats	14	12.50 17.95	14	12.50 4.35	23	20.54 27.06	-	-	2	1.70 15.38
Hunters	23	29.11 29.49	34	43.04 10.56	10	12.66 11.76	6	7.59 35.29	3	3.80 23.08
Others	-	-	3	33.33 0.93	-	-	4	44.44 23.53	-	-
Totals	78	10.46 100.00	322	43.16 100.00	85	11.39 100.00	17	2.28 99.99	13	1.70 99.99

-- November 1972.

KEY: No. Counted

Percent (%)

Percent (%)



Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
2	1.47 2.63	10	7.35 43.48	11	8.09 37.93	96	70.59 93.20	136	100.01 18.25
-		1	0.50 4.35	1	0.50 3.45	3	1.50 2.91	200	100.00 20.81
14	6.97 18.42	8	3.98 34.78	17	8.46 58.62	4	1.99 3.88	201	100.02 20.94
-		-		-		-		9	100.00 1.21
-		-		-		-		0	
-		-		-		-		0	
55	49.11 72.36	4	3.57 17.39	-		-		112	100.00 15.01
3	3.80 3.95	-		-		-		79	100.00 10.59
2	22.22 2.63	-		-		-		9	99.99 1.21
76	10.19 99.99	23	3.08 100.00	29	3.89 100.00	103	13.81 99.99	746	100.00 100.00

TABLE 14. Total Flight Count Summary --

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Bank Fishermen	415	7.86 5.26	1371	25.95 9.52	162	3.07 4.13	-	-	27	0.51 2.41
Boat Fishermen	1244	12.31 15.75	6599	65.32 45.80	966	9.56 24.62	157	1.55 15.73	255	2.52 22.77
Boating	2059	23.49 26.08	3015	34.39 20.93	1155	13.17 29.44	289	3.30 28.96	539	6.15 48.17
Shell Fishermen	1	0.20 0.01	487	98.19 3.38	3	0.60 0.80	-	-	-	-
Bathers	2615	33.15 33.12	1303	16.52 9.04	727	9.22 18.53	259	3.28 25.95	79	1.00 7.06
Water Skiers	125	34.25 1.58	29	7.95 0.20	72	19.73 1.84	30	8.22 3.01	31	8.49 2.77
Sail Boats	1051	25.34 13.31	792	19.09 5.50	735	17.72 18.74	194	4.68 19.44	96	2.31 8.58
Hunters	90	36.89 1.14	88	36.07 0.61	40	16.39 1.02	15	6.15 1.50	6	2.46 0.54
Others	296	15.97 3.75	723	39.00 5.02	63	3.40 1.61	54	2.91 5.41	86	4.64 7.69
Totals	7896	20.17 100.00	14407	36.80 100.00	3923	10.02 100.01	998	2.55 100.00	1119	2.86 100.01

KEY: No. Counted

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
370	7.00 6.32	463	8.76 41.19	675	12.78 44.47	1800	34.07 78.13	5283	100.00 13.50
365	3.61 6.23	87	0.86 7.74	233	2.31 15.35	196	1.94 8.51	10102	99.97 25.81
919	10.48 15.69	158	1.80 14.06	468	5.34 30.83	165	1.88 7.16	8767	100.00 22.40
-	-	-	-	4	0.81 0.26	1	0.20 0.04	496	100.00 1.27
2741	34.75 46.79	138	1.75 12.28	21	0.27 1.38	5	0.06 0.22	7888	100.00 20.15
60	16.44 1.02	8	2.19 0.71	9	2.47 0.59	1	0.27 0.04	365	100.01 0.93
1141	27.51 19.48	75	1.81 6.67	48	1.16 3.16	16	0.39 0.69	4148	100.01 10.60
5	2.05 0.09	-	-	-	-	-	-	244	100.01 0.62
257	13.86 4.39	195	10.52 17.35	60	3.24 3.95	120	6.47 5.21	1854	100.01 4.74
5858	14.96 100.01	1124	2.87 100.00	1518	3.88 99.99	2304	5.89 100.00	39147	100.00 100.02

