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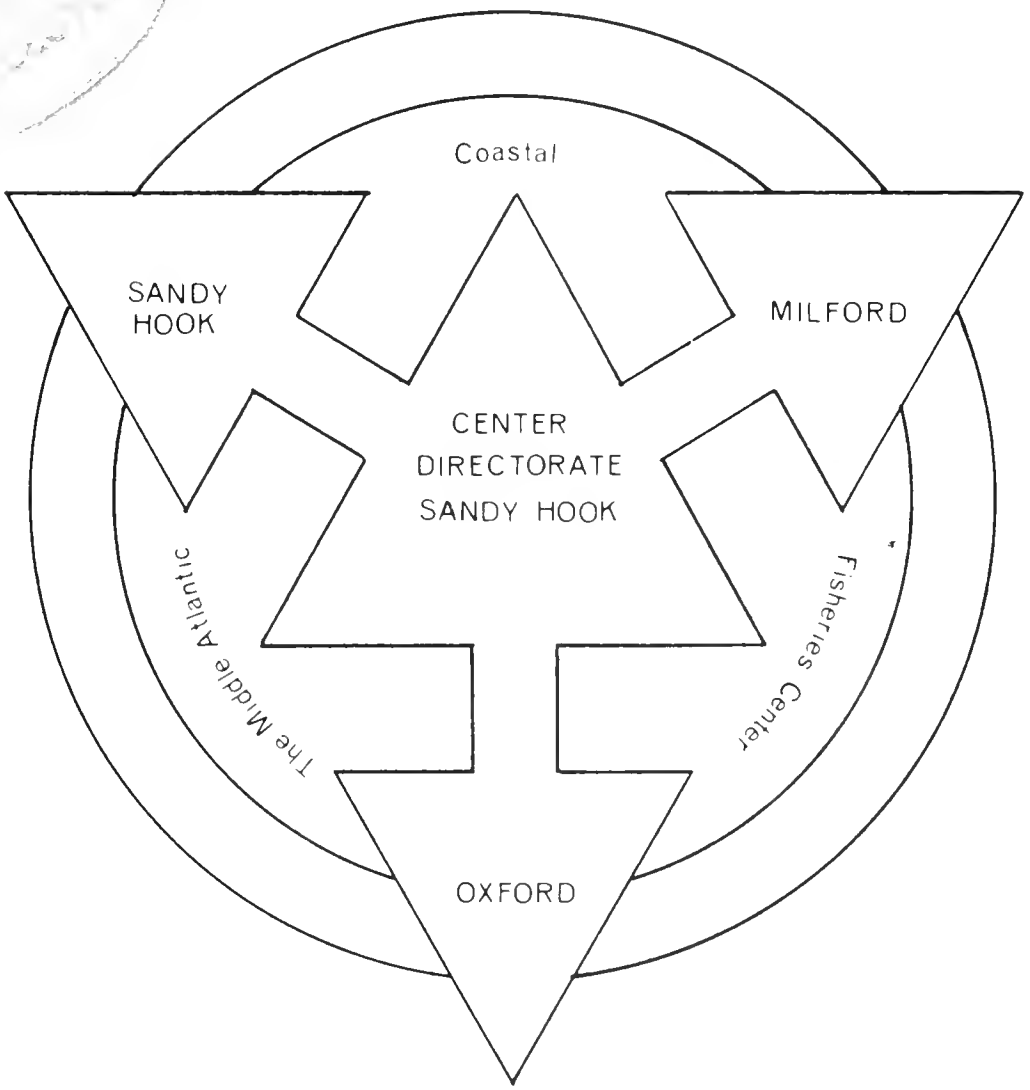
DAVIDS ISLAND PHASE I:
A SHORT-TERM ECOLOGICAL SURVEY OF WESTERN LONG ISLAND SOUND

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



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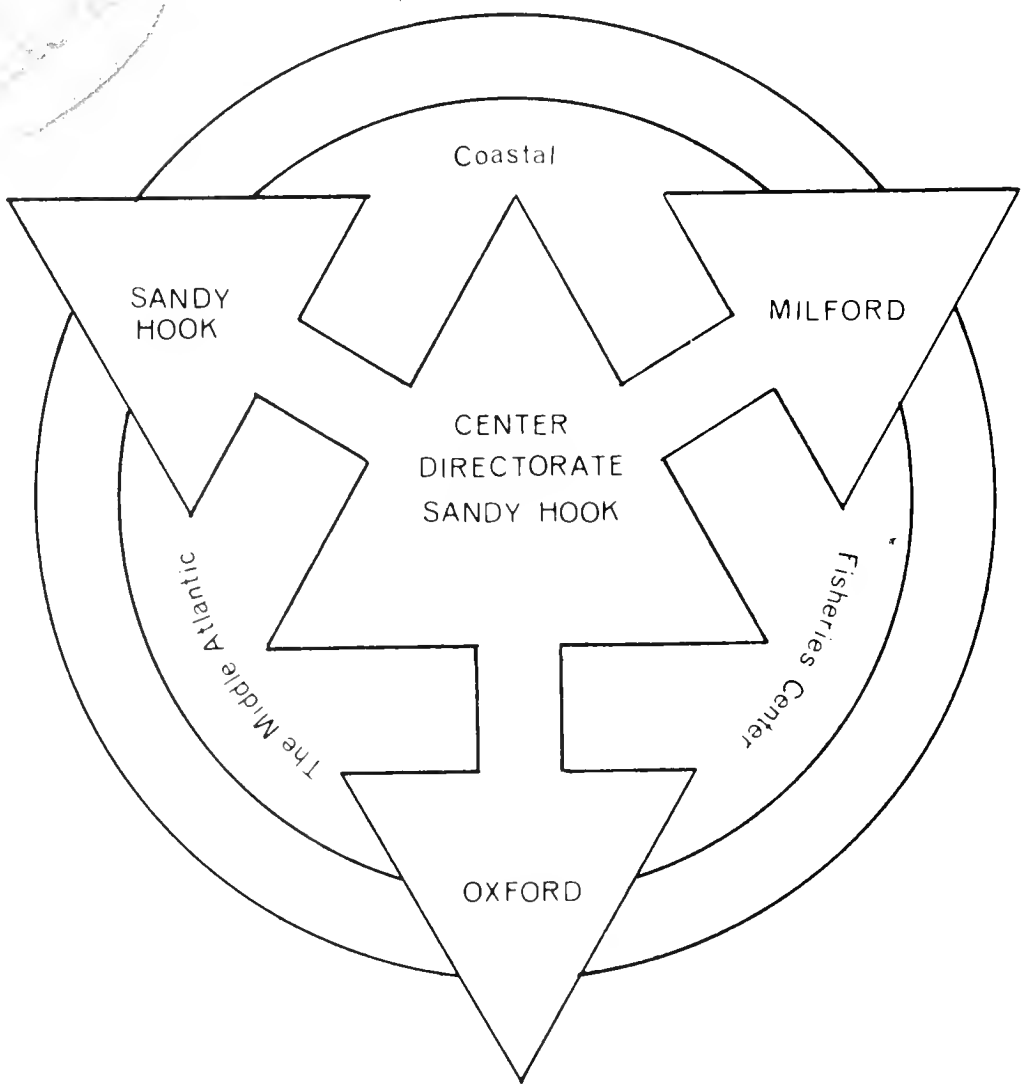

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A SHORT-TERM ECOLOGICAL SURVEY

OF WESTERN LONG ISLAND SOUND

by

U. S. DEPT. OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
MIDDLE ATLANTIC COASTAL FISHERIES CENTER
ECOSYSTEMS INVESTIGATIONS
SANDY HOOK LABORATORY
HIGHLANDS, NEW JERSEY 07732

5 December 1972

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ABSTRACT

A survey of the biology and water chemistry of western Long Island Sound was conducted from April-September 1971. Temperature and dissolved oxygen were found to be fairly uniform between stations, and followed predictable seasonal patterns. Nannochloris atomus and red tide dinoflagellates were prominent in the phytoplankton. Acartia sp. dominated the small zooplankton, with a well-defined succession of A. clausii by A. tonsa in July. Larger zooplankters were mostly larval forms, especially zoea and megalopa of brachyuran crabs. Fish eggs often reached high densities in July and August. Larval clupeid, engraulid and labrid fishes were very abundant during this period. Tautoga onitis, Tautogolabrus adspersus and Scophthalmus aquosus were the mature finfish collected in greatest numbers. Benthic infauna were rare in deep-water samples taken in early spring, but were more abundant around Davids Island later in the survey period. Generally, the study area was considered to support large and fairly typical populations of phytoplankton, zooplankton and larger fish and crustaceans. The area showed evidence of bacterial pollution, according to coliform data from several agencies.

INTRODUCTION

Extensive hydrographic and biological investigations have been made of central and eastern Long Island Sound (Riley, et al., 1956) and adjoining Block Island Sound (Riley, et al., 1952). No comparable study of the extreme western end of Long Island Sound (hereafter LIS), however, has been undertaken. The proposed construction of a steam electrical station on Davids Island in western LIS prompted the present study. The study was designed as a preliminary environmental survey, and included chemical and biological inventories to ascertain water quality and the abundance, distribution and seasonality of plant and animal life. This report summarizes data from eight cruises, each lasting three or four days, made from April 12 through September 2, 1971.

The study was, in part, funded by Battelle Northwest. A report was submitted to them on 22 November 1971. Principal participants in the various studies included Mr. Charles I. Gibson, Mr. Robert N. Reid, Miss Leslie H. Rogers and Mr. G. Newell Eisele.

MATERIALS AND METHODS

Field Operations

Sampling was done primarily at seven stations (Fig. 1). At these stations water quality, hydrography, zooplankton and epibenthic sled samples were taken at least monthly. Samples from other stations and with other gear (otter trawl, clam rake, Smith-McIntyre bottom grab, gill net and beach seine) were taken less regularly. A listing of the stations and collection dates for the various gears are given in Tables 1-8.

Water quality and hydrographic data were collected at surface and bottom levels from stations less than 35 feet deep, and at surface mid-depth and bottom at the deeper stations (Fig. 2). Water quality samples were taken with a Van Dorn bottle. Analyses included measurements of dissolved oxygen, chlorophyll-a, inorganic phosphate, total phosphate, nitrite and nitrate. Hydrographic data (temperature, salinity and conductivity) were taken with a Beckman Model RS-5 salinometer. Phytoplankton samples were taken with the Van Dorn bottle and fixed with a potassium iodide-iodine solution for laboratory examination.

Zooplankton collections (Fig. 3) were made with #8 (0.203 mm mesh aperture) and #0 (0.569 mm) Nitex half-meter nets. A flow meter was mounted in the throat of each net to estimate volume flow. Oblique tows were made by lowering the net slowly from surface to bottom and retrieving

at the same rate while moving ahead at about 1 nautical mile per hour. The samples were preserved in buffered formalin for laboratory examination.

Benthic infaunal samples (Fig. 4) were taken with a Smith-McIntyre bottom grab (sampling 0.1 m^2 of bottom) or a diver-operated stovepipe sampler (0.05 m^2). Samples of epibenthic macrofauna (Fig. 5) were taken with a 6-foot wide clam rake fitted with a 2-inch stretch mesh net. The rake was towed for 5 minutes at each station. Collections of smaller epibenthic organisms (Fig. 6) were made by lowering the epibenthic sled (0.569 mm mesh) to the bottom and towing for five minutes. The lowering and retrieval were done with the vessel moving ahead, so some contamination by pelagic organisms was possible. The samples were preserved in buffered formalin for later laboratory examination.

Finfish collections (Fig. 7) were made with a 30-foot otter trawl with 2 inch stretch mesh wings and 1¼ inch stretch mesh cod. The net was towed for ten minutes at 2 to 3 nautical miles per hour. The samples collected were either identified and measured on deck or preserved in 10% formalin for laboratory sorting. When possible, winter flounder (Pseudopleuronectes americanus) were saved for future stomach content analyses.

Finfish were also sampled with two other nets: a 50-foot monofilament gill net, 25 feet of which was 4-inch mesh and 25 feet 1½-inch mesh; and a 35 foot knotless nylon bag seine with ¼-inch mesh wings and bag.

SCUBA diver surveys were made in the shallow, rocky areas around Davids Island. This permitted examination of areas not amenible to traditional sampling gear. Surveys were made from the beach to 20 feet of water in the areas shown in Fig. 8.

Laboratory procedures

Dissolved oxygen measurements were made by the modified Winkler method (American Public Health Association, 1965). Nutrient and chlorophyll-a estimates were made using the methods of Strickland and Parsons (1968).

Phytoplankton samples (100 ml each) were concentrated 10- to 100-fold. Aliquots of concentrate were placed in four Palmer Nannoplankton Chambers and 10 microscopic fields per chamber were examined at 400 x. Nannochloris atomus (tentative identification) counts were made from unconcentrated aliquots using a haemocytometer.

Zooplankton samples collected with #8 mesh net were diluted to a known volume, and subsamples examined until at least 300 copepods were counted. Copepods were identified to species; other organisms were classified to specific level or higher taxonomic groups. As with all organisms collected, identification was carried as far as possible but was often limited by lack of time, experience or available literature. Zooplankton collected with #0 mesh net and epibenthic sled were sorted for larger crustaceans (i.e., mysids, decapod larvae), fish eggs and fish larvae. Entire samples were examined except those of very large volume (1 quart or more), of which only an aliquot was sorted.

Benthic samples were sorted to the 1 mm level.

Fish saved for stomach content analysis were measured, their stomachs removed and counts made of the identifiable organisms. Identification of food organisms was made to the lowest taxonomic group possible.

RESULTS

Hydrography

In our study of western LIS, temperature showed little variation between stations measured on the same date, though large seasonal changes were evident (Figs. 9-17). Average surface temperatures rose from 5.5°C in mid-April to 22.1 in early August. Average bottom temperatures ranged from 4.7 on the April cruise to 21.2 at the end of August. Dissolved oxygen was also fairly uniform between stations measured on the same date, except for low values in Station 1 surface waters throughout the sampling period. Dissolved oxygen decreased from high spring averages (10-13 ppm) to 4.0 and 1.9 ppm in surface and bottom waters respectively, by early August (Figs. 7-19).

Salinity rose slightly at stations taken moving east from the Throgs Neck Bridge, but was otherwise quite uniform both spatially and temporally during the course of this study. Mean salinities ranged from 25.1 o/oo (surface waters, Cruise 3) to 26.8 o/oo (bottom, Cruise 8). The small differences in temperature and salinity between surface and bottom waters at all stations indicate thorough mixing is taking place in this area of the Sound.

Nutrient samples collected on our cruises have been processed and the data fed to our computer, but results are not yet available.

Phytoplankton

The phytoplankton was dominated numerically by Nannochloris atomus, a very small (less than 3 μ diameter) Chlorella-like algae. Nannochloris atomis densities showed no clearly defined changes with location or season in the sampling area (Table 9). Densities of the larger phytoplankters (greater than 5 μ) increased somewhat moving east from Throgs Neck to Station 6; peak densities tended to occur later in the season moving in the same direction (Table 9). Very high densities for Station 6 on July 22 and August 2 were cheifly due to the presence of the dinoflagellates Massartia rotundata and Prorocentrum micans, respectively. Computerized listings of phytoplankton species and their densities are given in Appendix 1.

Zooplankton

Species of copepods collected with #8 mesh net, and their order of abundance, are listed in Table 10. Acartia clausii was the dominant copepod from early April until the end of July. It reached peak numbers (over 4,400/m^3) in early June. Acartia tonsa first appeared in early July and was the dominant copepod from mid-July to the end of the study in late August (Figs. 18-22). Other copepods present were Temora longicornis, Paracalanus parvus, Pseudocalanus minutus, Eurytemora hirundoides, Tortanus discaudatus, Oithona sp. and Tachidius brevicornis. Tortanus discaudatus did not appear in the #8 mesh net subsample but was found in #0 mesh and epibenthic sled samples.

Bivalve larvae became very abundant in early June and then gradually declined in number through the remainder of the study. Polychaete larvae were present in low numbers throughout the study period except for late June and early July, when up to 3,300/m^3 were taken. Other organisms occurring in the #8 mesh net samples are shown in Table 11. Appendix 2 gives computer listings of all organisms collected with this net.

Crustaceans

Crustacean populations (exclusive of copepods) sampled by #0 mesh net and epibenthic sled are summarized in Tables 12-32. The plankton was dominated by larval forms, especially zoea and megalopa stages of brachyuran crabs. Zoea and megalopa (glaucothoe) of pagurid crabs were next in abundance in the meroplankton. Also fairly numerous were zoea of the caridean shrimps, Crangon septemspinosus and Palaemonetes sp. Zoeal Thalassinidea (probably the burrowing shrimp Callianassa sp.). were occasionally collected. Of the holoplankton, only the opossum shrimp, Neomysis americana, occurred regularly. Crustaceans encountered in epifaunal sampling included, in addition to the above groups, adult Crangon septemspinosus, which were sometimes abundant, and smaller numbers of amphipods of several species, isopods (mostly Edotea triloba) and cumaceans.

No seasonal succession of crustacean species was apparent in our collecting, though there was a well-defined progression of developmental instars over the sampling period. Crab zoea were present throughout this period, occurring in high densities (to 260/m^3) from early June into August. Their numbers had diminished by the September 1 sampling, as was true of the planktonic crustaceans generally. Crab megalopa first appeared in our June 24 collections. They were most abundant in late July and early August, sometimes comprising a majority of the plankton biomass, but could no longer be found by September 1. Small numbers of postlarval crabs (Ovalipes ocellatus and Cancer irroratus) were taken from July 20 through September 1.

Pagurid zoea were encountered from early June through September 1, with peak abundance in July and early August. Pagurid glaucothoe occurred in fair numbers from mid-July into August. Like the bachyuran megalopa, glaucothoe were not found on our final cruise.

Larval Crangon septemspinosus were present throughout the study, and were slightly more abundant in mid-summer than at other times. Mature C. septemspinosus were fairly well represented in epibenthic samples from May to early August. Neomysis americana were collected on every cruise, with no clearly-defined population peak but several instances of very large numbers per tow. Zoea of Palaemonotes sp. and Thalassinidea were recorded from June onward; their numbers were always small in comparison with the above groups.

Distribution of these crustaceans varied little with changes in location in the area studied, except that Neomysis americana and adult Crangon septemspinosus were more numerous at deeper stations towards Throgs Neck than in shallow areas around Davids Island.

The rock crab, Cancer irroratus, was the most abundant of the larger crustaceans sampled by otter trawl (Tables 33-36) and clam rake (Tables 37-38). Lobsters (Homarus americanus) and hermit crabs (Pagurus sp.) were present in fair numbers. Calico crabs (Ovalipes ocellatus) and spider crabs (Libinia sp.) were infrequently encountered. All these crustaceans except hermit crabs were more numerous in collections from deeper waters near Throgs Neck than elsewhere. However, SCUBA surveys revealed that lobsters and crabs were also plentiful in rocky areas around Davids Island. Hermit crabs were often extremely abundant in these areas.

Benthos

Analyses of two series of benthic samples yielded contrasting results. Collections made in April with the boat-operated Smith-McIntyre grab contained only small numbers of infaunal organisms, and species diversity was low (Table 39). Only Nassarius sp. (actually an epifaunal organisms) was present at all stations.

Samples taken in July showed a much richer benthic community (Table 40). This sampling was done with a diver-operated hand grab in waters less than 10 feet deep close to Davids Island. In addition to Nassarius sp., the soft-shelled clam, Mya arenaria, was abundant, and polychaetes were present in fair numbers and diversity.

Clam rake samples revealed scattered populations of hard clams (Mercenaria mercenaria) and small numbers of other benthic organisms (Tables 37-38).

Diver surveys of the area revealed an abundant flora and attached fauna on most of the hard substrata in depths to 15 feet. Large beds of mussels (Mytilus edulus), barnacles (Balanus sp.) and sea lettuce (Ulva sp.) were observed. The barnacles and mussels were also abundant in the intertidal zone while the sea lettuce was confined to the sublittoral zone.

Fish Eggs and Larvae

Fish eggs and larvae collected with #0 mesh net and epibenthic sled are listed in Tables 41-61. Fish eggs were collected on all cruises. with densities increasing until June and remaining high through July. Their abundance dropped sharply in August. Species determinations have not yet been made on the eggs.

Fish larvae of 17 taxa were identified during the study. Their numbers increased from our first observations in April until mid-July, and then declined again. By September we were unable to find fish larvae.

Eel elvers (Anguilla rostrata), sand lance (Ammodytes americanus) and winter flounder (Pseudopleuronectes americanus) were the most common species taken during April and early May. Windowpane flounder (Scophthalmus aquosus), hake (Urophysis sp.) and herring and anchovies (Clupeiformes) appeared in early June and remained until late August. The hake were present in low numbers and not found consistently at any station. Windowpane flounder larvae were plentiful at all stations. Clupeiform larvae were very abundant throughout the study area during this period. Larval cunner (Tautogolabrus adsperus) and blackfish (Tautoga onitis) appeared in June and were consistently present at all stations until late August. Weakfish (Cynoscion regalis) larvae were found in low numbers in July and August. Other fish larvae collected were: Fundulus sp., Enchelyopus cimbrius, Syngnathus fuscus, Scomber scombrus, Triglidae, Myoxocephalus octodecemspinosus, Menidia sp. and Sphaeroides maculatus.

Finfish

Otter trawl collections (Tables 33-36) were dominated by windowpane flounder (Scophthalmus aquosus) and winter flounder (Pseudopleuronectes americanus). These two species comprised 84% of the catch. The majority of the flounder were caught at the deeper stations (1, 2 and 3). Another

13% of the catch was made up of cunner (Tautogolabrus adspersus), tomcod (Microgadus tomcod) and blackfish (Tautoga onitis). The remaining 3% was comprised of longhorn sculpin (Myoxocephalus octodecemspinosus), eel (Anguilla rostrata), whiting (Merluccius bilinearis), fourspot flounder (Paralichthys oblongus), striped sea robin (Prionotus carolinus), common sea robin (Prionotus evolans), Atlantic mackerel (Scomber scombrus), porgy (Stenotomus chrysops), hickory shad (Alosa mediocris) and American smelt (Osmerus mordax).

A gill net, used in the rocky area east of Davids Island where trawling was not feasible, was set and worked four times. The time period from late afternoon to sunset was sampled twice, from sunset to early morning once and from morning to late afternoon once. No fish were taken during the morning to afternoon sampling period. The evening sets produced herring, blackfish and cunner and the night set caught blackfish and cunner. Table 62 lists the sampling times and fish collected.

Haul seining was limited to two sandy beaches on Davids Island because of the rocky shoreline elsewhere. The common silverside, Menidia menidia, was the fish most frequently taken. Two other species of fish were collected, young herring (Alosa sp.) and sand lance (Ammodytes sp.).

Diver surveys revealed that large numbers of small fish inhabited the shallow, rocky areas around Davids Island. The most commonly-observed fish were young cunner. Young winter flounder were also abundant, with schools of 50 or more seen scattered over the bottom.

Silversides were plentiful in the shallows during summer and fall. Large cunner and blackfish were found in almost every crevice during our night dives. Toadfish (Opsanus tau), fourspot flounder (Paralichthys dentatus), pipefish (Syngnathus fuscus), puffers (Sphaeroides maculatus), sea robins and eels were observed quite often during the dives. The area appeared to have an abundant fish population.

DISCUSSION

Our study indicates that the Davids Island region of LIS has a flora and fauna typical of a temperate estuary with the hydrographic characteristics previously described. Densities of the large phytoplankton are similar to those reported by Riley and Conover (1967) for western LIS and by S. M. Conover (1956) for central LIS, except for the two instances in our survey (Station 6 on July 20 and August 2) where the dinoflagellates Massartia rotundata and Prorocentrum micans were present in extremely high numbers. Both these species have been reported by Sandy Hook scientists as major components of red tide blooms (Jay O'Reilly, Sandy Hook Laboratory for Environmental Relations of Fishes, pers. comm., 15 November 1971).

Riley (1952) reports lower cell densities for Block Island Sound (hereafter BIS). He considers LIS populations an order of magnitude greater than the less nutrient-rich outer coastal waters, with BIS intermediate between the two. Neither of these investigators mention Nannochloris atomus, which we found in such great abundance. However, Hulburt (1963) recognized the occasional dominance of N. atomis in LIS flora. If desired, more data on the productivity of the area can be furnished after results of our chlorophyll-a analyses become available.

The copepod community is Acartia-dominated with densities comparable to earlier values found for LIS (Deevey, 1956) and similar estuaries (Deevey, 1952, BIS; Heinle, 1956, Patuxent River estuary; Herman, et al.,

1968, Patuxent; Jefferies, 1959, Raritan Bay; Yamazi, 1962, Sandy Hook Bay). The seasonal shift from Acartia clausii to Acartia tonsa in July is identical to that described by R. J. Conover (1956) for the central portion of the Sound.

The composition of the crustacean population in general shows good qualitative agreement with studies by Deevey on central LIS (1956) and BIS (1952), though relative abundances of some groups differed from the present study. Deevey also found brachyuran zoea to be the dominant larval crustacean form, with densities to 410/m^3. Megalopa, however, were much less frequently encountered in her collections than in ours. Pagurid zoea and glaucothoe were more numerous in our survey than in Deevey's, and amphipods less so. Abundance of cumaceans, Neomysis americana and larval Crangon septemspinosus was similar in all studies. Deevey did not report the occurrence of Palaemonetes sp. zoea, which we found in small numbers. Hippolyte sp. and stomatopod larvae present in her surveys were not encountered in ours.

Our benthic infaunal samples show an unexplained disparity. The April collections were almost devoid of life, while samples taken from shallower waters in July had large numbers of species and individuals. Sampling was not extensive enough to determine whether this difference was correlated to depth, season or some other factor(s). It appeared unlikely that the earlier population could have been limited by ambient dissolved oxygen, temperature or salinity. Later collections consisted mostly of young organisms; it may be that they had not yet been produced or were unavailable to our gear during the first sampling period.

Species of fish larvae present in the survey area agreed closely with Wheatland's (1956) data for central LIS. Larval densities were much greater in the present study. This was especially true for clupeiformes, with more than $20/m^3$ frequently encountered in July, and a maximum of $56/m^3$ (compared to Wheatland's maximum of $3.6/m^3$). Perlmutter (1938) had earlier reported only small numbers of larvae of clupeiformes, rockling and windowpane flounder in west-central LIS. BIS was found to be similar in larval fish populations except for the presence there of larval cod (Gadus morhua), yellowtail (Limanda ferruginea) and lumpfish (Cyclopterus lumpus), and the absence of rockling, winter flounder and Ammodytes sp. (Merriman and Sclar, 1952).

The abundance of fish eggs and larvae in our study indicates that the area is an important spawning and nursery grounds for a variety of finfish. Diver observations also showed juvenile fish to be present, particularly winter flounder and cunner.

Trawl information indicates the adult groundfish population is poor in abundance and variety. Because of limitation on the gear used and the study design, these data may be misleading. Surveys of local periodicals and interviews with fishermen and tackle store proprietors indicate that the area is productive and provides an excellent sport fishery for pelagic species such as striped bass (Morone saxatilis), bluefish (Pomatomus saltatrix), blackfish (Tautoga onitis) and winter flounder. (Fig. 23; from Freeman and Walford, Sandy Hook Lab., unpublished data).

Commercial fishing in the immediate area is limited to menhaden (Brevoortia tyrannus) and lobsters. LIS as a whole supports commercial fisheries for bluefish, butterfish, blackback (winter flounder), fluke, menhaden, porgy and striped bass, with smaller catches of mackerel, sea bass, weakfish and several other species. Annual landings in LIS from 1954-1969 are listed in Table 63 (U. S. Fish and Wildlife Service, 1954-69).

The shallow waters support a lush epifauna and a heavy growth of sea lettuce. These observations, along with the previously-noted abundance of phyto- and zooplankton and larger fish and crustaceans, point up the productive, nutrient-rich condition of the western LIS.

The area should be considered somewhat polluted. Coliform bacteria densities and BOD were not measured in our study; however, a survey of available data revealed portions of western LIS to be of unacceptable water quality in regard to these parameters. The Environmental Protection Agency (1971) found "Evidence of severe bacterial pollution, in violation of the water quality standards...in the East River, off Stepping Stones, off Hewlett Point, Eastchester Bay,...Little Neck Bay, Manhasset Bay " (Tables 64-65). EPA feels that "discharge of inadequately treated municipal and industrial wastes with their high concentrations of biochemical oxygen demand has resulted in seriously low levels of dissolved oxygen in violation of the Federal-State standards " in all but the last two of the above named locations (Fig. 24 shows sampling locations for all coliform surveys cited).

The Interstate Sanitation Commission (1970) reported an increase in coliform density between LIS surveys made in 1959 and 1970 (Fig. 25). Yearly data from the New York City Harbor Pollution Survey (1956-70) show no clear-cut rise in coliform density at Hart Island or Stepping Stones during this period, though an increase in BOD is apparent (Tables 66-67).

Also not covered by our study was a bird population census. Schierbaum, et al. (1959) mentions LIS as a wintering ground for many Atlantic Flyway marsh ducks, and a resting area for others. Bird counts for western LIS (1948-1970) from the New York Department of Environmental Conservation should reach this office by Nov. 22 and will be forwarded upon request.

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LIST OF FIGURES

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Letter

A Computer print-out of statistics generated from our phytoplankton counts. Densities are in cells/ml.

A-1 Listing of numerical and alpha codes for phytoplankton species.

B Computer listings of raw and calculated ($\#/m^3$) data for zooplankton collected with #8 mesh net. Included is an explanation of the design of the computer program and the information printed with each sample listing.

B-1 Summaries of average densities ($\#/m^3$) for each species by station and by cruise.

B-2 Numerical and alpha codes for zooplankton species.

* Appendices may be available upon request.

Figure 1

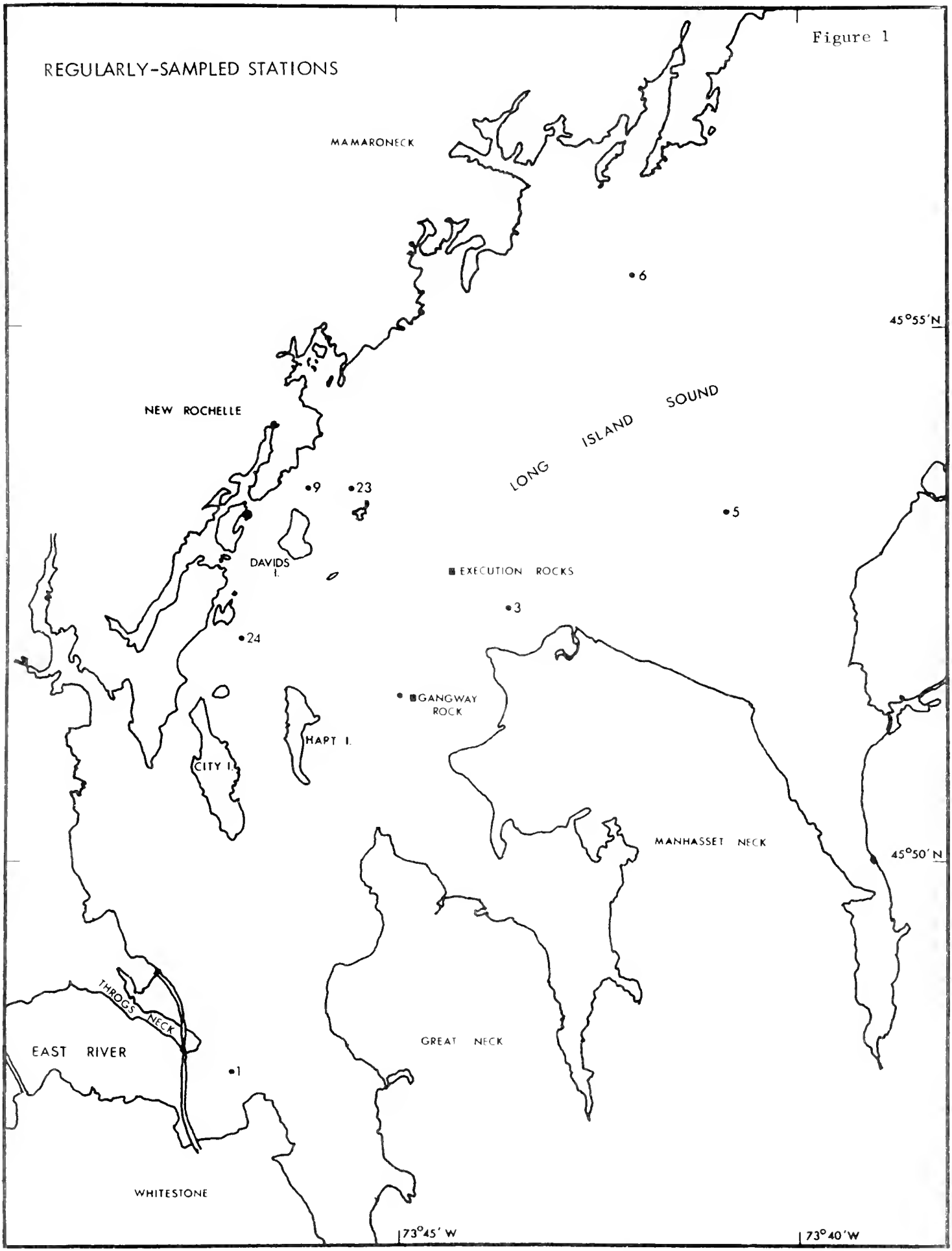

REGULARLY-SAMPLED STATIONS
MAMARONECK
NEW ROCHELLE
LONG ISLAND SOUND
DAVIDS I.
EXECUTION ROCKS
GANGWAY ROCK
HAPT I.
CITY I.
MANHASSET NECK
THROGS NECK
EAST RIVER
GREAT NECK
WHITESTONE
•1
•3
•5
•6
•9
•23
•24
45°55'N
45°50'N
73°45'W
73°40'W

Figure 2

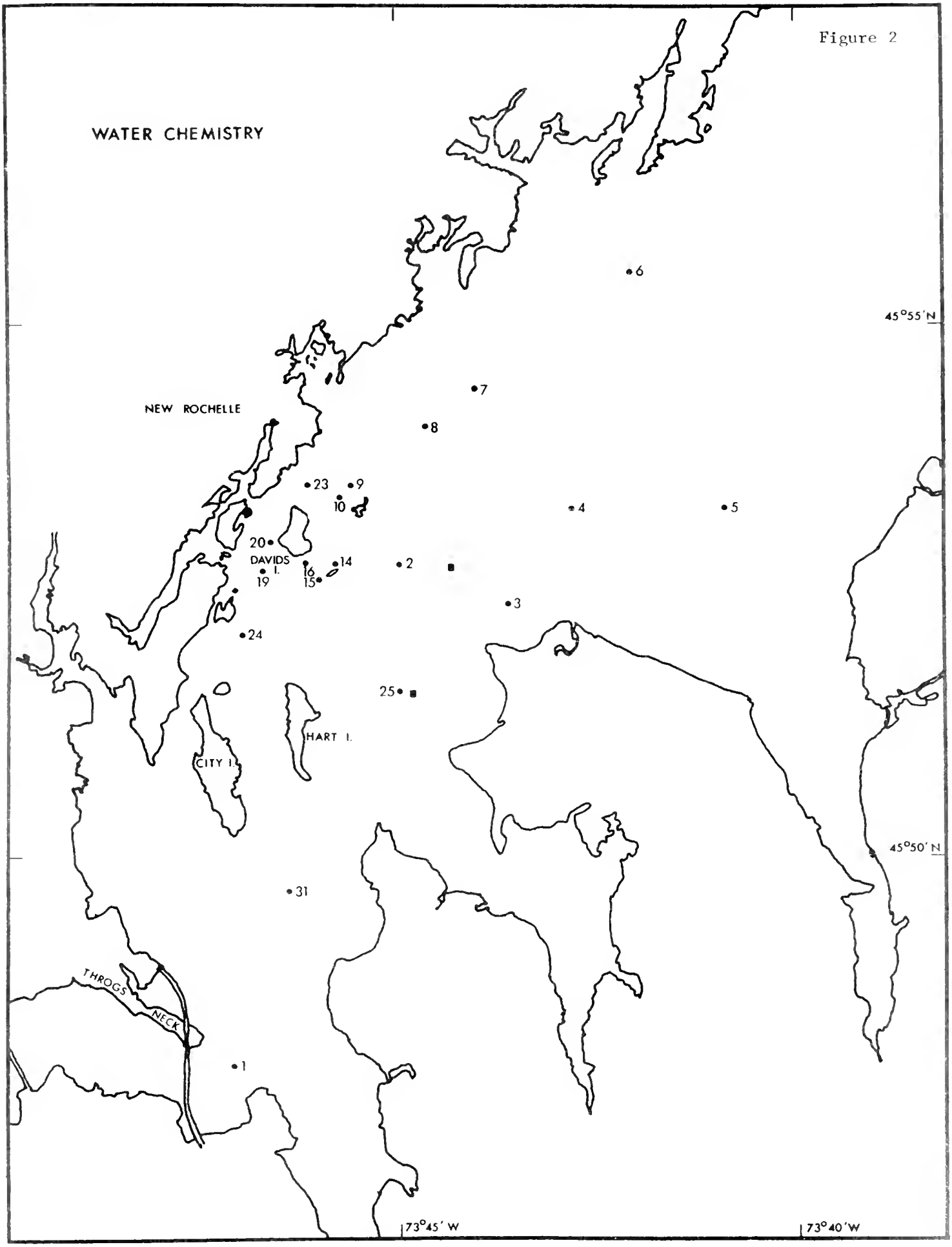

WATER CHEMISTRY
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
THROGS NECK
45°55'N
45°50'N
73°45' W
73°40'W
1
2
3
4
5
6
7
8
9
10
14
15
16
19
20
23
24
25
31

Figure 3

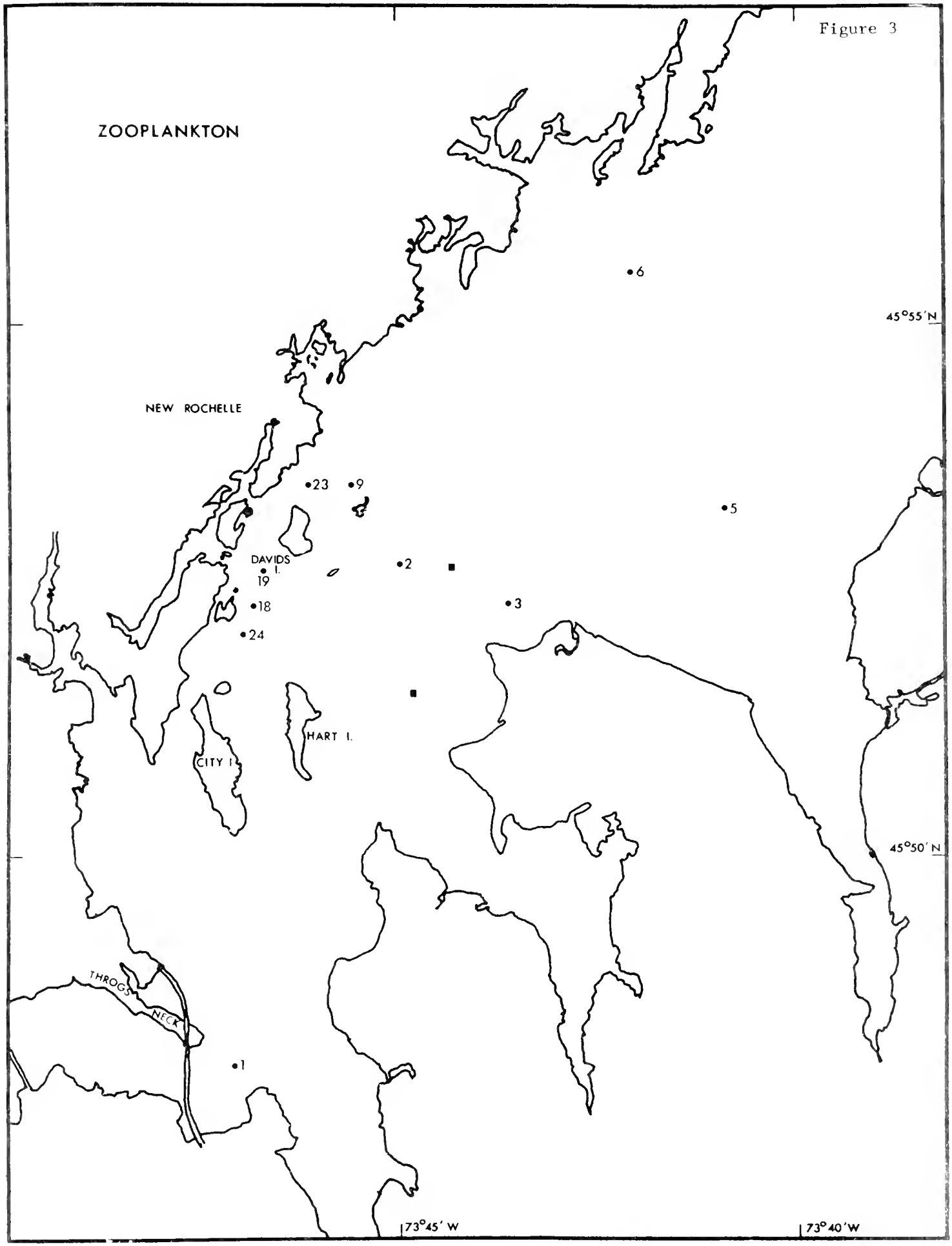

ZOOPLANKTON
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
THROGS NECK
45°55'N
45°50'N
73°45' W
73°40'W
1
2
3
5
6
9
18
19
23
24