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek	Silver Bay	
Dec.	3	2.46 0.72	47	38.52 3.43	-	-	-	1	0.82 3.70
Jan.	2	2.67 0.48	15	20.00 1.09	-	-	-	-	-
Feb.	1	10.00 0.24	1	10.00 0.07	-	-	-	-	-
March	18	5.98 4.34	66	21.93 4.81	1	0.33 0.62	-	1	0.3 3.7
April	49	14.89 11.81	35	10.64 2.55	4	1.22 2.47	-	1	0.3 3.7
May	44	19.47 10.60	59	26.11 4.30	1	0.44 0.62	-	-	-
June	15	8.98 3.61	36	21.56 2.63	-	-	-	-	-
July	103	7.88 24.82	400	30.60 29.18	44	3.37 27.16	-	17	1.30 62.96
August	105	6.38 25.30	417	25.32 30.42	67	4.07 41.36	-	5	0.3 18.5
Sept.	63	9.75 15.18	237	36.69 17.29	18	2.79 11.11	-	1	0.1 3.7
Oct.	10	3.15 2.41	55	17.35 4.01	16	5.05 9.88	-	-	-
Nov.	2	1.47 0.48	3	2.21 0.22	11	8.09 6.79	-	1	0.7 3.7
Totals	415	7.86 99.99	1371	25.95 100.00	162	3.07 100.01	0	27	0.51 99.98

KEY: No. Counted

Percent (%)

Percent (%)

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
8	6.56 2.16	-		3	2.46 0.44	60	49.18 3.33	122	100.00 2.31
2	2.67 0.54	-		2	2.67 0.30	54	72.00 3.00	75	100.01 1.42
1	10.00 0.27	-		1	10.00 0.15	6	60.00 0.33	10	100.00 0.19
24	7.97 6.49	-		30	9.97 4.44	161	53.49 8.94	301	100.00 5.70
85	25.84 22.97	2	0.61 0.43	45	13.68 6.67	108	32.83 6.00	329	100.01 6.23
41	18.14 11.08	-		17	7.52 2.52	64	28.32 3.56	226	100.00 4.28
4	2.40 1.08	13	7.78 2.81	8	4.79 1.19	91	54.49 5.06	167	100.00 3.16
38	2.91 10.27	142	10.86 30.67	201	15.38 29.78	362	27.70 20.11	1307	100.00 24.74
100	6.07 27.03	213	12.93 46.00	270	16.39 40.00	470	28.54 26.11	1647	100.00 31.18
49	7.59 13.24	49	7.59 10.58	53	8.20 7.85	176	27.24 9.78	646	100.00 12.23
16	5.05 4.32	34	10.73 7.34	34	10.73 5.04	152	47.95 8.44	317	100.01 6.00
2	1.47 0.54	10	7.35 2.16	11	8.09 1.63	96	70.59 5.33	136	100.01 2.57
370	7.00 99.99	463	8.76 99.99	675	12.78 100.01	1800	34.07 99.99	5283	100.00 100.01