Figure 4

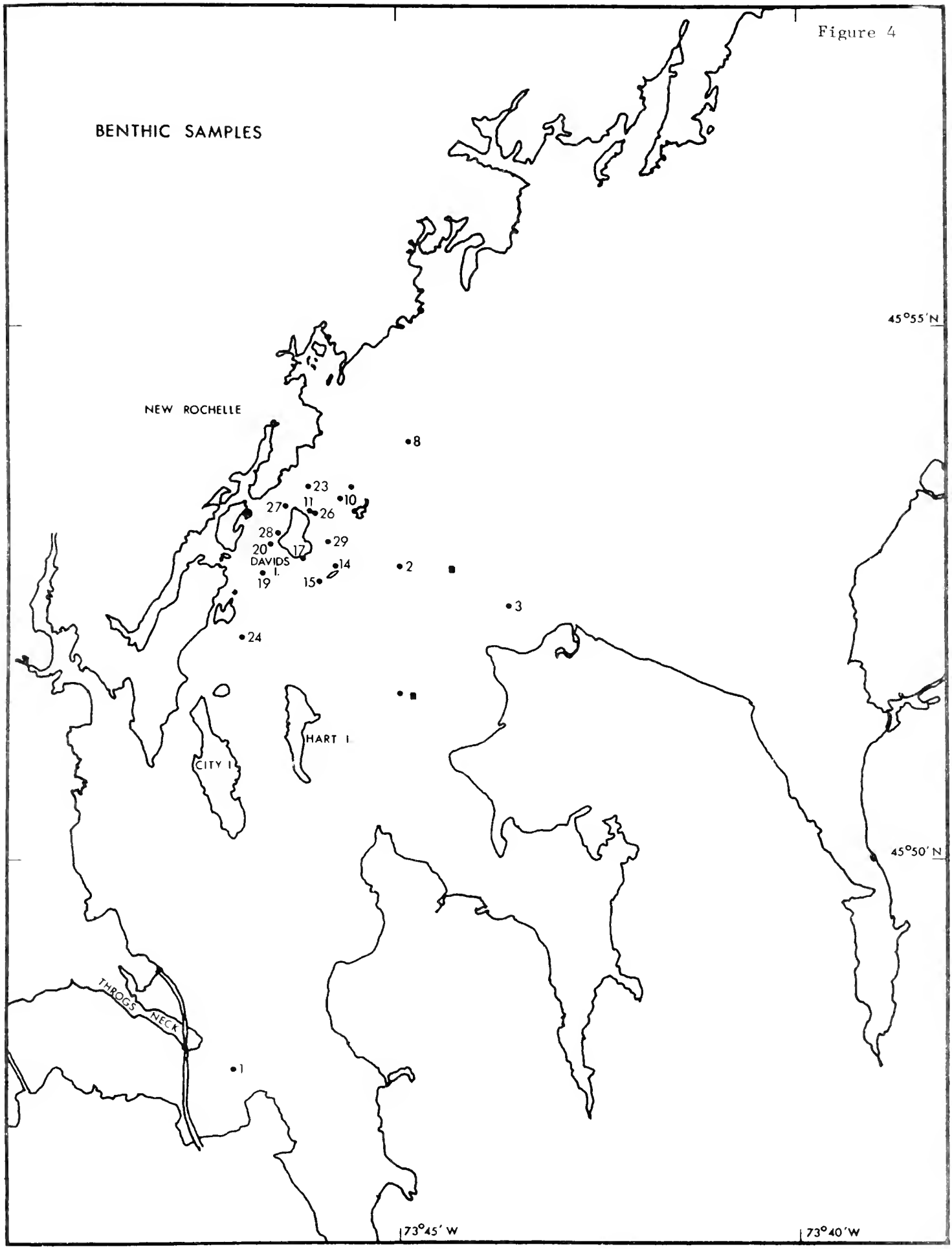

BENTHIC SAMPLES
45°55'N
NEW ROCHELLE
8
23
11
10
27
26
28
29
20
17
DAVIDS I.
14
19
15
2
3
24
HART I.
CITY I.
45°50'N
THROGS NECK
1
73°45'W
73°40'W

Figure 5

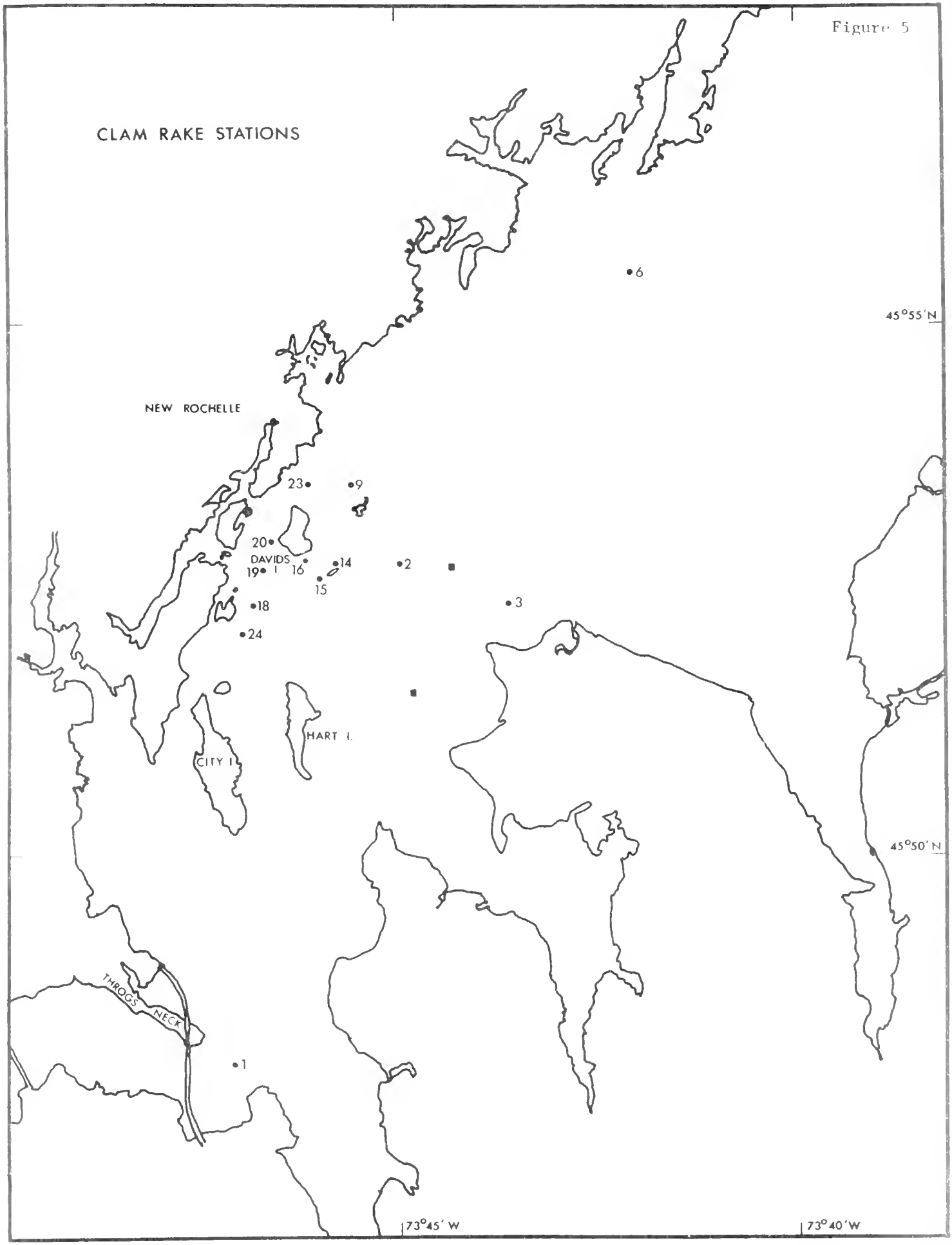

CLAM RAKE STATIONS
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
THROGS NECK
1
2
3
6
9
14
15
16
18
19
20
23
24
45°55'N
45°50'N
73°45' W
73°40'W

Figure 6

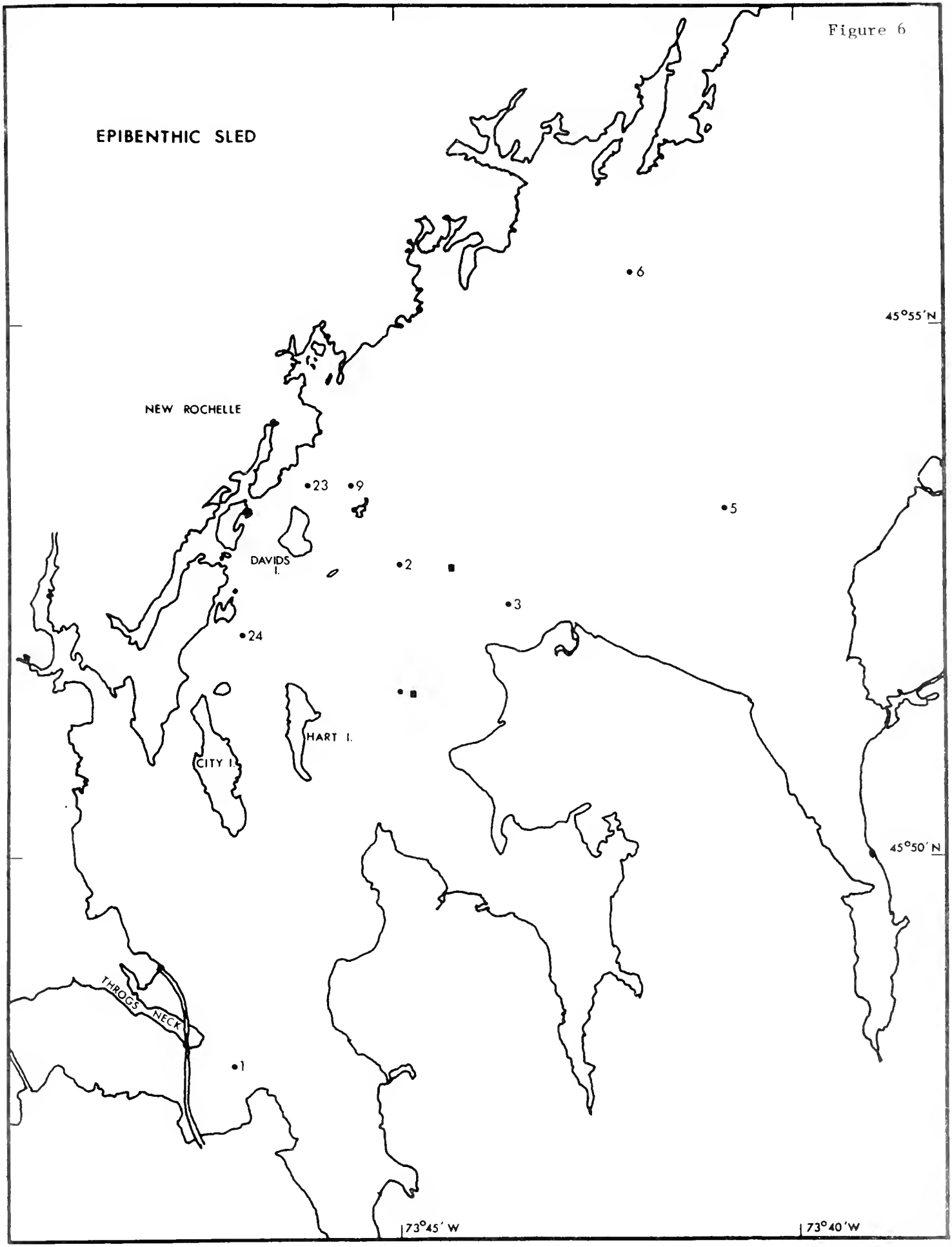

EPIBENTHIC SLED
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
THROGS NECK
•1
•2
•3
•5
•6
•9
•23
•24
45°55'N
45°50'N
73°45'W
73°40'W

Figure 7

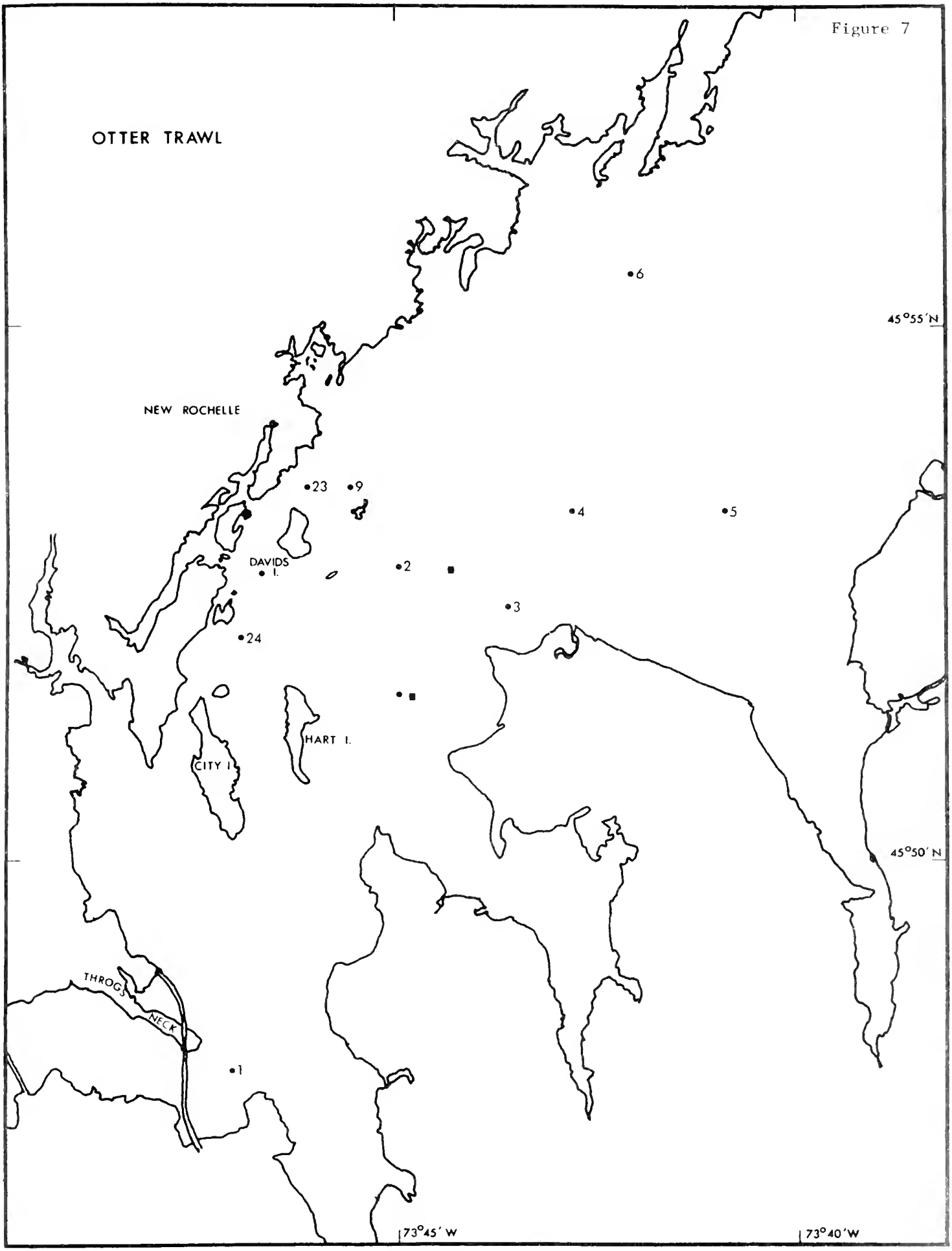

OTTER TRAWL
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
THROGS NECK
45°55'N
45°50'N
73°45'W
73°40'W
1
2
3
4
5
6
9
23
24

Figure 8

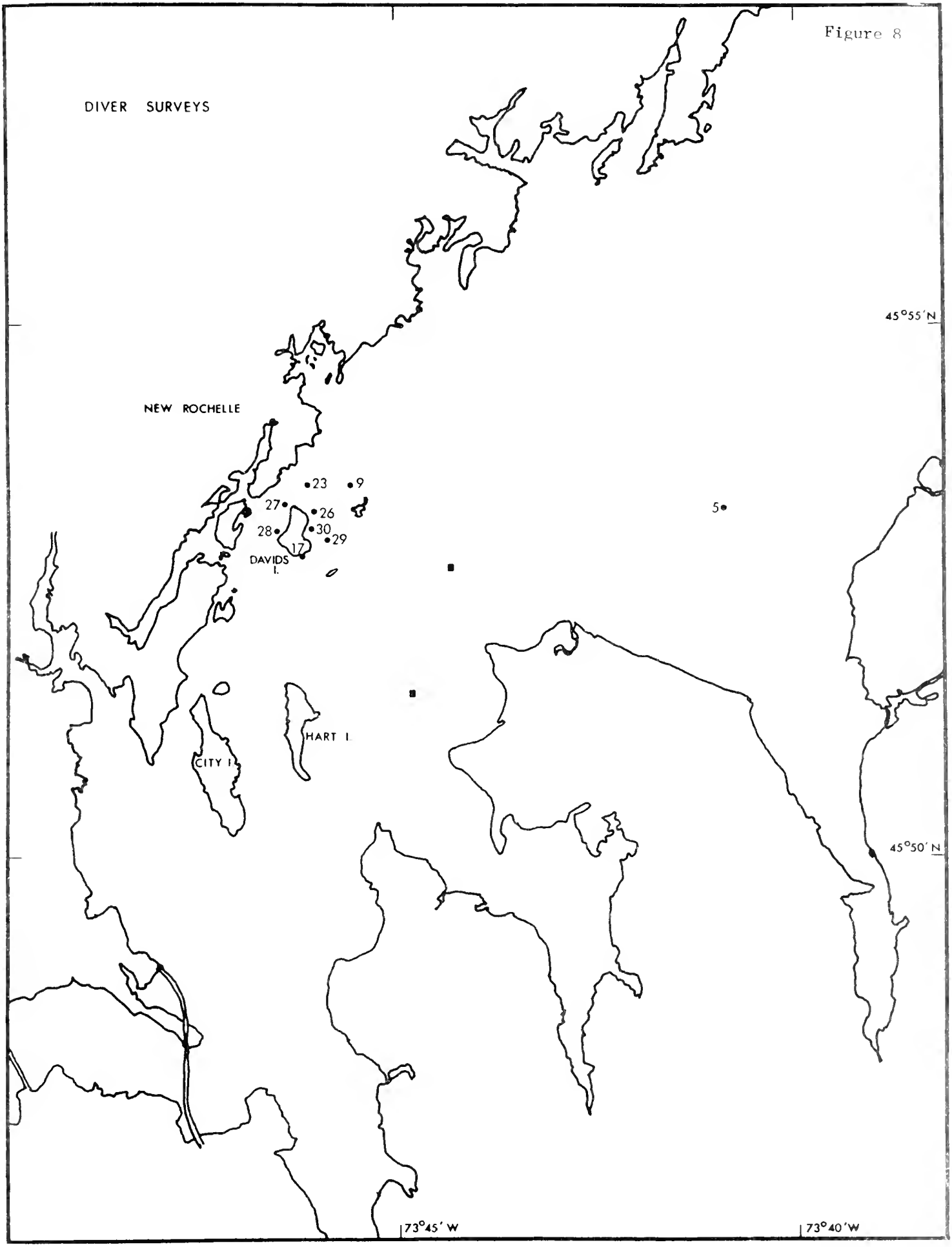

DIVER SURVEYS
45°55'N
NEW ROCHELLE
23
9
27
26
5
28
30
29
17
DAVIDS I.
HART I.
CITY I.
45°50'N
73°45'W
73°40'W

Figure 9

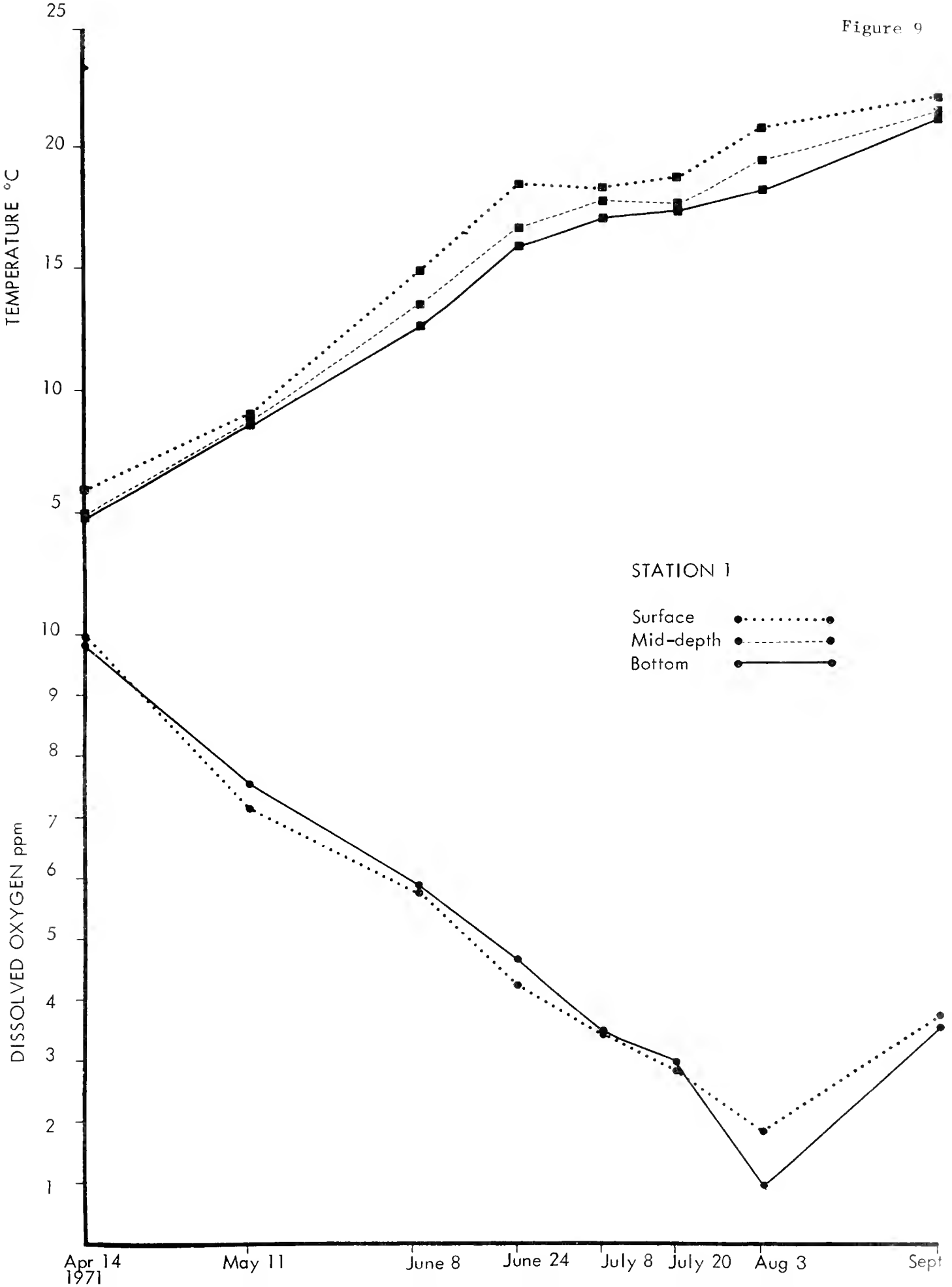

TEMPERATURE °C
25
20
15
10
5
STATION 1
Surface
Mid-depth
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 10

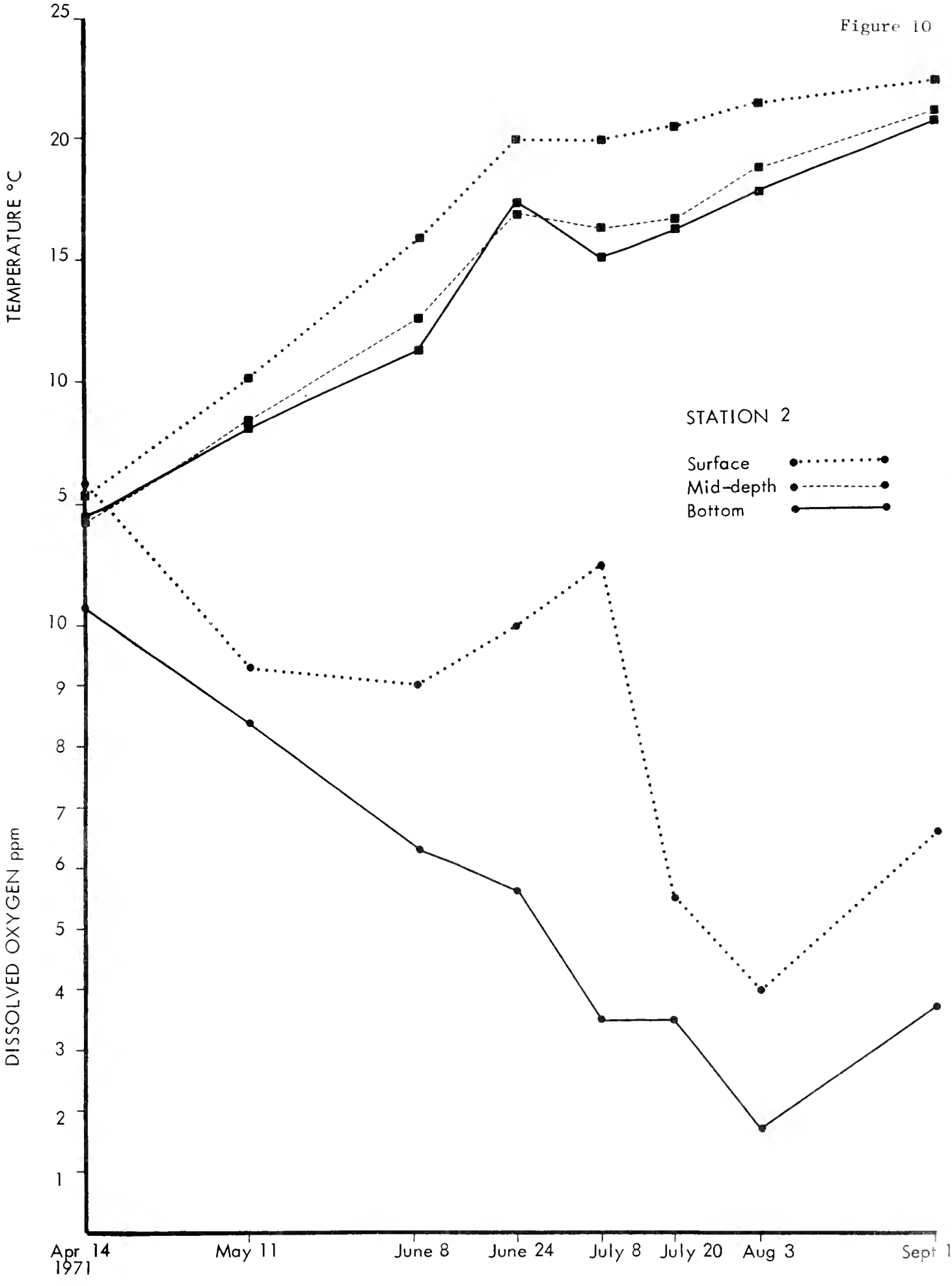

TEMPERATURE °C
25
20
15
10
5
STATION 2
Surface
Mid-depth
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 11

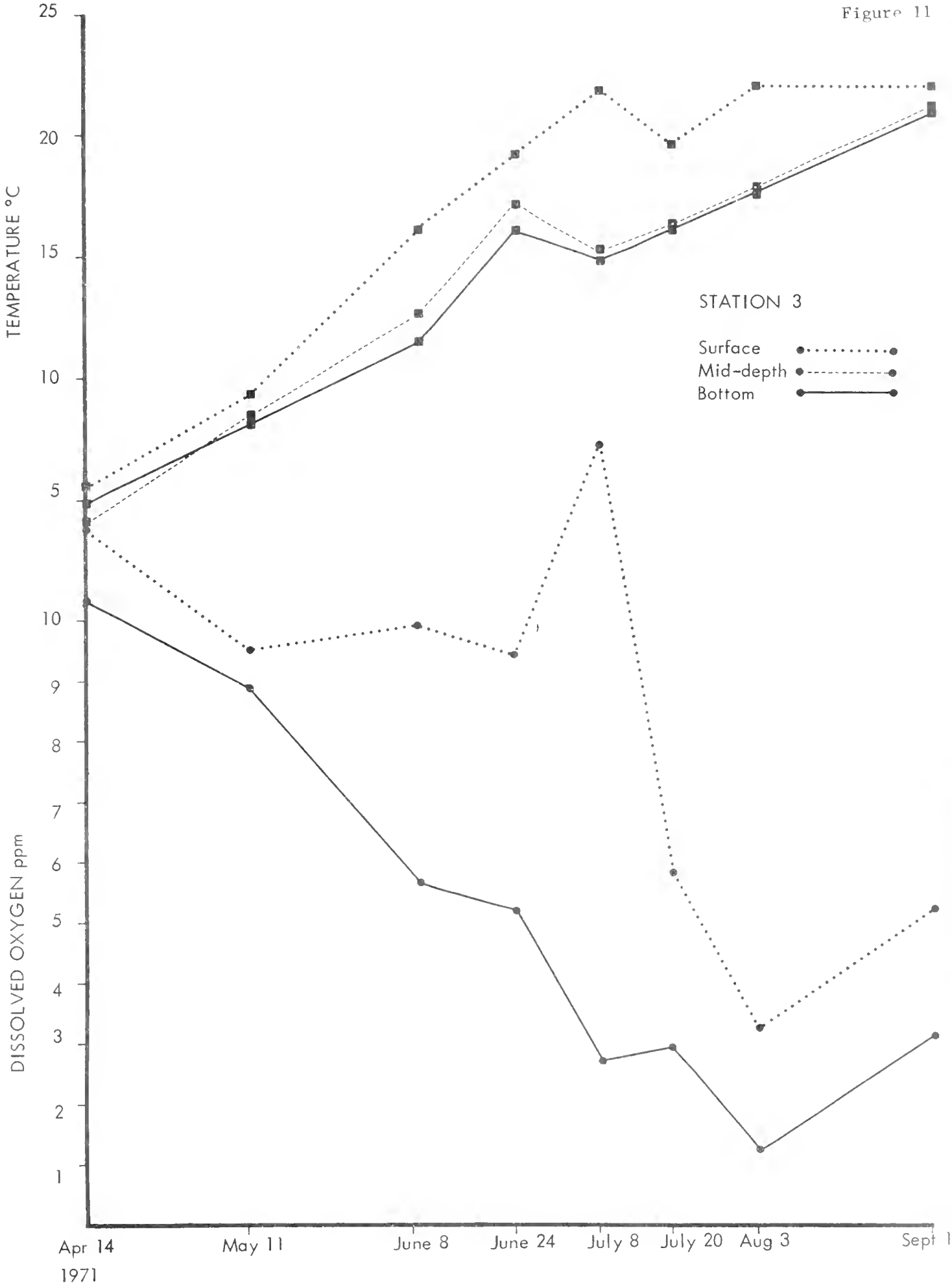

TEMPERATURE °C
25
20
15
10
5
STATION 3
Surface
Mid-depth
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 12

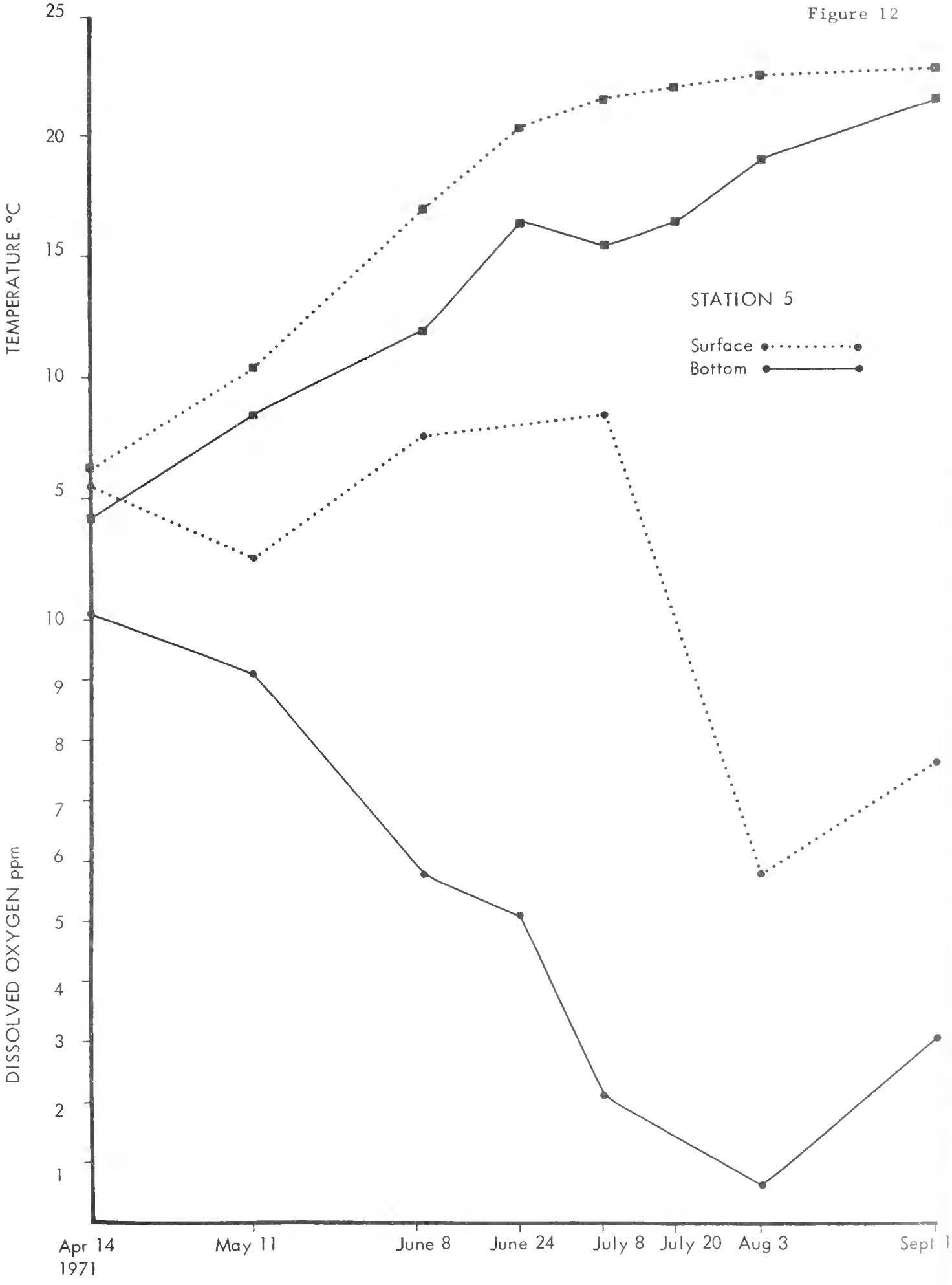

TEMPERATURE °C
25
20
15
10
5
STATION 5
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 13

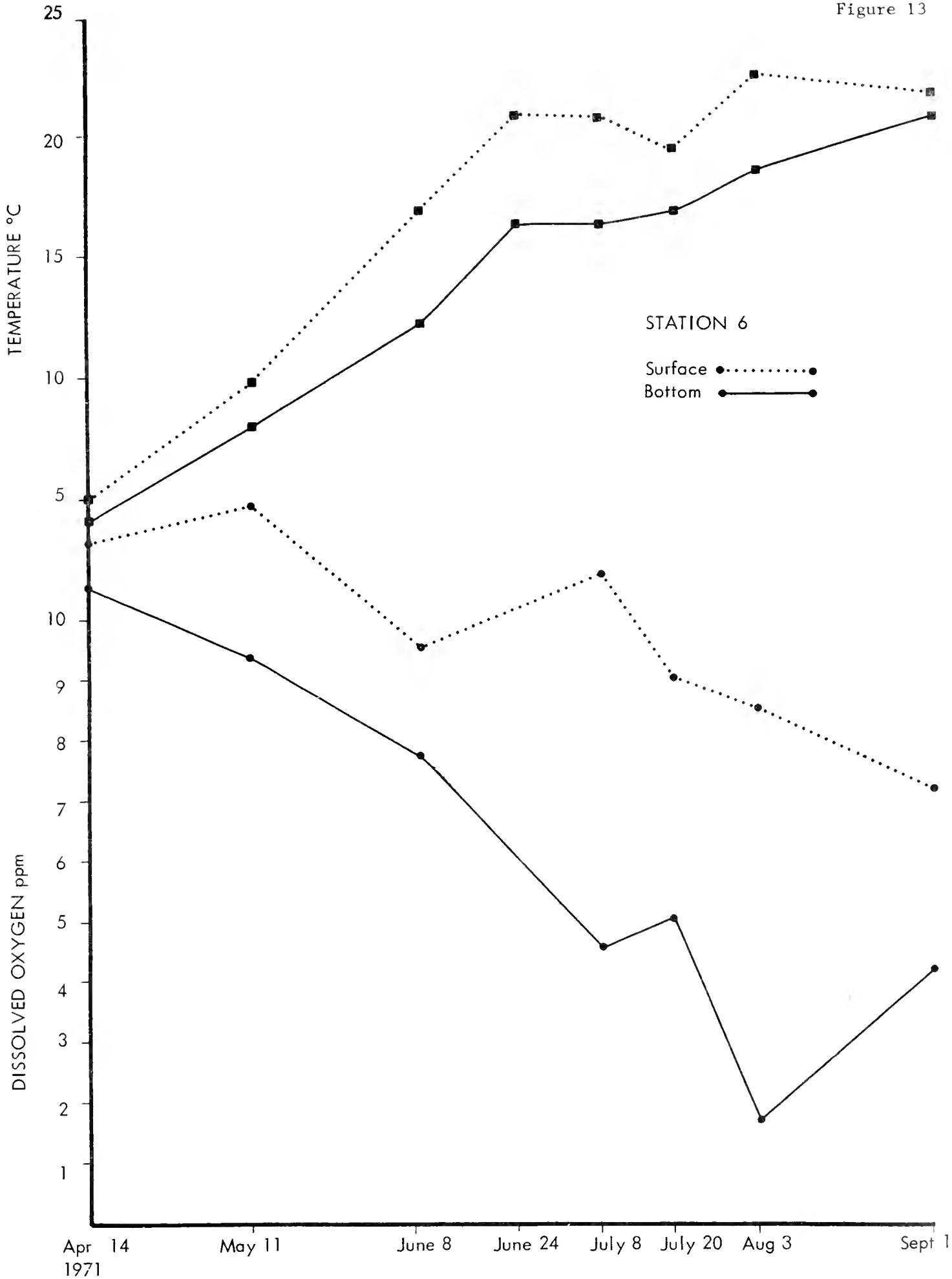

TEMPERATURE °C
25
20
15
10
5
STATION 6
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 14

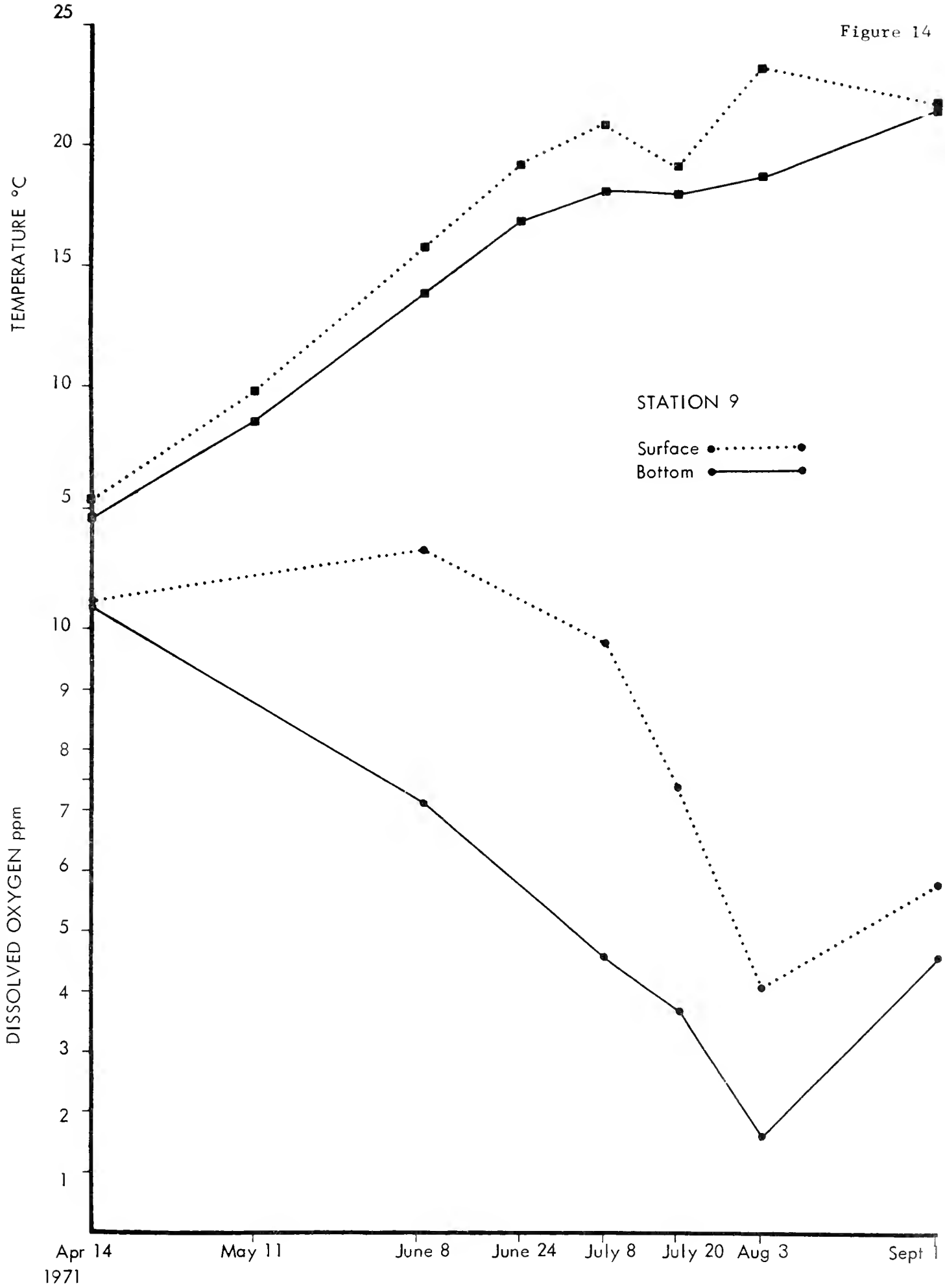

TEMPERATURE °C
25
20
15
10
5
STATION 9
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 15