TABLE 16. Distribution of Boat Fishing --

	Upper Bay		Lower Bay		Meteconk River		Kettle Creek		Silver Bay	
Dec.	3	15.79 0.24	12	63.16 0.18	-	-	-	-	-	-
Jan.	1	20.00 0.08	2	40.00 0.03	-	-	1	20.00 0.64	-	-
Feb.	-	-	1	50.00 0.02	-	-	-	-	-	-
March	14	11.67 1.13	93	77.50 1.41	1	0.83 0.10	-	-	1	0.83 0.39
April	51	20.40 4.10	170	68.00 2.58	7	2.80 0.72	-	-	1	0.40 0.39
May	61	20.54 4.90	193	64.98 2.92	32	10.77 3.31	-	-	2	0.67 0.78
June	20	15.27 1.61	48	36.64 0.73	31	23.66 3.21	1	0.76 0.64	8	6.11 3.14
July	310	10.99 24.92	1702	60.31 25.79	290	10.28 30.02	48	1.70 30.57	85	3.01 33.33
August	637	14.66 51.21	2825	65.03 42.81	356	8.20 36.85	79	1.82 50.32	134	3.08 52.55
Sept.	108	8.26 8.68	951	72.76 14.41	155	11.86 16.05	18	1.38 11.46	21	1.61 8.24
Oct.	33	5.45 2.65	437	72.23 6.62	74	12.23 7.66	8	1.32 5.10	1	0.17 0.39
Nov.	6	3.00 0.48	165	82.50 2.50	20	100.00 2.07	2	1.00 1.27	2	1.00 0.78
Totals	1244	12.31 100.00	6599	65.32 100.00	966	9.56 99.99	157	1.55 100.00	255	2.52 99.99

KEY: No. Counted Percent (%) —————→
 Percent (%) ↓
 V

Toms River		Cedar Creek		Forked River		Oyster Creek		TOTALS	
1	5.26 0.27	1	5.26 1.15	1	5.26 0.43	1	5.26 0.51	19	99.99 0.19
-		-		-		1	20.00 0.51	5	100.00 0.05
-		-		-		1	50.00 0.51	2	100.00 0.02
3	2.50 0.82	-		1	0.83 0.43	7	5.83 3.57	120	99.99 1.19
8	3.20 2.19	3	1.20 3.45	7	2.80 3.00	3	1.20 1.53	250	100.00 2.47
1	0.34 0.27	-		3	1.01 1.29	5	1.68 2.55	297	99.99 2.94
5	3.82 1.37	4	3.05 4.60	11	8.40 4.72	3	2.29 1.53	131	100.00 1.30
183	6.48 50.14	41	1.45 47.13	78	2.76 33.48	85	3.01 43.37	2822	99.99 27.94
129	2.97 35.34	29	0.67 33.33	97	2.23 41.63	58	1.34 29.59	4344	100.00 43.00
23	1.76 6.30	3	0.23 3.45	20	1.53 8.58	8	0.61 4.08	1307	100.00 12.94
12	1.98 3.29	5	0.83 5.75	14	2.31 6.01	21	3.47 10.71	605	99.99 5.99
-		1	0.50 1.15	1	0.50 0.43	3	1.50 1.53	200	100.00 1.98
365	3.61 99.99	87	0.86 100.01	233	2.31 100.00	196	1.94 99.99	10102	99.98 100.01

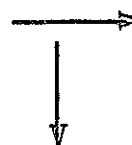
TABLE 17. Distribution of Boating --

	Upper Bay		Lower Bay		Metedeconk River		Kettle Creek		Silver Bay	
Dec.	4	20.00 0.19	6	30.00 0.20	1	5.00 0.09	2	10.00 0.69	2	10.00 0.37
Jan.	1	7.69 0.05	5	38.46 0.17	1	7.69 0.09	-		2	15.38 0.37
Feb.	-		-		-		-		-	
March	11	13.58 0.53	40	49.38 1.33	9	11.11 0.78	2	2.47 0.69	4	4.94 0.74
April	101	22.60 4.91	161	36.02 5.34	45	10.07 3.90	14	3.13 4.84	12	2.68 2.23
May	187	23.17 9.08	267	33.09 8.86	122	15.12 10.56	18	2.23 6.23	33	4.10 6.12
June	68	25.09 3.30	73	26.94 2.42	44	16.24 3.81	6	2.21 2.08	12	4.43 2.23
July	636	23.75 30.89	882	32.94 29.25	370	13.82 32.03	117	4.37 40.48	215	8.03 39.89
August	682	25.01 33.12	828	30.36 27.46	360	13.20 31.17	103	3.78 35.64	182	6.67 33.77
Sept.	199	24.00 9.66	361	43.55 11.97	90	10.86 7.79	12	1.45 4.15	36	4.34 6.68
Oct.	137	19.80 6.65	298	43.06 9.88	92	13.29 7.97	10	1.45 3.46	36	5.20 6.68
Nov.	33	16.42 1.60	94	46.77 3.12	21	10.45 1.82	5	2.49 1.73	5	2.49 0.93
Totals	2059	23.49 99.98	3015	34.39 100.00	1155	13.17 100.01	289	3.30 99.99	539	6.15 100.01