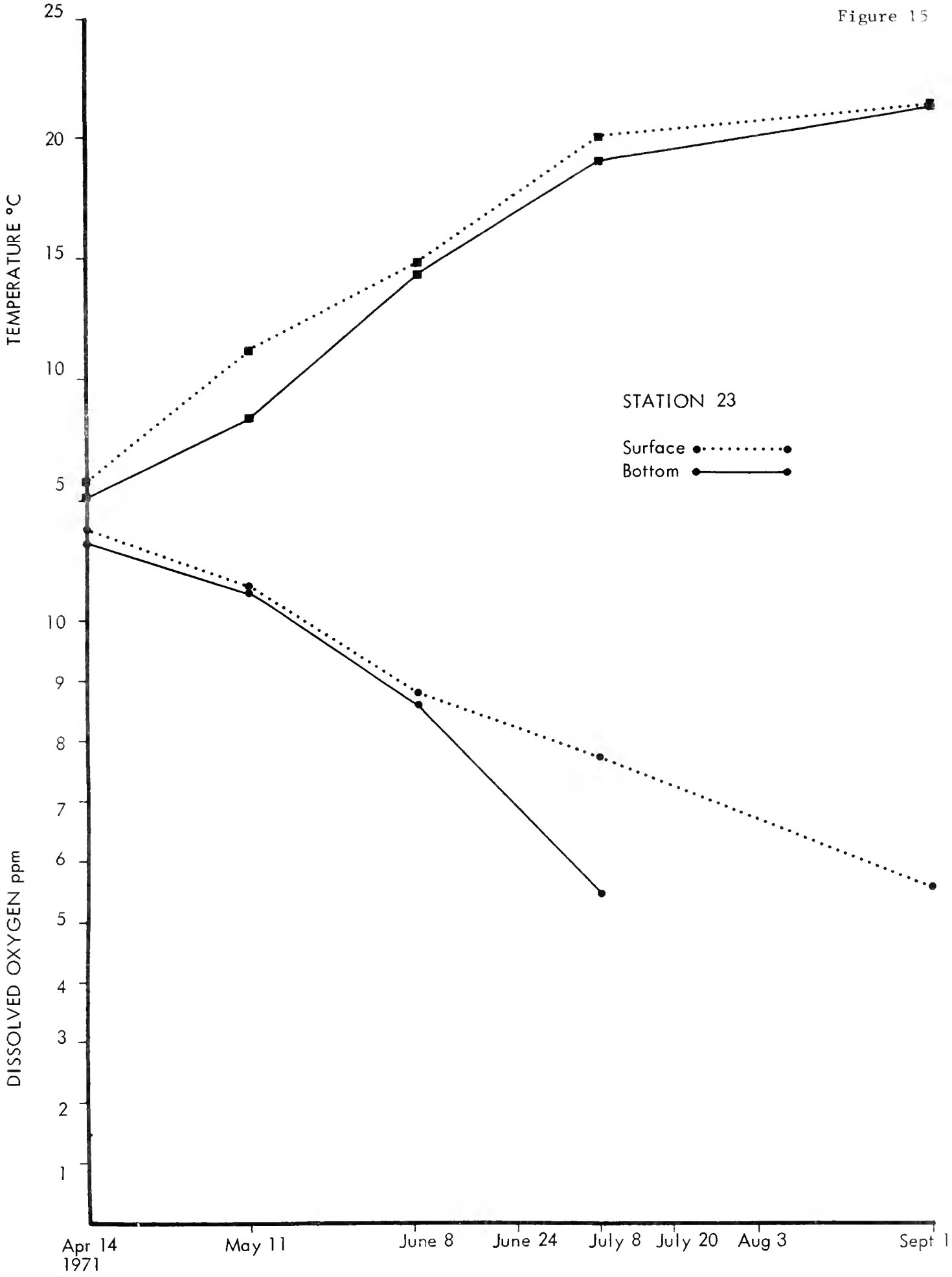

TEMPERATURE °C
25
20
15
10
5
STATION 23
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

Figure 16

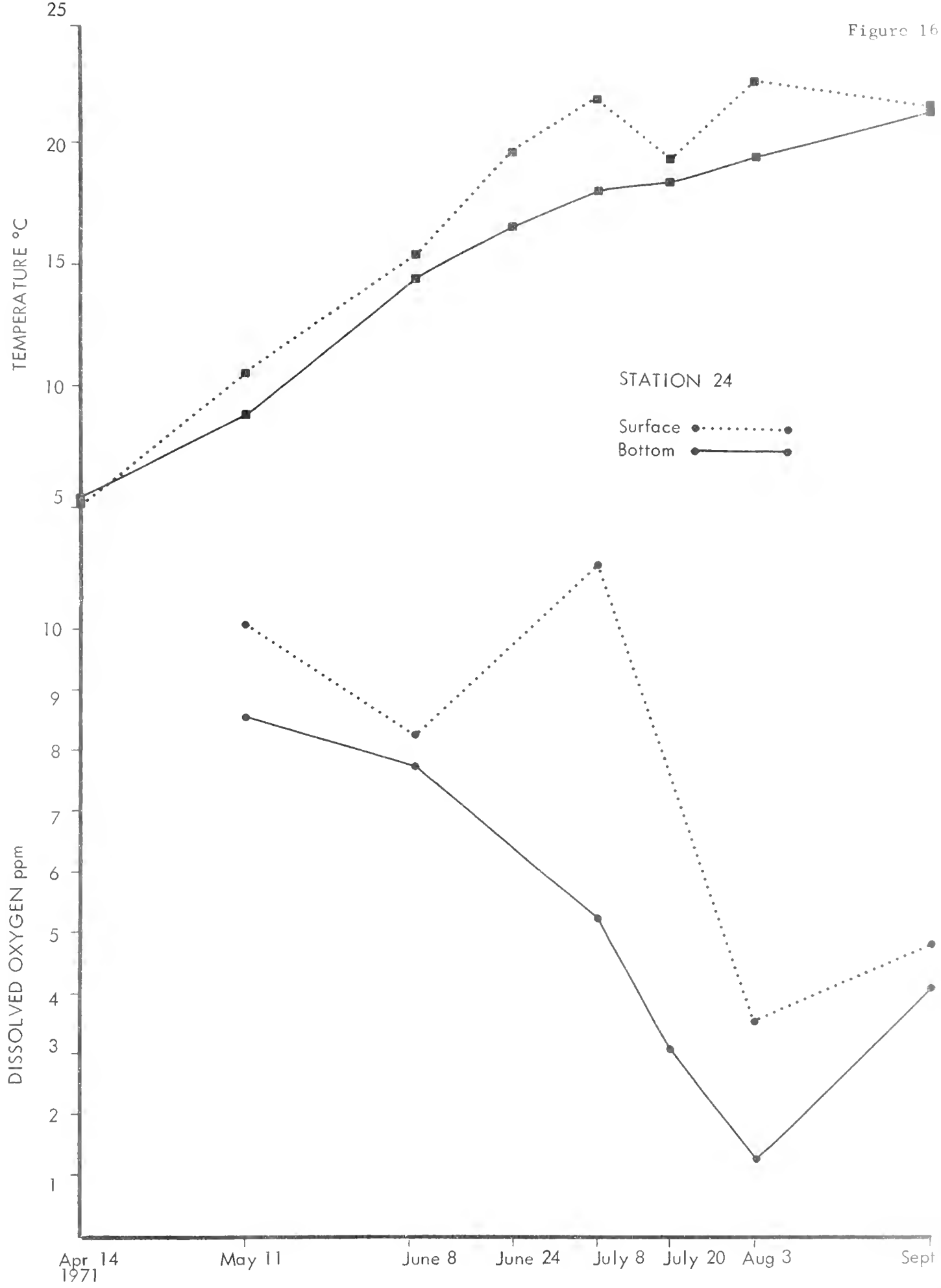
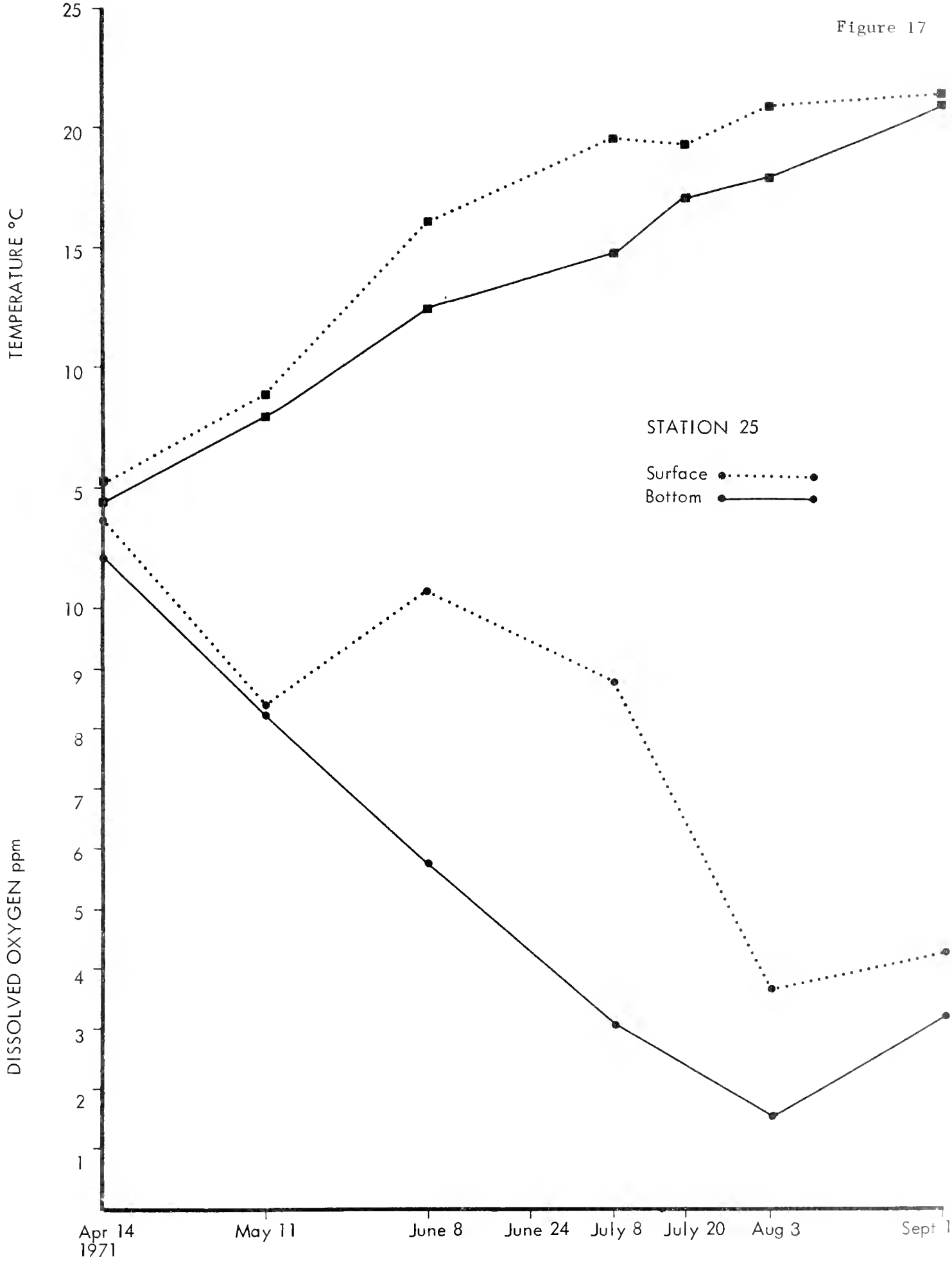
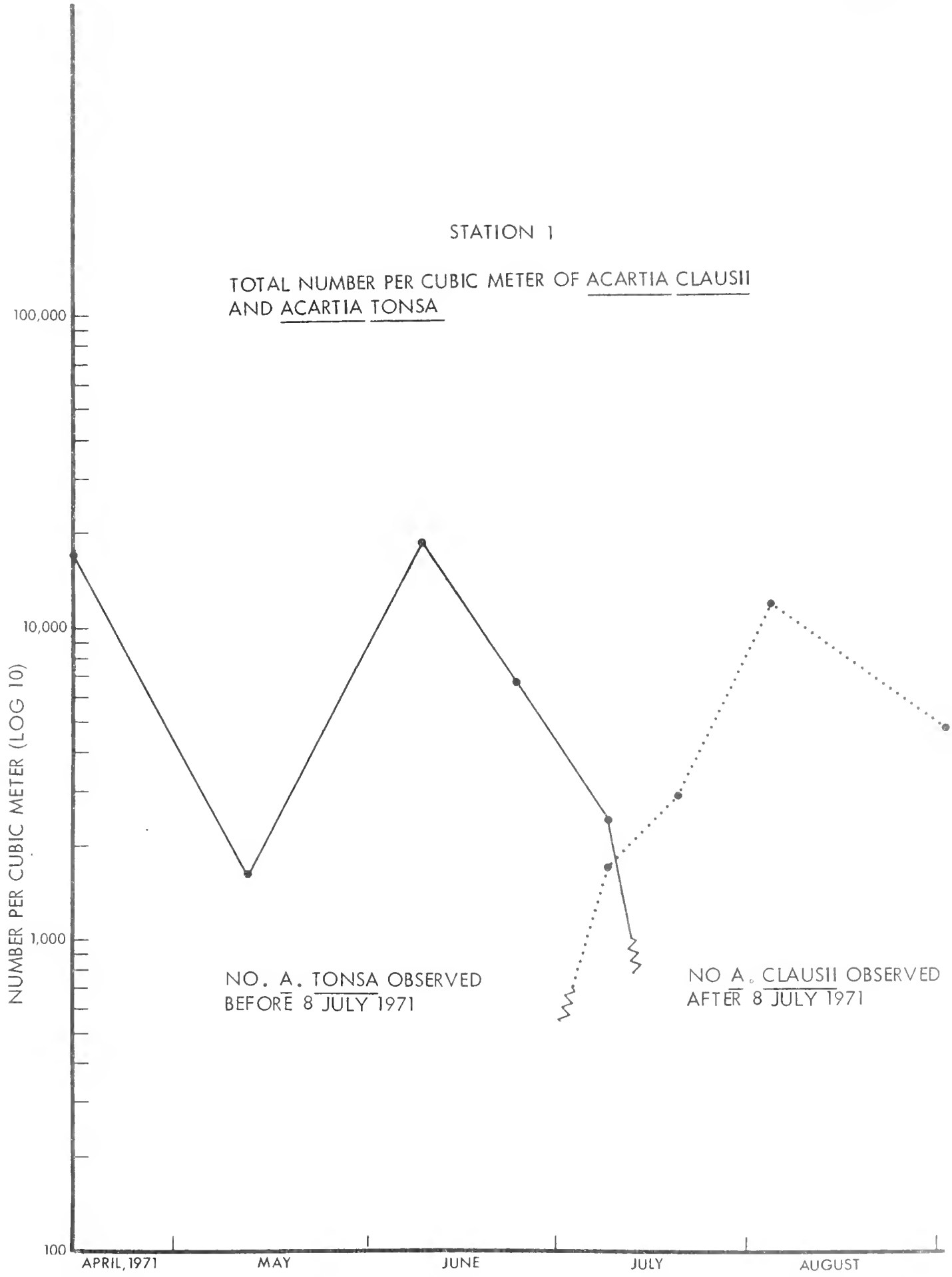
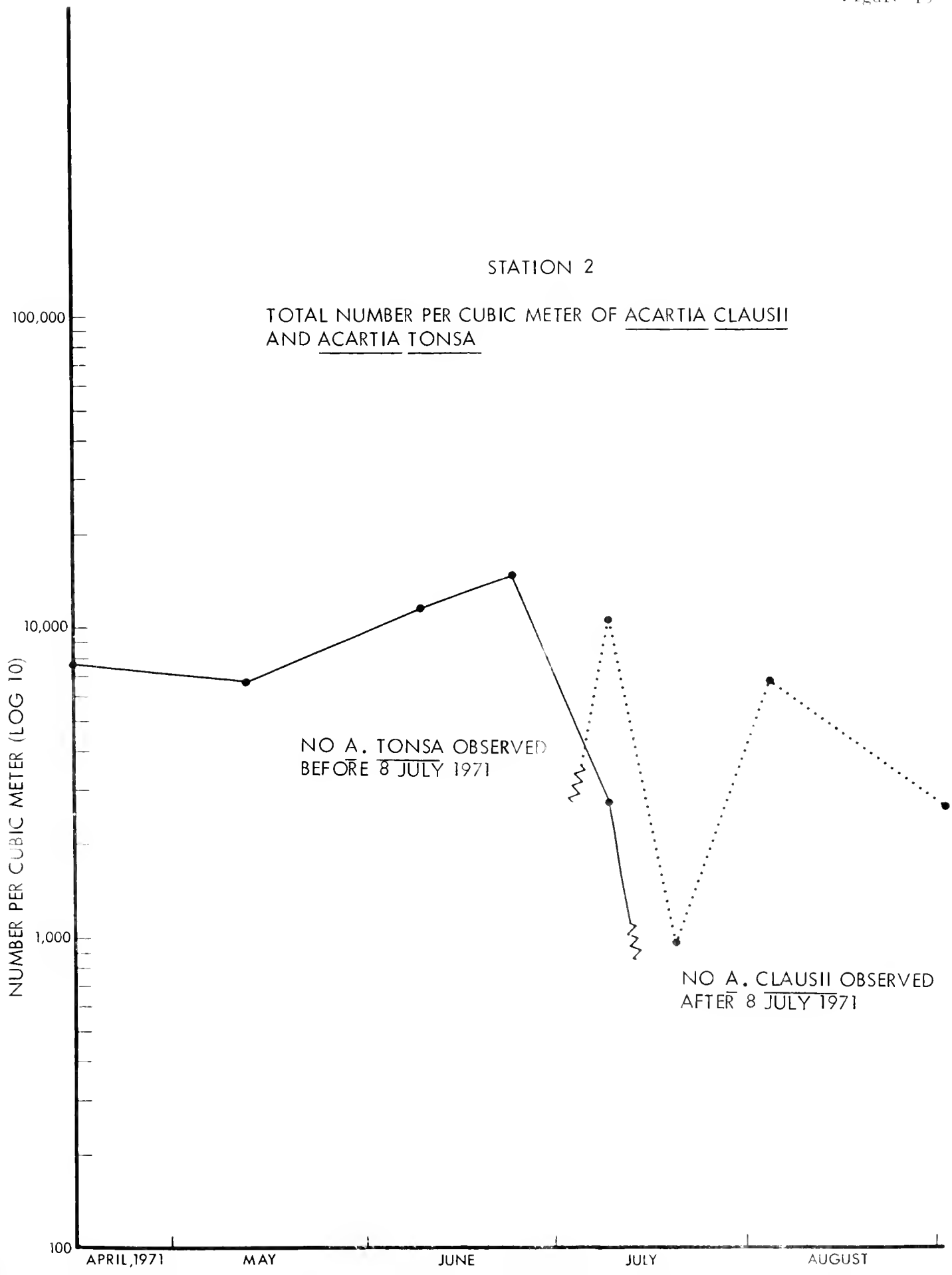
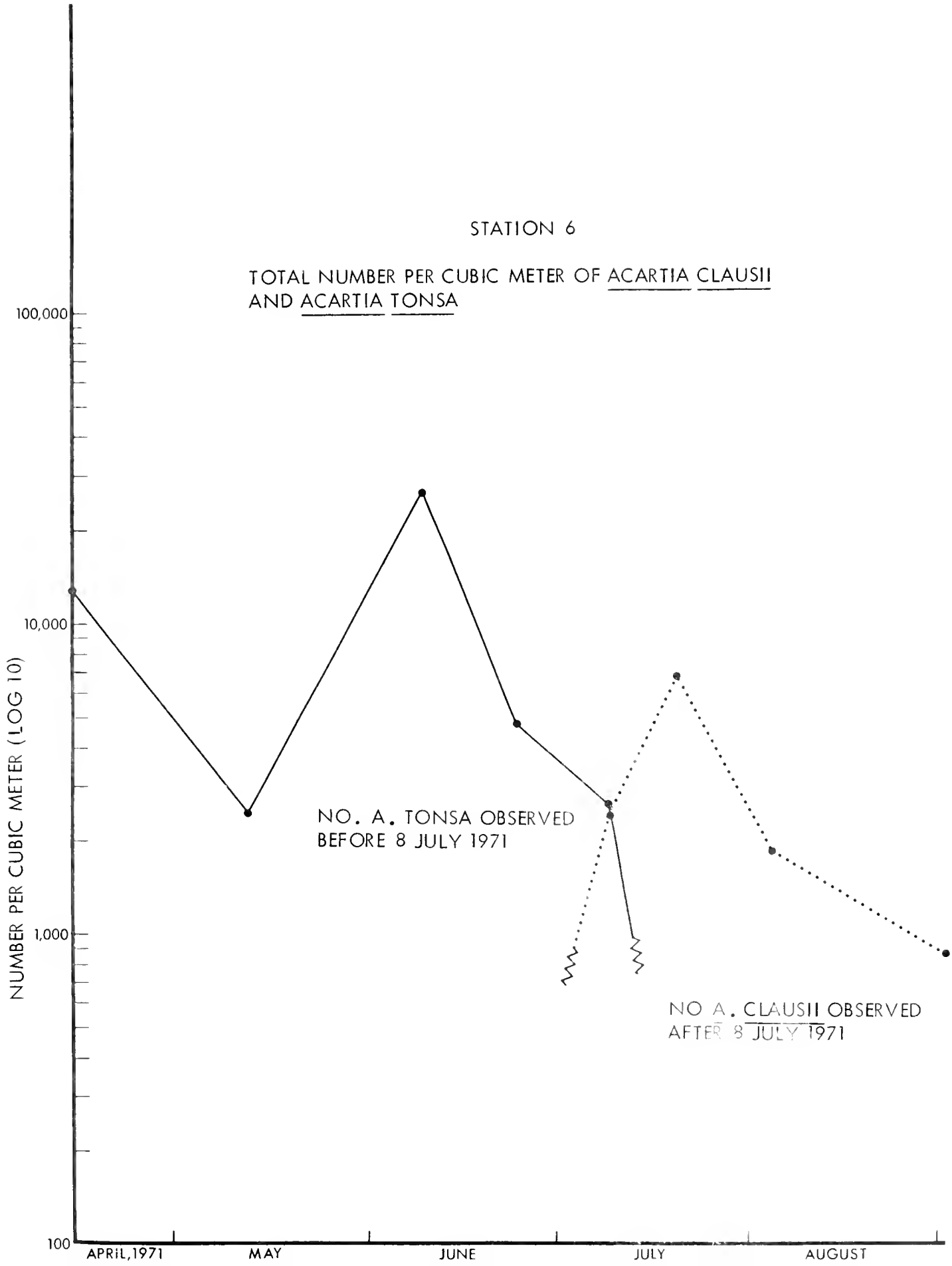

TEMPERATURE °C
25
20
15
10
5
STATION 24
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

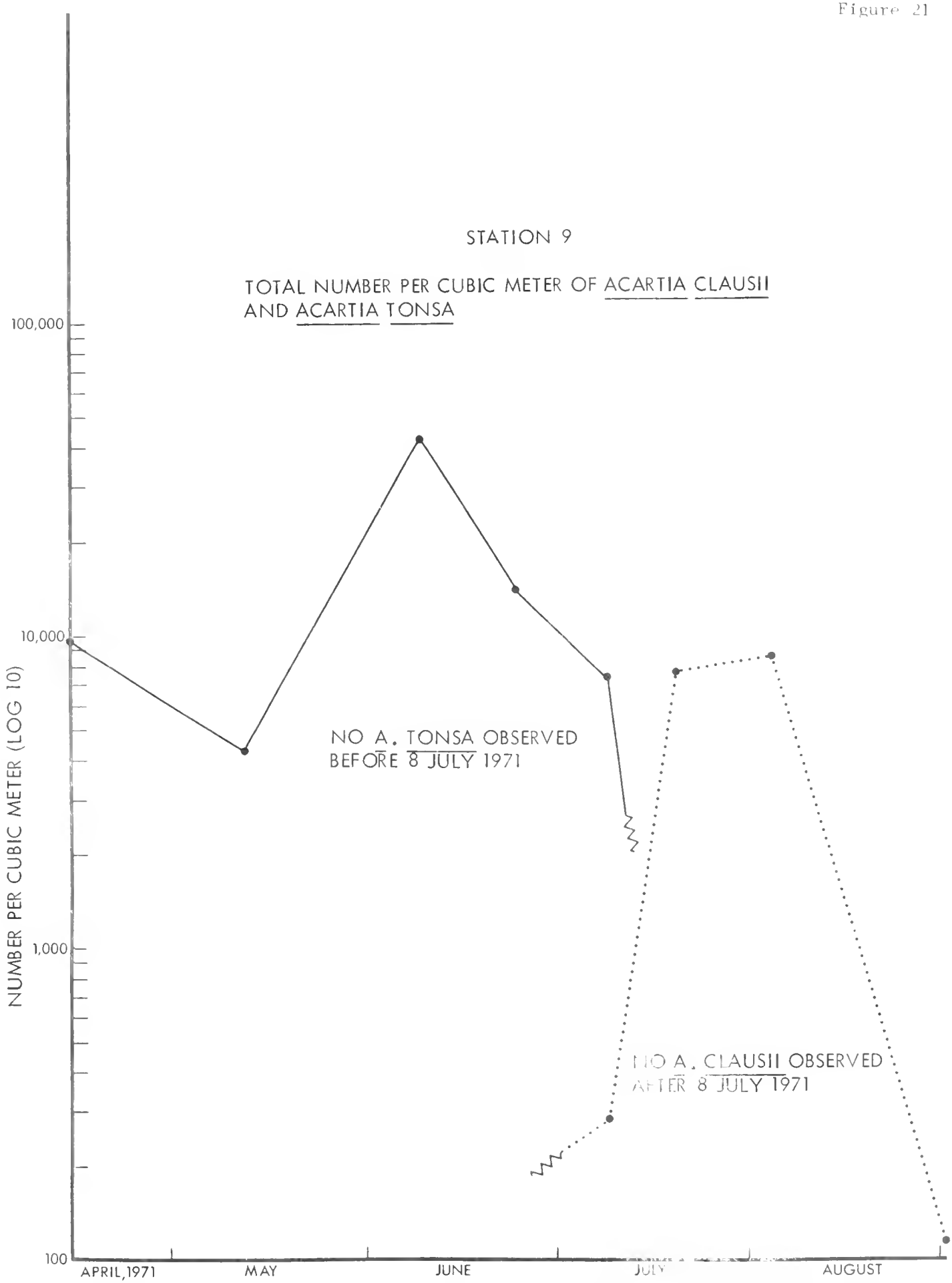
Figure 17

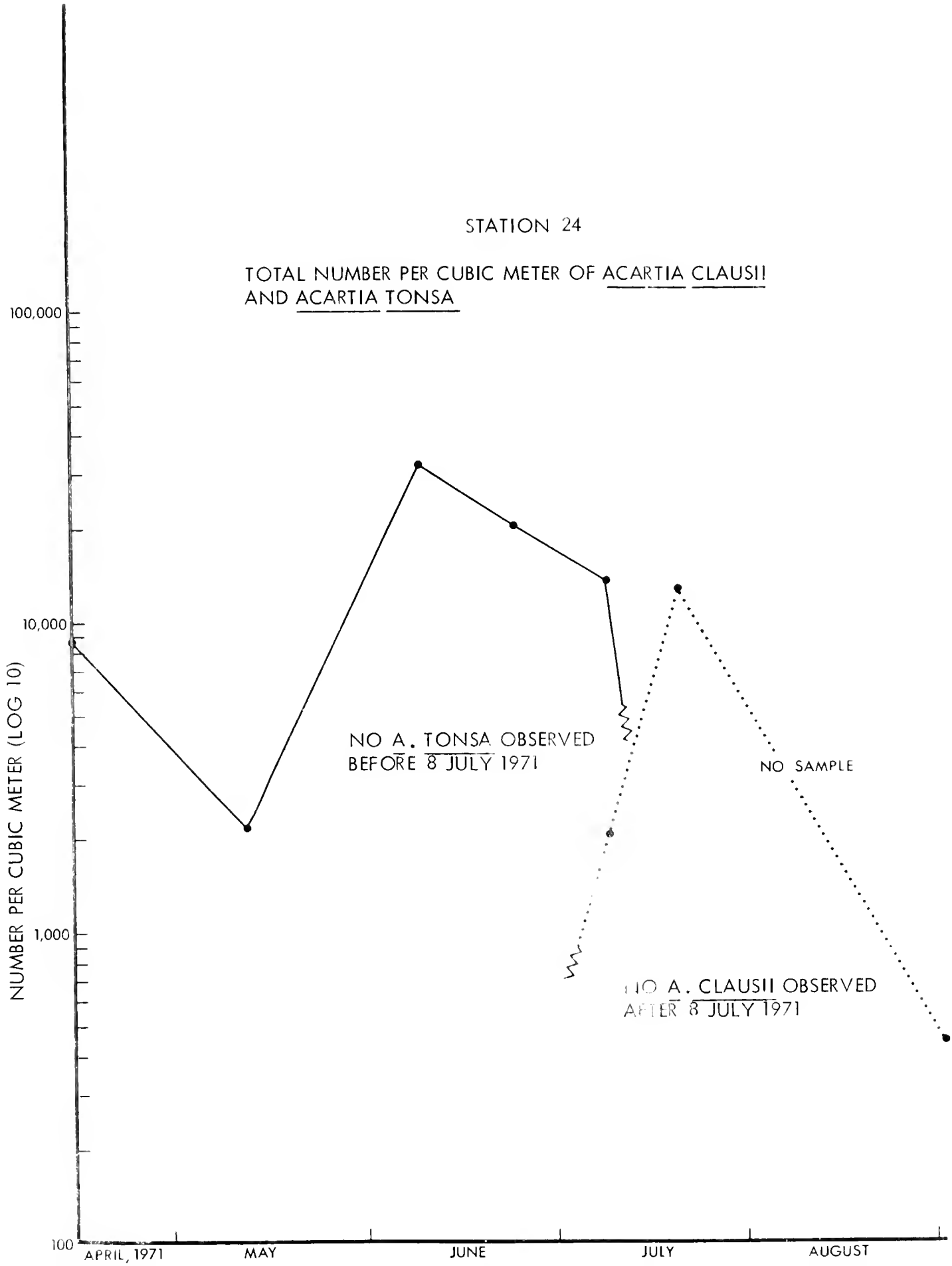

TEMPERATURE °C
25
20
15
10
5
STATION 25
Surface
Bottom
DISSOLVED OXYGEN ppm
10
9
8
7
6
5
4
3
2
1
Apr 14
1971
May 11
June 8
June 24
July 8
July 20
Aug 3
Sept 1

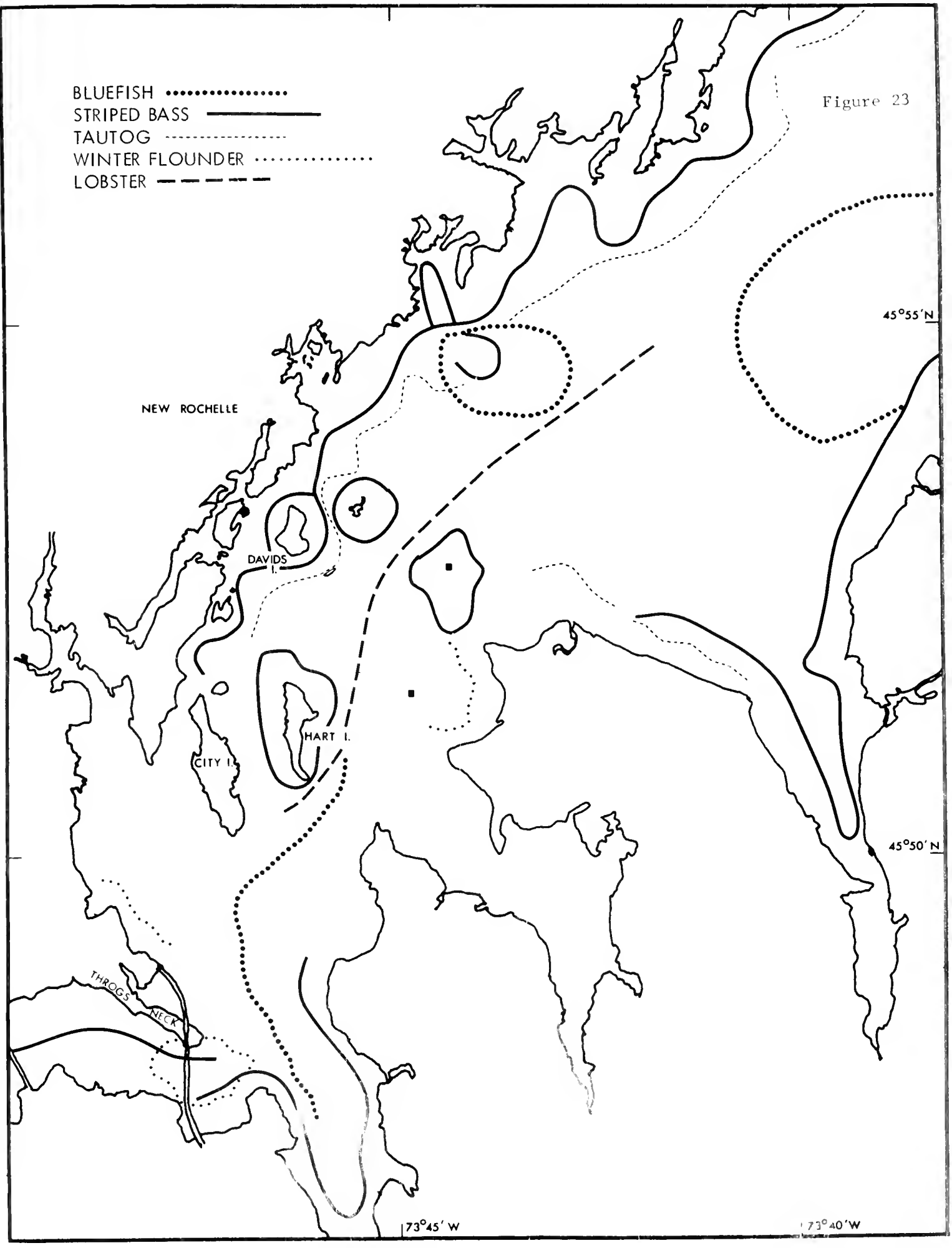

STATION 1
TOTAL NUMBER PER CUBIC METER OF ACARTIA CLAUSII AND ACARTIA TONSA
100,000
10,000
1,000
100
NUMBER PER CUBIC METER (LOG 10)
NO. A. TONSA OBSERVED BEFORE 8 JULY 1971
NO A. CLAUSII OBSERVED AFTER 8 JULY 1971
APRIL, 1971
MAY
JUNE
JULY
AUGUST


STATION 2
TOTAL NUMBER PER CUBIC METER OF ACARTIA CLAUSII AND ACARTIA TONSA
100,000
10,000
1,000
100
NUMBER PER CUBIC METER (LOG 10)
NO A. TONSA OBSERVED BEFORE 8 JULY 1971
NO A. CLAUSII OBSERVED AFTER 8 JULY 1971
APRIL, 1971
MAY
JUNE
JULY
AUGUST


STATION 6
TOTAL NUMBER PER CUBIC METER OF ACARTIA CLAUSII AND ACARTIA TONSA
100,000
10,000
1,000
100
NUMBER PER CUBIC METER (LOG 10)
NO. A. TONSA OBSERVED BEFORE 8 JULY 1971
NO A. CLAUSII OBSERVED AFTER 8 JULY 1971
APRIL, 1971
MAY
JUNE
JULY
AUGUST


STATION 9
TOTAL NUMBER PER CUBIC METER OF ACARTIA CLAUSII AND ACARTIA TONSA
100,000
10,000
1,000
100
NUMBER PER CUBIC METER (LOG 10)
NO A. TONSA OBSERVED BEFORE 8 JULY 1971
NO A. CLAUSII OBSERVED AFTER 8 JULY 1971
APRIL, 1971
MAY
JUNE
JULY
AUGUST


STATION 24
TOTAL NUMBER PER CUBIC METER OF ACARTIA CLAUSII AND ACARTIA TONSA
100,000
10,000
1,000
100
NUMBER PER CUBIC METER (LOG 10)
NO A. TONSA OBSERVED BEFORE 8 JULY 1971
NO SAMPLE
NO A. CLAUSII OBSERVED AFTER 8 JULY 1971
APRIL, 1971
MAY
JUNE
JULY
AUGUST


BLUEFISH
STRIPED BASS
TAUTOG
WINTER FLOUNDER
LOBSTER
Figure 23
45°55'N
NEW ROCHELLE
DAVIDS I.
HART I.
CITY I.
45°50'N
THROGS NECK
73°45'W
73°40'W

STATION LOCATIONS FOR COLIFORM SURVEYS

Figure 24

I-Interstate Sanitation Commission surveys
NS-1970 EPA survey
No letter-1969 EPA survey