KEY: No. Counted

Percent (%)

Percent (%)



Toms River		Cedar Creek		Forked River		Oyster Creek		Totals	
2	10.00 0.22	1	5.00 0.63	1	5.00 0.21	1	5.00 0.61	20	100.00 0.23
2	15.38 0.22	2	15.38 1.27	-	-	-	-	13	99.98 0.15
-	-	-	-	1	100.00 0.21	-	-	1	100.00 0.01
4	4.94 0.44	2	2.47 1.27	7	8.64 1.50	2	2.47 1.21	81	100.00 0.92
77	17.23 8.38	8	1.79 5.06	22	4.92 4.70	7	1.57 4.24	447	100.01 5.16
128	15.86 13.93	10	1.24 6.33	25	3.10 5.34	17	2.11 10.30	807	100.00 9.20
30	11.07 3.26	8	2.95 5.06	21	7.75 4.49	9	3.32 5.45	271	100.00 3.09
239	8.92 26.01	42	1.57 26.58	128	4.78 27.35	49	1.83 29.70	2678	100.01 30.55
297	10.89 32.32	48	1.76 30.38	182	6.67 38.89	45	1.65 27.27	2727	99.99 31.11
64	7.72 6.96	13	1.57 8.23	36	4.34 7.69	18	2.17 10.91	829	100.00 9.46
62	8.96 6.75	16	2.31 10.13	28	4.05 5.98	13	1.88 7.88	692	100.00 7.89
14	6.97 1.52	8	3.98 5.06	17	8.46 3.63	4	1.99 2.42	201	100.02 2.29
919	10.48 100.01	158	1.80 100.00	468	5.34 99.99	165	1.88 99.99	8767	100.00 100.00

TABLE 18. Bank Fishing Catch Composition by
Month from Creel Census

Species	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals	%
Black-fish	1	-	-	-	-	2	1	-	4	-	1	7	16	0.25
Blow-fish	-	-	-	-	-	5	-	6	6	-	1	1	19	0.29
Blue crab	-	-	-	-	-	1	537	1813	1473	459	128	9	4420	68.03
Bluefish	-	-	-	-	-	-	-	4	105	173	136	2	420	6.46
Eels	-	-	-	-	-	9	11	23	10	3	3	-	59	0.91
Flounder	52	30	12	242	104	80	112	-	33	2	2	20	689	10.60
Fluke	-	-	-	-	-	2	-	8	2	-	-	-	12	0.18
Kingfish	-	-	-	-	-	-	-	-	-	-	9	-	9	0.14
Porgy	3	4	-	-	-	-	-	2	2	-	-	1	12	0.18
Sea Bass	-	-	-	-	-	-	-	-	1	-	-	1	2	0.03
Striped Bass	-	-	-	-	-	1	1	1	1	-	1	-	5	0.08
Weakfish	-	-	-	-	1	2	-	-	10	-	-	-	13	0.20
White perch	175	46	-	94	283	49	57	72	6	-	-	14	796	12.25
Other	-	-	-	-	-	4	-	5	16	-	-	-	25	0.38
Totals	231	80	12	336	388	155	719	1934	1669	637	281	55	6497	99.98
Percent	3.56	1.23	0.18	5.17	5.97	2.39	11.07	29.77	25.69	9.80	4.33	0.85		100.01

TABLE 19. Total Estimated Bank Fishing Catch Composition by Month.