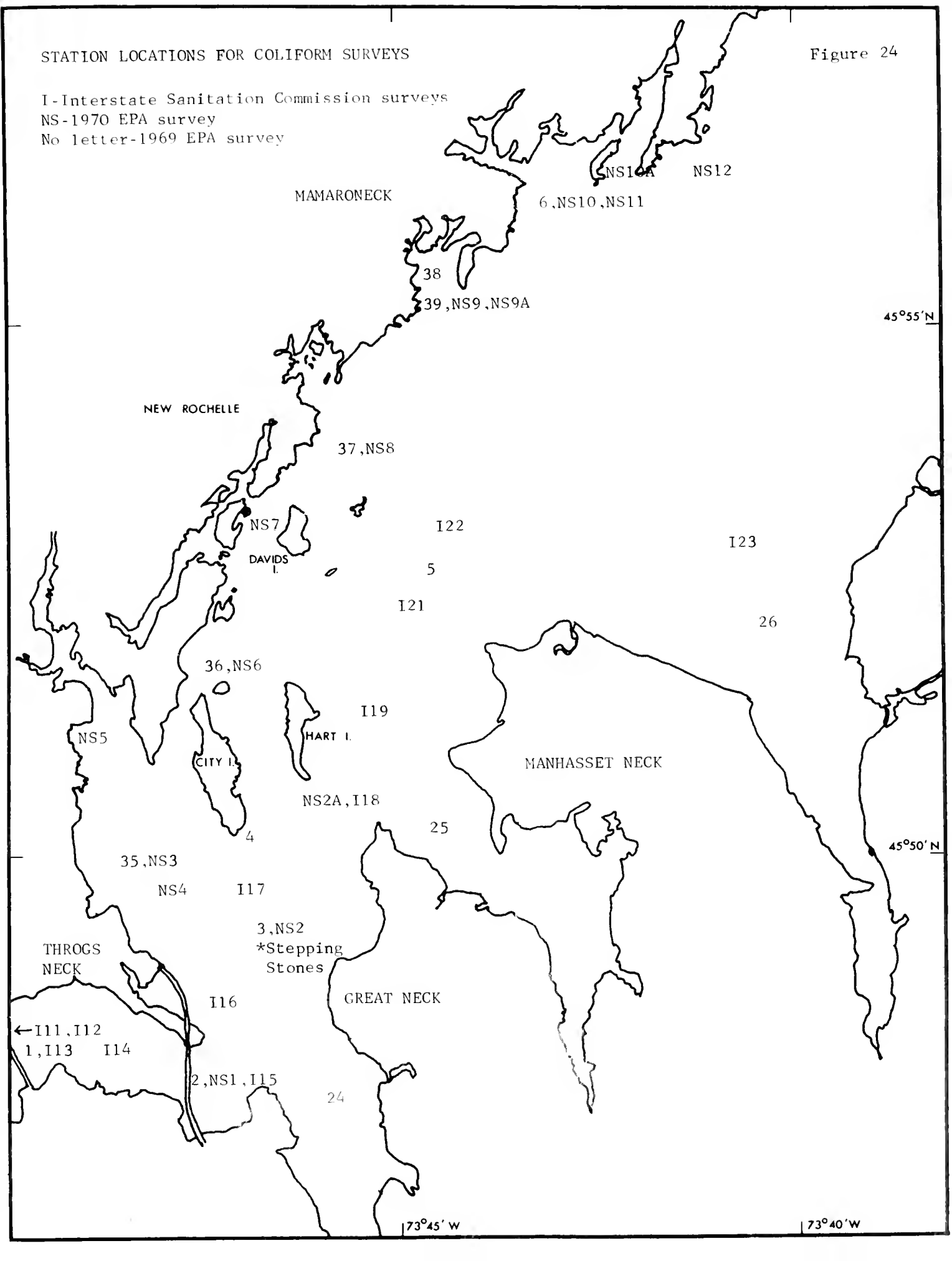
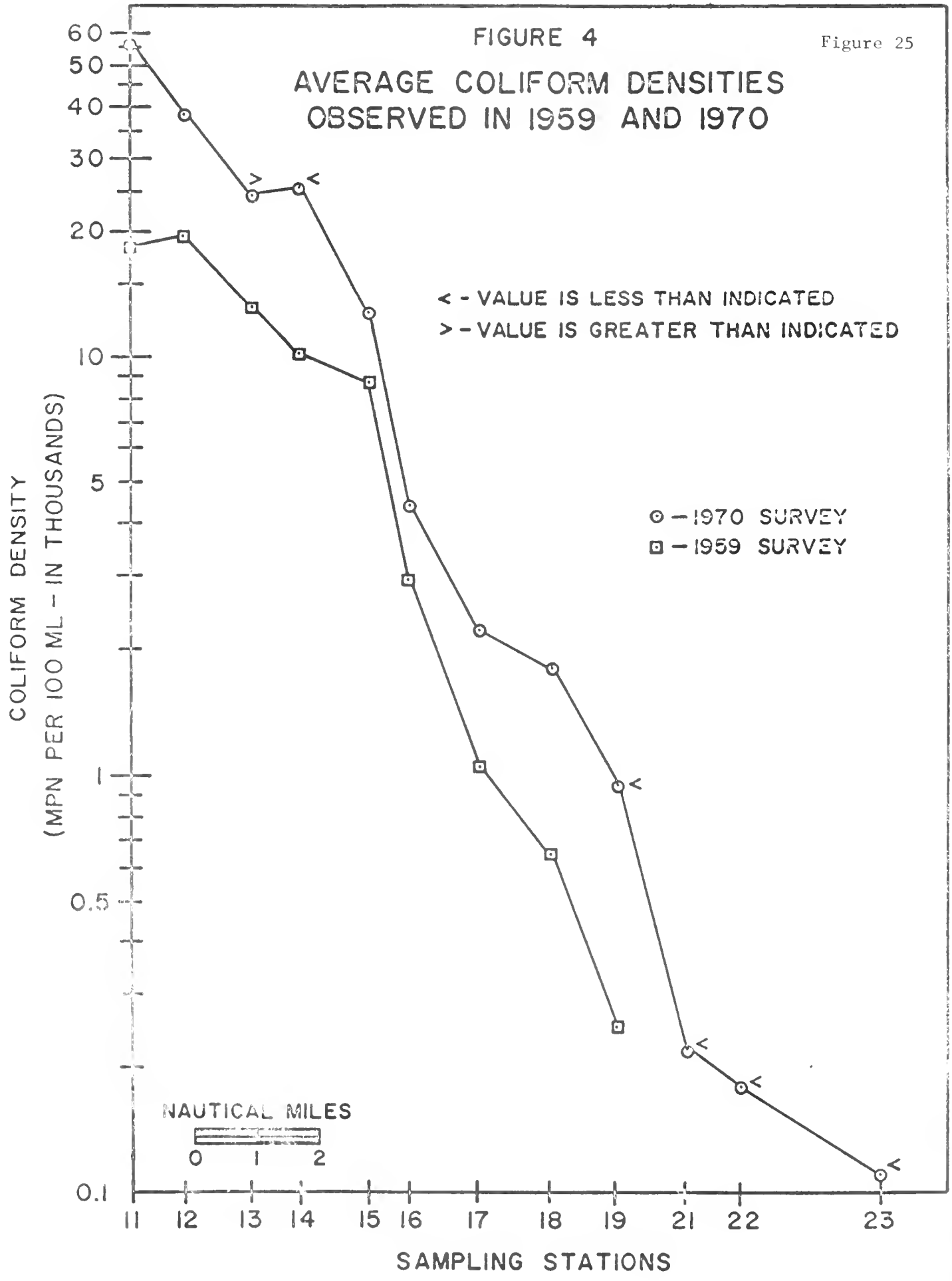


FIGURE 4

AVERAGE COLIFORM DENSITIES OBSERVED IN 1959 AND 1970



Cruise 1 Date 12-15 April 71 Table 1

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X	X	X	X	X	X					X
2	X	X	X	X	X	X	X				X
3			X	X	X	X	X				X
5			X	X	X						X
6	X	X	X	X	X						X
9			X	X	X						X
9-23	X	X						X			
23			X	X	X		X				
24	X	X	X								X
25			X	X	X						
4			X	X	X						
7			X	X	X						
8			X				X				
10			X				X				
15			X	X	X		X				
19			X	X	X		X				

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 2 Date 10-12 May 71 Table 2

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X	X	X	X	X	X			X		X
2	X	X	X	X	X	X			X		X
3	X	X	X	X	X	X					X
5	X	X	X	X	X	X					X
6	X	X	X	X	X	X					X
9			X								X
9-23	X	X						X			
23			X	X	X						
24	X	X	X	X	X						X
25			X	X	X						
7			X	X	X						
19			X	X	X						

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 3 Date 8-9 June 71 Table 3

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X	X	X	X	X	X			X		X
2	X	X	X	X	X	X			X		X
3			X	X		X					
5	X	X	X	X	X				X		X
6	X	X	X	X	X	X			X		X
9			X	X	X						X
9-23	X	X				X					
23			X	X	X						X
24	X	X	X	X	X						X
25			X	X	X						X
4			X	X		X					
19			X	X	X						X

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 4 Date 24 June 71

Table 4

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X		X	X	X				X		
2	X		X	X	X				X		
3	X		X	X	X						
5	X		X	X	X						
6	X		X								
9			X								
9-23	X										
23											
24	X		X								
25											
18-19	X										

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving obaervations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 5 Date 6-9 July 71 Table 5

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X		X	X	X		X		X		X
2	X	X	X	X	X				X		X
3	X	X	X	X	X						X
5	X	X	X	X	X						X
6	X	X	X	X	X				X		X
9			X	X	X						X
9-23	X	X									
23			X	X	X						X
24	X	X	X	X	X		X				X
25			X	X	X						X
10			X				X				
14			X				X				
15			X	X	X		X				X
17								X		B.S.	
20			X				X				
26								X			
27								X			
28								X			
29								X			
30										B.S.	
11								X			

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 6 Date 20 July 71 Table 6

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X		X	X	X				X	C.R.	
2	X		X	X	X				X	C.R.	
3	X		X	X	X					C.R.	
5			X		X						
6	X		X	X	X				X	C.R.	
9			X	X	X						
9-23	X									C.R.	
23											
24	X		X	X	X					C.R.	
25			X		X						

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 7 Date 2-6 Aug. 71 Table 7

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X	X	X	X	X	X			X		
2	X	X	X	X	X	X			X		
3		X	X	X							
5	X	X	X	X	X	X					
6	X	X	X	X	X	X			X		
9			X	X	X						
9-23	X	X				X					
23											
24		X	X	X		X					
25			X	X	X						
17								X		B.S.	
26								X			
30								X			
31			X	X	X						

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

Cruise 8 Date 31 Aug.-2 Sept. 71 Table 8

Sta.	Zoo. Samples	Epi. Dredge	Temp. & Sal.	DO	NO_3 & P_2O_5	Otter Trawl	Core & Grab Samples	Dives	Phyto	BS/CR	Chl-a
1	X	X	X	X	X				X	C.R.	X
2	X	X	X	X	X				X		X
3	X	X	X	X	X						X
5	X	X	X	X	X						X
6	X	X	X	X	X				X		X
9		X	X	X				X			X
9-23	X	X	X	X		X				C.R.	
23			X	X	X						
24	X	X	X	X		X					X
25			X	X	X					C.R.	X
14			X	X							
15			X	X						C.R.	
16			X	X						C.R.	
20			X	X						C.R.	
7			X	X	X						X
13								X			
17								X			
19			X	X	X						X

Zoo. Samples - Zooplankton Samples #8 & #0 mesh net
Epi. Dredge - Epibenthic dredge samples-#0 mesh net
D.O. - Dissolved Oxygen
NO_3 - Nitrates
P_2O_5 - Phosphates
Dives - SCUBA diving observations and benthic sampling
Phyto - Phytoplankton
B.S./C.R. - Beach Seine/Clam Rake
Chl-a - Chlorophyll-a

PHYTOPLANKTON DENSITIES

Total Phytoplankton, (> 5 μ), cells/ml

	Sta. 1	Sta. 2	Sta. 6
11 May 1971	884	2229	
9 June 1971	2744	4454	11832
24 June 1971	3491	6006	
8 July 1971	967	7075	1631
20 July 1971	248	1910	51887
2 Aug. 1971			45597
4 Aug. 1971	452	943	2186

Nannochloris atomus, cells/ml

11 May 1971	92,000	132,000	
9 June 1971	350,000	160,000	171,000
24 June 1971	168,000	184,000	
8 July 1971	142,000	143,000	101,000
20 July 1971	126,000	115,000	150,000
2 Aug. 1971			263,000
4 Aug. 1971	73,000	110,000	139,000
1 Sept.1971	359,000	248,000	366,000

COPEPODS LISTED BY ORDER OF DOMINANCE

	rank
Acartia clausii	1
Acartia tonsa	2
Temora longicornis	3
Pseudocalanus minutus	4
Tachidius brevicornis	5
Eurytemora hirundoides	6
Paracalanus parvus	7
Oithona sp.	8

TAXA OTHER THAN COPEPODS OBSERVED

IN #8 MESH NET SAMPLES

Coelenterata medusa

Bivalve larvae

Polychaete larvae

Gastropod larvae

Balanus sp. nauplius

Balanus sp. cypris

Evadne sp.

Podon sp.

Neomysis americana

Decapod larvae

Siphonophora

Chaetognatha

Fish eggs and larvae

CRUSTACEANS

Station 1 Epibenthic Dredge Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea			864	472	136	
Brachyuran megalopa				43	160	
Postlarval brachyura					6	
Total			864	515	302	
Pagurid zoea				711	808	
Pagurid glaucothoe				8	56	
Total				719	864	
Crangon septemspinosus zoea			224	251	344	
C. septemspinosus postlarvae			192	63	114	
Palaemonetes sp. zoea				51	96	
Thalassinidea zoea					1	
Neomysis americana	584	131424	5928	467	4264	NOT SORTED
Amphipods:						
Ampithoe longimana						
Carinogammarus mucronatus						
Corophium sp.					9	
Jassa falcata						
Microdeutopus gryllotalpa						
Unidentified amphipods				2	10	
Edotea triloba			8	338	6	
Unidentified isopods						
Cumaceans		32		21	12	
Unidentified crustaceans				2		
Total crustaceans	584	131456	7216	2429	6022	

CRUSTACEANS

Station 2 : Epibenthic Dredge — Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea		44	1464	1264	432	
Brachyuran megalopa				35	3008	
Postlarval brachyura	2				6	
Total	2	44	1464	1299	3446	
Pagurid zoea			10	286	356	
Pagurid glaucothoe					183	
Total			10	286	539	
Crangon septemspinosus zoea		2	56	85	47	
C. septemspinosus postlarvae	10				1	
Palaemonetes sp. zoea				16	58	
Thalassinidea zoea			1		4	
Neomysis americana	2917	1	86	4	1340	NOT SORTED
Amphipods:						
Ampithoe longimana						
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata				3		
Microdeutopus gryllotalpa				1		
Unidentified amphipods	4	1			3	
Edotea triloba	1			24	16	
Unidentified isopods						
Cumaceans	4					
Unidentified crustaceans					8	
Total crustaceans	2938	48	1617	1718	5462	

CRUSTACEANS

Station 3 Epibenthic Dredge Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea		14		1896	120	787
Brachyuran megalopa				2744	272	
Postlarval brachyura					1	1
Total		14		4640	393	788
Pagurid zoea				916	369	43
Pagurid glaucothoe				15	185	
Total				931	554	43
Crangon septemspinosus zoea		10		247	278	7
C. septemspinosus postlarvae				7	129	
Palaemonetes sp. zoea				2	15	10
Thalassinidea zoea				1	2	147
Neomysis americana	NOT SORTED	6	NOT SORTED	952	1149	95
Amphipods:						
Ampithoe longimana						
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata						
Microdeutopus gryllotalpa						
Unidentified amphipods						1
Edotea triloba					2	1
Unidentified isopods						
Cumaceans		1				5
Unidentified crustaceans				2		
Total crustaceans		31		6782	2527	1092

CRUSTACEANS

Station 5 Epibenthic Dredge Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea			439	1616	42	
Brachyuran megalopa				48	147	
Postlarval brachyura					43	
Total			439	1664	232	
Pagurid zoea			4	127	184	
Pagurid glaucothoe				4	75	
Total			4	131	259	
Crangon septemspinosus zoea			6	339	39	
C. septemspinosus postlarvae				5	704	
Palaemonetes sp. zoea				27	6	
Thalassinidea zoea	NOT SORTED					NOT SORTED
Neomysis americana			2	64	6736	
Amphipods:						
Ampithoe longimana				1		
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata						
Microdeutopus gryllotalpa			2			
Unidentified amphipods						
Edotea triloba						
Unidentified isopods						
Cumaceans					5	
Unidentified crustaceans						
Total crustaceans		0	453	2231	7981	

CRUSTACEANS

Station 6 Epibenthic Dredge Organisms per 5 min tow

	CRUISES					
	1	2	3	5	7	8
Brachyuran zoea		41	956	1256	35488	791
Brachyuran megalopa				2	2700	
Postlarval brachyura				[illegible]	11	
Total		41	956	1258	38199	791
Pagurid zoea				756	34	28
Pagurid glaucothoe				5	39	
Total				761	73	28
Crangon septemspinosus zoea		25	17	103		1
C. septemspinosus postlarvae				1		
Palaemonetes sp. zoea				18	19	
Thalassinidea zoea					1	13
Neomysis americana	26				2	
Amphipods:						
Ampithoe longimana					1	
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata						
Microdeutopus gryllotalpa						
Unidentified amphipods						
Edotea triloba						
Unidentified isopods						
Cumaceans						
Unidentified crustaceans				1	104	
Total crustaceans	26	66	973	2142	38399	833

CRUSTACEANS

Station 9-23 Epibenthic Dredge Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea			202	528	6112	
Brachyuran megalopa					43	
Postlarval brachyura						
Total			202	528	6155	
Pagurid zoea			1	22	29	
Pagurid glaucothoe					9	
Total			1	22	38	
Crangon septemspinosus zoea			4		12	
C. septemspinosus postlarvae		144			3	
Palaemonetes sp. zoea				5	27	
Thalassinidea zoea					1	
Neomysis americana	3	6816			2	
Amphipods:						
Ampithoe longimana						
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata						
Microdeutopus gryllotalpa						
Unidentified amphipods						
Edotea triloba						
Unidentified isopods						
Cumaceans					1	
Unidentified crustaceans					11	
Total crustaceans	3	6960	207	555	6250	

NOT SORTED

CRUSTACEANS

Station 24 Epibenthic Dredge Organisms per 5 min tow

	CRUISES 1	2	3	5	7	8
Brachyuran zoea		24	212	1320		
Brachyuran megalopa				3		
Postlarval brachyura						
Total		24	212	1323		
Pagurid zoea			2	190		
Pagurid glaucothoe				1		
Total			2	191		
Crangon septemspinosus zoea			5	50		
C. septemspinosus postlarvae		40				
Palaemonetes sp. zoea				36		
Thalassinidea zoea					NOT SORTED	NOT SORTED
Neomysis americana		232				
Amphipods:						
Ampithoe longimana						
Carinogammarus mucronatus						
Corophium sp.						
Jassa falcata				1		
Microdeutopus gryllotalpa						
Unidentified amphipods		48				
Edotea triloba						
Unidentified isopods						
Cumaceans		8				
Unidentified crustaceans		8				
Total crustaceans	0	360	219	1601		

CRUSTACEANS

Station 1 | #0 Mesh Net | Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea	1	23	2050	863	560	608	142	202
Brachyuran megalopa				2	6	38		
Postlarval brachyura								
Total	1	23	2050	865	566	646	142	202
Pagurid zoea			294	63	448	320	201	4
Pagurid glaucothoe						16	6	
Total			294	63	448	336	207	4
Crangon septemspinosus zoea	2	89	522	17	227	190	95	17
C. septemspinosus postlarvae						2	8	
Palaemonetes sp. zoea					19	15	85	4
Thalassinidea zoea								
Neomysis americana	125	600	3632	7	298	94	88	
Amphipods:								
Ampithoe longimana							5	
Carinogammarus mucronatus							2	
Corophium sp.		1						
Jassa falcata		3						
Microdeutopus gryllotalpa							2	
Unidentified amphipods					1			
Edotea triloba			1					3
Unidentified isopods		1						
Cumaceans		1						
Unidentified crustaceans							1	1
Total crustaceans	128	718	6499	952	1559	1283	635	231

CRUSTACEANS

Station 2 # 0 Mesh Net Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		96	1488	1091	920	560	309	317
Brachyuran megalopa				4	12	608	463	
Postlarval brachyura							1	
Total		96	1488	1095	932	1168	773	317
Pagurid zoea			35	71	230	23	6	1
Pagurid glaucothoe						9	11	
Total			35	71	230	32	17	1
Crangon septemspinosus zoea		1	98	35	162	52	10	11
C. septemspinosus postlarvae				1				
Palaemonetes sp. zoea				4	28	23	23	1
Thalassinidea zoea							1	
Neomysis americana	1	1	35	7	2	4	2	
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata								
Microdeutopus gryllotalpa								
Unidentified amphipods					2			
Edotea triloba								
Unidentified isopods						4		
Cumaceans			1					
Unidentified crustaceans						4		1
Total crustaceans	1	98	1657	1213	1356	1287	826	332

CRUSTACEANS

Station 3 # 0 Mesh Net Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		443		1560	765	1880		141
Brachyuran megalopa				12	154	289		
Postlarval brachyura								
Total		443		1572	919	2169		141
Pagurid zoea								
Pagurid glaucothoe				8	228	785		5
Total					2	36		
				8	230	821		5
Crangon septemspinosus zoea		1		40	137	1568		23
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				11	15	22		1
Thalassinidea zoea								3
Neomysis americana					11	52		
Amphipods:	NOT SAMPLED		NOT SAMPLED				NOT SAMPLED	
Ampithoe longimana					7			
Carinogammarus mucronatus					4			
Corophium sp.								
Jassa falcata					1			
Microdeutopus gryllotalpa								
Unidentified amphipods				1				1
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans					1			1
Total crustaceans		444		1632	1325	4632		180

CRUSTACEANS

Station 5 # 0 Mesh Net Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		27	912	5649	1050		73	47
Brachyuran megalopa				6	29		72	
Postlarval brachyura							11	
Total		27	912	5705	1079		156	47
Pagurid zoea			1	11	216		5	2
Pagurid glaucothoe							9	
Total			1	11	216		14	2
Crangon septemspinosus zoea			41	99	433		1	1
C. septemspinosus postlarvae					1		2	
Palaemonetes sp. zoea				10	19		12	
Thalassinidea zoea								
Neomysis americana					30		3	
Amphipods:	NOT SAMPLED					NOT SAMPLED		
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.		1						
Jassa falcata								
Microdeutopus gryllotalpa								
Unidentified amphipods			1	4	3			
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans								
Total crustaceans		28	955	5829	1781		188	50