Species	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals	%
Black-fish	13	-	-	-	-	29	11	-	63	-	14	65	195	0.25
Blowfish	-	-	-	-	-	74	-	43	94	-	14	9	234	0.30
Blue crab	-	-	-	-	-	15	5998	13,107	23,126	5347	1752	83	49,428	63.55
Bluefish	-	-	-	-	-	-	-	29	1,648	2015	1862	19	5,573	7.17
Eels	-	-	-	-	-	133	123	166	157	35	41	-	655	0.84
Flounder	689	369	267	3873	1558	1179	1251	-	519	23	27	185	9,940	12.78
Fluke	-	-	-	-	-	29	-	57	31	-	-	-	117	0.15
Kingfish	-	-	-	-	-	-	-	-	-	-	123	-	123	0.16
Porgy	40	49	-	-	-	-	-	14	31	-	-	9	143	0.18
Sea bass	-	-	-	-	-	-	-	-	16	-	-	9	25	0.03
Striped bass	-	-	-	-	-	15	11	7	16	-	14	-	63	0.08
Weakfish	-	-	-	-	15	29	-	-	157	-	-	-	201	0.26
White perch	2321	565	-	1504	4239	722	637	520	94	-	-	130	10,732	13.80
Others	-	-	-	-	-	59	-	36	252	-	-	-	347	0.45
Totals	3063	983	267	5377	5812	2284	8031	13,979	26,204	7420	3847	509	77,776	100.00
Percent	3.94	1.26	0.34	6.91	7.47	2.94	10.33	17.97	33.69	9.54	4.95	0.65	99.99	

TABLE 20. Boat Fishing Catch Composition by Month From Creel Census.

Species	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals	%
Black-fish	-	-	-	-	-	-	-	-	-	-	1	2	3	0.10
Blowfish	-	-	-	-	-	5	-	1	2	106	15	-	129	4.40
Blue crab	-	-	-	-	-	-	24	685	735	252	176	5	1,877	64.06
Bluefish	-	-	-	-	-	-	-	-	1	135	26	-	162	5.53
Eels	-	-	-	-	1	3	-	5	2	-	2	1	14	0.48
Flounder	12	-	10	29	168	37	-	-	4	7	-	17	284	9.69
Fluke	-	-	-	-	-	2	-	57	76	3	-	-	138	4.71
Kingfish	-	-	-	-	-	-	-	-	22	11	3	-	36	1.23
Porgy	3	-	-	-	-	-	-	-	-	6	-	-	9	0.31
Sea bass	-	-	-	1	-	-	-	1	6	24	1	-	33	1.13
Striped bass	-	-	-	-	-	3	9	-	-	-	4	-	16	0.55
Weakfish	-	-	-	-	-	-	1	12	124	29	11	-	177	6.04
White perch	5	-	1	5	-	2	-	-	-	-	-	-	13	0.44
Others	-	-	-	-	-	-	-	7	24	8	-	-	39	1.33
Totals	20	0	11	35	169	52	34	768	996	581	239	25	2,930	100.00
Percent	0.68	-	0.38	1.19	5.77	1.77	1.16	26.21	33.99	19.83	8.16	0.85	99.99	

TABLE 21. Total Estimated Boat Fishing Catch Composition by Month.

Species	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals	%
Black-fish	-	-	-	-	-	-	-	-	-	-	113	153	266	0.04
Blowfish	-	-	-	-	-	1,249	-	209	483	26,203	1,684	-	29,828	4.79
Blue crab	-	-	-	-	-	-	3809	143,670	178,106	62,304	19,744	383	408,016	65.48
Bluefish	-	-	-	-	-	-	-	-	241	33,386	2,917	-	36,544	5.86
Eels	-	-	-	-	126	749	-	1,047	482	-	225	77	2,706	0.43
Flounder	392	-	106	6,583	21,162	9,239	-	-	965	1,724	-	1304	41,475	6.66
Fluke	-	-	-	-	-	500	-	11,952	18,414	747	-	-	31,613	5.07
Kingfish	-	-	-	-	-	-	-	-	5,334	2,715	338	-	8,387	1.35
Porgy	98	-	-	-	-	-	-	-	-	1,480	-	-	1,578	0.25
Sea bass	-	-	-	227	-	-	-	209	1,448	5,933	113	-	7,930	1.27
Striped bass	-	-	-	-	-	749	1428	-	-	-	448	-	2,625	0.42
Weakfish	163	-	-	-	-	-	159	2,513	30,046	7,168	1,233	-	41,119	6.60
White perch	-	-	11	1,135	-	500	-	-	-	-	-	-	1,809	0.29
Others	-	-	-	-	-	-	-	1,466	5,816	1,982	-	-	9,264	1.49
Totals	653	0	117	7945	21,288	12,986	5396	161,066	241,335	143,642	26,815	1917	623,160	100.00
Percent	0.10	-	0.02	1.27	3.42	2.08	0.87	25.85	38.73	23.05	4.30	0.31	100.00	

TABLE 22. Estimated Total Catch and Catch per Effort by Month for Bank, Boat and Combined Fishing.

Month	<u>Bank Fishermen</u>		<u>Boat Fishermen</u>		<u>Combined</u>	
	Catch	C/E	Catch	C/E	Catch	C/E
December	3,063	1.77	653	0.78	3,716	1.45
January	983	0.53	-	-	983	0.53
February	267	0.92	117	0.81	384	0.88
March	5,377	0.94	7,945	2.69	13,322	1.54
April	5,812	1.27	21,288	1.67	27,100	1.56
May	2,284	0.94	12,895	1.16	15,269	1.12
June	8,030	2.13	5,396	0.71	13,426	1.18
July	13,982	1.20	161,083	1.51	175,065	1.48
August	26,202	1.86	241,336	2.06	267,538	2.04
Sept.	7,420	1.44	143,656	2.91	151,061	2.77
October	3,847	1.68	26,811	1.90	30,658	1.87
November	509	0.53	1,917	0.45	2,426	0.46
Total	77,776	1.43	623,217	1.91	700,993	1.84

TABLE 23. Summary of Hunter Harvest based on Hunters Checked on Survey Area.

Month	No. Hunters Interviewed	Man-Hours of Interviewed Hunters	Birds Harvested by Interviewed Hunters	Birds/Hunter	Man-Hours/Hunter	Catch/Effort	Estimated Total Harvest
December	8	38.5	19	2.38	4.81	0.49	648
January	7	32.0	5	0.71	4.57	0.16	85
October	5	35.0	4	0.80	7.00	0.11	172
November	7	38.5	2	0.29	5.50	0.05	30
Totals	27	144.0	30	1.11	5.33	0.21	935

TABLE 24. Estimated Waterfowl Harvest by Species on Survey Area.

Species	Estimated Total	Percent
Black	34	3.64
Brant	478	51.12
Canada Goose	43	4.60
Green-winged teal	205	21.93
Mallard	126	13.48
Pintail	15	1.60
Scaup	34	3.64
Totals	935	100.01

TABLE 25. Estimated Total Expenditures of Boat Fishermen by Month and Major Expenditure Categories.

Month	Bait	Gas & Oil for Boat	Equipment Rental	Food	Fees	Auto Mileage and Costs	Total	Average Individual Equipment Value
Dec.	\$ 200.25	\$ 200.25	\$	\$	\$	1,869 mi. \$ 93.45	\$ 493.95	\$ 275.00
Jan.	43.50	43.50				406 mi. 20.30	107.30	275.00
Feb.	116.00	-		87.00		174 mi. 8.70	211.70	75.00
March	912.90	214.80				4,296 mi. 214.80	1,342.50	82.00
April	407.16	2,756.16				31,320 mi. 1,566.00	4,729.32	53.75
May	1,768.32	2,901.15		1,381.50	3,315.60	70,457 mi. 3,522.85	12,889.42	120.00
June	218.40	364.00		2,184.00	480.48	31,056 mi. 1,552.80	4,799.68	666.67
July	12,161.38	3,900.82	27,076.28	2,753.52		233,131 mi. 11,656.55	57,548.55	219.91
August	19,200.63	11,687.34	23,931.22	17,809.28		246,547 mi. 12,327.35	84,955.82	382.14
Sept.	14,059.80	9,685.64	51,396.38	10,154.30		194,650 mi. 9,732.50	95,028.62	384.62
Oct.	3,312.00	3,600.00	20,412.00	1,800.00		155,988 mi. 7,799.40	36,923.40	110.00
Nov.	657.50	-	-	-		4,379 mi. 218.95	876.45	666.67
Totals	\$53,057.84	\$35,353.66	\$122,815.88	\$36,169.60	\$3,796.08	974,273 mi. \$48,713.65	\$299,906.71	\$281.29 Yearly Individual Average

TABLE 26. Estimated Total Expenditures of Bank Fishermen by Month and Major Expenditure Categories.

Month	Bait	Food	Fees	Other	Auto Mileage and Costs	Total	Average Individual Equipment Value
December	\$ 748.44	\$ 695.52	\$	\$	10,584 mi. \$ 529.20	\$ 1,973.16	\$ 33.94
January	492.10	77.70			12,359 mi. 617.95	1,187.75	45.07
February	165.30	217.50			435 mi. 21.75	404.55	35.00
March	1,749.80	767.22		(hooks) 13.46	30,622 mi. 1,531.10	4,061.58	27.50
April	1,330.42	891.82			25,278 mi. 1,263.90	3,486.14	28.25
May	619.08	110.88			13,324 mi. 666.20	1,396.16	19.04
June	614.22	264.75			18,893 mi. 944.64	1,823.62	13.31
July	1,742.67	478.38	512.55		75,618 mi. 3,780.90	6,514.50	6.57
August	2,449.92	2,449.92	918.72		96,389 mi. 4,819.45	10,638.01	12.39
September	1,302.75	955.35			50,373 mi. 2,518.65	4,776.75	13.67
October	481.14	445.50	187.11		12,207 mi. 610.35	1,724.10	17.20
November	246.37	246.37			3,571 mi. 178.55	671.29	25.71
Totals	\$11,942.21	\$7,600.91	\$1,618.38	\$ 13.46	349,653 mi. \$17,482.65	\$38,657.61	\$ 19.07
							Yearly Individual Average

TABLE 27. Estimated Total Expenditures of Hunters by Month and Major Expenditure Categories.

Month	Gas and Oil for Boats	Food	Ammo	Auto Mileage and Costs	Total	Average Indivi- dual Equipment Value	
December	\$ 121.05	\$ -	\$ 365.84	4,815 mi. \$ 240.75	\$ 727.64	\$ 259.00	
January	61.48	265.00	159.00	601 mi. 30.05	515.53	116.67	
February	-	-	-	-	-	-	
March	-	-	-	-	-	-	
April	-	-	-	-	-	-	
May	-	-	-	-	-	-	
June	-	-	-	-	-	-	
July	-	-	-	-	-	-	
August	-	-	-	-	-	-	
September	-	-	-	-	-	-	
October	-	289.90	200.70	2,676 mi. 133.80	624.40	210.00	
November	41.42	81.75	123.17	927 mi. 43.35	289.69	262.50	
Totals	\$ 223.95	\$ 636.65	\$ 848.71	9,019 mi. \$ 447.95	\$ 2,157.26	\$ 220.29	Yearly Individual Average