CRUSTACEANS

Station 6 # 0 Mesh Net Organisms per tow

	CRUISES							
	1	2	3	4	5	6	7	8
Brachyuran zoea		36	302	979	936	1429	724	88
Brachyuran megalopa				13		99	596	
Postlarval brachyura						1	3	
Total		36	302	992	936	1529	1323	88
Pagurid zoea			4	32	113	185	6	
Pagurid glaucothoe					3	15	1	
Total			4	32	116	200	7	
Crangon septemspinosus zoea			1	14	25	22		
C. septemspinosus postlarvae					1			
Palaemonetes sp. zoea				5	9	7	9	
Thalassinidea zoea								
Neomysis americana				7		1		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata								
Microdeutopus gryllotalpa								
Unidentified amphipods				1		1		
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans						11	2	
Total crustaceans	0	36	307	1051	1087	1771	1341	88

CRUSTACEANS

Station 9-23 # 0 Mesh Net Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		34	110	1783	9248	3184	485	69
Brachyuran megalopa				40		29	7	
Postlarval brachyura						1	2	
Total		34	110	1823	9248	3214	494	69
Pagurid zoea			7	345	263	342	8	2
Pagurid glaucothoe					1	42	2	
Total			7	345	264	384	10	2
Crangon septemspinosus zoea	3	2	3	38	17	19	2	
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				6	28	71	10	1
Thalassinidea zoea								
Neomysis americana				2		5		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata						4		
Microdeutopus gryllotalpa								
Unidentified amphipods		1	1			1		
Edotea triloba								
Unidentified isopods			1					
Cumaceans								
Unidentified crustaceans					2	2	1	
Total crustaceans	3	37	122	2214	9559	3700	517	72

CRUSTACEANS

Station 24 # 0 Mesh Net Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		24	913	1607	608	2176		36
Brachyuran megalopa				3		8		
Postlarval brachyura								
Total		24	913	1610	608	2184		36
Pagurid zoea			19	82	240	74		2
Pagurid glaucothoe					1	14		
Total			19	82	241	88		2
Crangon septemspinosus zoea			21	45	113	36		
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				1	15	12		
Thalassinidea zoea								
Neomysis americana					2	4		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata						1		
Microdeutopus gryllotalpa								
Unidentified amphipods		1			1			
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans						1		
Total crustaceans	0	25	953	1738	980	2326		38

NOT SAMPLED

CRUSTACEANS

Station 1 * 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea	2	18	1389	1047	912		172	526
Brachyuran megalopa				2	10			
Postlarval brachyura								
Total	2	18	1389	1049	922		172	526
Pagurid zoea			199	77	730		244	10
Pagurid glaucothoe							7	
Total			199	77	730		251	10
Crangon septemspinosus zoea	4	69	354	21	370		115	44
C. septemspinosus postlarvae							10	
Palaemonetes sp. zoea					31		103	10
Thalassinidea zoea								
Neomysis americana	262	466	2461	9	485		107	
Amphipods:								
Ampithoe longimana							6	
Carinogammarus mucronatus							2	
Corophium sp.		1						
Jassa falcata		2						
Microdeutopus gryllotalpa							2	
Unidentified amphipods					2			
Edotea triloba			1					8
Unidentified isopods		1						
Cumaceans		1						
Unidentified crustaceans							1	3
Total crustaceans	268	558	4404	1156	2540		769	601

CRUSTACEANS

Station 2 # 0 Mesh Net Organisms per $100m^3$

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		260	1019	1432	1584	1148	561	518
Brachyuran megalopa				5	21	1246	840	
Postlarval brachyura							2	
Total		260	1019	1437	1605	2394	1403	518
Pagurid zoea			24	93	396	47	11	2
Pagurid glaucothoe						18	20	
Total			24	93	396	65	31	2
Crangon septemspinosus zoea		3	67	46	279	107	18	18
C. septemspinosus postlarvae				1				
Palaemonetes sp. zoea				5	48	47	42	2
Thalassinidea zoea							2	
Neomysis americana	3	3	24	9	3	8	4	
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata								
Microdeutopus gryllotalpa					3			
Unidentified amphipods								
Edotea triloba						8		
Unidentified isopods								
Cumaceans			1					
Unidentified crustaceans						8		2
Total crustaceans	3	266	1135	1591	2334	2637	1500	542

CRUSTACEANS

Station 3 # 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		427		1562	1037	2260		344
Brachyuran megalopa				12	209	347		
Postlarval brachyura								
Total		427		1574	1246	2607		344
Pagurid zoea				8	309	944		12
Pagurid glaucothoe					3	43		
Total				8	312	987		12
Crangon septemspinosus zoea		1		40	186	1885		56
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				11	20	26		2
Thalassinidea zoea								7
Neomysis americana	NOT SAMPLED		NOT SAMPLED		15	63	NOT SAMPLED	
Amphipods:								
Ampithoe longimana					9			
Carinogammarus mucronatus					5			
Corophium sp.								
Jassa falcata					1			
Microdeutopus gryllotalpa								2
Unidentified amphipods				1				
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans					1			2
Total crustaceans		428		1634	1795	5568		425

CRUSTACEANS

Station 5 # 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		42	937	26023	1570		442	120
Brachyuran megalopa				27	43		436	
Postlarval brachyura							67	
Total		42	937	26050	1613		945	120
Pagurid zoea			1	50	323		30	5
Pagurid glaucothoe							55	
Total			1	50	323		85	5
Crangon septemspinosus zoea			44	452	647		6	3
C. septemspinosus postlarvae					1		12	
Palaemonetes sp. zoea				46	28		73	
Thalassinidea zoea								
Neomysis americana	NOT SAMPLED				45	NOT SAMPLED	18	
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.		2						
Jassa [illegible]ata								
Microdeutopus gryllotalpa								
Unidentified amphipods			1	18	4			
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans								
Total crustaceans		44	983	26616	2661		1139	128

CRUSTACEANS

Station 6 # 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		52	353	1958	2071	2681	1962	210
Brachyuran megalopa				26		186	1615	
Postlarval brachyura						2	8	
Total		52	353	1984	2071	2869	3585	210
Pagurid zoea			5	64	250	347	16	
Pagurid glaucothoe					7	28	3	
Total			5	64	257	375	19	
Crangon septemspinosus zoea			1	28	55	41		
C. septemspinosus postlarvae					2			
Palaemonetes sp. zoea				10	20	13	24	
Thalassinidea zoea								
Neomysis americana				14		2		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata								
Microdeutopus gryllotalpa								
Unidentified amphipods				2		2		
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans						21	5	
Total crustaceans	0	52	359	2102	2405	3323	3633	210

CRUSTACEANS

Station 9-23 # 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		67	160	2871	13193	6525	2004	240
Brachyuran megalopa				64		59	29	
Postlarval brachyura						2	8	
Total		67	160	2935	13193	6586	2041	240
Pagurid zoea			10	556	375	701	33	7
Pagurid glaucothoe					1	86	8	
Total			10	556	376	787	41	7
Crangon septemspinosus zoea	4	4	4	61	24	39	8	
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				10	40	145	41	3
Thalassinidea zoea								
Neomysis americana				3		10		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata						8		
Microdeutopus gryllotalpa								
Unidentified amphipods		2	1			2		
Edotea triloba								
Unidentified isopods			1					
Cumaceans								
Unidentified crustaceans					3	4	4	
Total crustaceans	4	73	176	3565	13636	7581	2135	250

CRUSTACEANS

Station 24 # 0 Mesh Net Organisms per 100 m^3

	CRUISES 1	2	3	4	5	6	7	8
Brachyuran zoea		63	1580	2943	925	6438		212
Brachyuran megalopa				5		24		
Postlarval brachyura								
Total		63	1580	2948	925	6462		212
Pagurid zoea			33	150	365	219		12
Pagurid glaucothoe					2	41		
Total			33	150	367	260		12
Crangon septemspinosus zoea			36	82	172	107		
C. septemspinosus postlarvae								
Palaemonetes sp. zoea				2	23	36		
Thalassinidea zoea								
Neomysis americana					3	12		
Amphipods:								
Ampithoe longimana								
Carinogammarus mucronatus								
Corophium sp.								
Jassa falcata						3		
Microdeutopus gryllotalpa								
Unidentified amphipods		3			2			
Edotea triloba								
Unidentified isopods								
Cumaceans								
Unidentified crustaceans						3		
Total crustaceans	0	66	1682	3182	1492	6883		224

NO SAMPLE

OTTER TRAWL - 10 min. tow Cruise 1 Date 12-15 April 1971

		Sta. 1		Sta. 2		Sta. 3		Sta.		Sta.		Sta.		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata														
	Merluccius bilinearis														
	Microgadus tomcod														
	Paralichthys oblongus														
	Prionotus carolinus														
	Prionotus evolans														
	Pseudopleuronectes americanus	26	74-215	13	80-290										
	Scomber scombrus														
	Scophthalmus aquosus	204	86-310	13	87-272	46	103-280								
	Stenotomus chrysops														
	Tautoga onitis														
	Tautogolabrus adspersus	7	106-194	3	154-182	3	160-210								
	Myoxocephalus octodecemspinosus	1	100												
Crustacea	Cancer irroratus	1	65	1	31	22									
	Crangon sp.	5		3											
	Homarus americanus														
Other	Porifera	1													

Table 3.

OTTER TRAWL - 10 min. tow Cruise 2 Date 10-12 May 1971

		Sta. 1		Sta. 2		Sta. 3		Sta. 5		Sta. 6*		Sta.		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata					1	600								
	Merluccius bilinearis														
	Microgadus tomcod	29	152-238			6									
	Paralichthys oblongus														
	Prionotus carolinus														
	Prionotus evolans														
	Pseudopleuronectes americanus	24		3		3		1	85	7	107-180				
	Scomber scombrus							1	390						
	Scophthalmus aquosus	181	84-305	43	45-275	161	120-311	5	155-240	8	115-280				
	Stenotomus chrysops														
	Tautoga onitis	5	205-282							5	150-360				
	Tautogolabrus adspersus	20	92-210	1	168			3	154-198	19	120-202				
	Myoxocephalus octodecemspinosus	3				1									
	Clupeidae	5													
Crustacea	Cancer irroratus					2				1					
	Crangon sp.			1											
	Homarus americanus														
Other	Limulus polyphemus	4													
	Asterias sp.			4											

* Tow terminated after 5 min. due to rocky obstructions

Table 34

OTTER TRAWL - 10 min. tow Cruise 3 Date 8-9 June 1971

		Sta. 1		Sta. 2		Sta. 3*		Sta. 4		Sta. 6		Sta. 9-23*		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata														
	Merluccius bilinearis									1	225				
	Microgadus tomcod	66	173-240	1	204					1	255				
	Paralichthys oblongus	5	225-262	4	253-260			2	245-270	3	240-245				
	Prionotus carolinus	12	220-307							3	251-311				
	Prionotus evolans							1	275	4	284-340				
	Pseudopleuronectes americanus	38	107-220	5	117-173	6	121-175	5	135-201	5	111-195	7	85-235		
	Scomber scombrus	1	384												
	Scophthalmus aquosus	314	100-260	203	105-310	8	121-172	40	130-250	68	150-280				
	Stenotomus chrysops	2	109-125			1	300	1	250	1	106				
	Tautoga onitis			3	242-422	4	210-360	5	362-430	1	357				
	Tautogolabrus adspersus	5	61-140	1	178	28	146-229			1	190	15	71-165		
	Myoxocephalus sp.	5	100-124												
	Osmerus mordax											6	146-187		
	Alosa mediocris	1	301												
Crustacea	Cancer irroratus	3	60-90												
	Crangon sp.														
	Homarus americanus	7	48-105	4	55-105	1	95								
Other	Anthozoan					1									
	Asterias sp.					1									
	Limulus polyphemus	2								1					
	Mercenaria mercenaria														

*Tow terminated after 6 min. due to obstructions.

Table 35

CLAM RAKE - 5 min. tow

Cruise 6

Date 20 July 1971

		Sta. 1		Sta. 2		Sta. 3		Sta. 6		Sta. 9-23		Sta. 24		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata														
	Merluccius bilinearis														
	Microgadus tomcod														
	Paralichthys oblongus														
	Prionotus carolinus														
	Prionotus evolans														
	Pseudopleuronectes americanus					1	130								
	Scomber scombrus														
	Scophthalmus aquosus	10	110-176			1	128								
	Stenotomus chrysops														
	Tautoga onitis														
	Tautogolabrus adspersus														
	Enchelyopus cimbrius	1	135												
Crustacea	Cancer irroratus	25	20-89	2	46-81	21	44-68			1					
	Crangon sp.														
	Homarus americanus														
	Libinia sp.	4	60-79					1	88	1					
	Limulus polyphemus	4													
	Ovalipes ocellatus					1	33								
Other	Asterias sp.	5	61-105									8			
	Lumbrineridae			1											
	Lunatia heros			1	43	1	31								
	Metridium sp.	14	10-45												

Table 36

OTTER TRAWL - 10 min. tow

Cruise 7 Date 2 August 1971

		Sta. 1		Sta. 2		Sta. 5		Sta. 6		Sta. 9-23		Sta. 24		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata														
	Merluccius bilinearis														
	Microgadus tomcod														
	Paralichthys oblongus	6	250-320	2	235-270										
	Prionotus carolinus														
	Prionotus evolans											1	338		
	Pseudopleuronectes americanus	6	140-225	2	190-270			26	132-210	6	125-170	1	155		
	Scomber scombrus														
	Scophthalmus aquosus	4	195-424	3	118-245			7				2	105-245		
	Stenotomus chrysops														
	Tautoga onitis	1	240												
	Tautogolabrus adspersus	1		3	155-176					1	195	4	125-185		
	Myoxocephalus octodecemspinosus									1	110				
Crustacea	Cancer irroratus	49													
	Crangon sp.														
	Homarus americanus	6	40-105	1	65					1		1	85		
	Libinia sp.			1											
Other	Cliona sp.			1											

NO ORGANISMS TAKEN

Table 37

CLAM RAKE - 5 min. tow

Cruise 8 **Date** 31 Aug-2 Sept, 1971

		Sta. 1		Sta. 14		Sta. 15[1]		Sta. 16[1]		Sta. 18[1]		Sta. 9-23[1]		Sta.	
		# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm	# Per Tow	Size Range mm
Fish	Anguilla rostrata														
	Merluccius bilinearis														
	Microgadus tomcod														
	Paralichthys oblongus														
	Prionotus carolinus									2	54-73				
	Prionotus evolans														
	Pseudopleuronectes americanus	1	120							1	180				
	Scomber scombrus														
	Scophthalmus aquosus	1	155					3	80-170	1	40				
	Stenotomus chrysops														
	Tautoga onitis														
	Tautogolabrus adspersus														
	Syngnathus fuscus							1	50						
	Sphaeroides maculatus									1	25				
Crustacea	Cancer irroratus	3		9		1		12	20-90	136	40-80	15	20-35		
	Crangon sp.	1													
	Homarus americanus														
	Ovalipes ocellatus							10		8		3	25		
	Libinia sp.			2						2		2			
	Limulus polyphemus	1						2	210-240	1	260				
	Pagurus sp.									+					
Other	Asterias forbesi	93		20		+		2				1			
	Mercenaria mercenaria			15	65-83	1	95	1	85	6	60-80				
	Polynices	+		1				1		1		6			
	Modiolus demissus							+							
	Metridium sp.	+													

[1] 10 min. tow + present but not counted

Table 38

Benthic Samples

Cruise 1

12-15 April 1971

Number per 0.1 m^2 grab sample

		Sta. 2	Sta. 3	Sta. 8	Sta. 10	Sta. 15	Sta. 19	Sta. 23
Polychaetes	*Pectinaria gouldii*	1						
	Nereidae					1		1
	Orbiniidae							24
Bivalves	*Cyprina* sp.							1
	Mytilus edulus				1			
Gastropods	*Nassarius* sp.	11	10	4	1	23	1	2
Crustaceans	*Neomysis americana*		2	4			2	
Other	Rhynchocoela							1

Benthic Samples

Cruise 5 9 July 1971

		Number per .05 m^2 grab sample	
		Sta. 29	Sta. 17
Polychaetes	Polynoidae	1	
	Harmothoe sp.	1	5
	Phyllodocidae		5
	Nereidae	1	1
	Glyceridae	4	2
	Onuphidae	1	
	Lumbrineridae		1
	Orbiniidae		1
	Maldanidae	4	124
	Capitellidae		4
	Cirratulidae	1	28
	Flabelligeridae	1	
	Spio sp.		127
	Unidentified	2	59
Bivalves	*Mya arenaria*	421	1118
	Mytilus edulus		2
	Ensis directus		13
	Mercenaria mercenaria	1	
	Petricola sp.	1	
Gastropods	*Nassarius* sp.	27	20
Crustaceans	Gammaridae		3
	Xanthidae	1	
Others	Rhynchocoel	1	*

* fragments present

FISH EGGS AND LARVAE

EPIBENTHIC SLED

Station 1

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			320		115		4	
Anguilla rostrata	2							
Fundulus sp.								
Enchelyopus cimbrius					1			
Urophycis sp.								
Syngnathus fuscus					3			
Cynoscion regalis							32	
Tautoga onitis							6	
Tautogolabrus adspersus							8	
Scomber scombrus				NOT SAMPLED		NOT SAMPLED		NOT SORTED
Triglidae								
Myoxocephalus octodecemspinosus	5							
Ammodytes sp.	1							
Menidia sp.								
Scophthalmus aquosus					8		15	
Pseudopleuronectes americanus		32	24					
Sphaeroides maculatus								
Unidentified larvae								
Total number	8	32	344		127		65	
Fish eggs	38	1312	4064		567		72	

FISH EGGS AND LARVAE
EPIBENTHIC SLED

Station 2

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			5		119		91	
Anguilla rostrata	2							
Fundulus sp.								
Enchelyopus cimbrius			1					
Urophycis sp.								
Syngnathus fuscus					1			
Cynoscion regalis							37	
Tautoga onitis							8	
Tautogolabrus adspersus					1		546	
Scomber scombrus								
Triglidae				NOT SAMPLED		NOT SAMPLED		NOT SORTED
Myoxocephalus octodecemspinosus	1							
Ammodytes sp.		3						
Menidia sp.								
Scophthalmus aquosus			1		20		27	
Pseudopleuronectes americanus		123	6					
Sphaeroides maculatus								
Unidentified larvae	1		4					
Total number	4	126	17		141		709	
Fish eggs	64	2423	7876		10720		103	

FISH EGGS AND LARVAE

EPIBENTHIC SLED

Station 3

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes					107		81	8
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.								
Syngnathus fuscus							1	2
Cynoscion regalis							10	
Tautoga onitis							17	
Tautogolabrus adspersus					1		258	
Scomber scombrus	NOT SAMPLED		NOT SAMPLED	NOT SAMPLED		NOT SAMPLED		
Triglidae							1	
Myoxocephalus octodecemspinosus		4						
Ammodytes sp.		14						
Menidia sp.								
Scophthalmus aquosus					26		4	
Pseudopleuronectes americanus		169						
Sphaeroides maculatus								
Unidentified larvae								
Total number		187			134		372	10
Fish eggs		3535			5168		49	64

FISH EGGS AND LARVAE

EPIBENTHIC SLED

Station 5

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			8		1601		73	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius			1					
Urophycis sp.			3					
Syngnathus fuscus					5		2	
Cynoscion regalis					1		1	
Tautoga onitis					2		25	
Tautogolabrus adspersus					2		273	
Scomber scombrus	NOT SAMPLED		1	NOT SAMPLED		NOT SAMPLED		NOT SORTED
Triglidae								
Myoxocephalus octodecemspinosus								
Ammodytes sp.		4						
Menidia sp.								
Scophthalmus aquosus			1		8		2	
Pseudopleuronectes americanus		55						
Sphaeroides maculatus								
Unidentified larvae			3				2	
Total number		59	17		1619		378	
Fish eggs		4638	3901		13923		3	

FISH EGGS AND LARVAE

EPIBENTHIC SLED

Station 6

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			13		699		254	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius			4					
Urophycis sp.								
Syngnathus fuscus					6		27	
Cynoscion regalis								
Tautoga onitis					7		43	
Tautogolabrus adspersus					6		457	
Scomber scombrus				NOT SAMPLED		NOT SAMPLED		NO LARVAE COLLECTED
Triglidae								
Myoxocephalus octodecemspinosus	1	4						
Ammodytes sp.	50	5						
Menidia sp.								
Scophthalmus aquosus			6		41		2	
Pseudopleuronectes americanus		85						
Sphaeroides maculatus								
Unidentified larvae	1		3					
Total number	52	94	26		759		783	0
Fish eggs	10	5823	14288		4728		511	180

FISH EGGS AND LARVAE

EPIBENTHIC SLED

Station 9-23

Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			10		87		4	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.								
Syngnathus fuscus					1		3	
Cynoscion regalis								
Tautoga onitis					1		7	
Tautogolabrus adspersus							10	
Scomber scombrus		NO LARVAE TAKEN		NOT SAMPLED		NOT SAMPLED		NOT SORTED
Triglidae								
Myoxocephalus octodecemspinosus	6							
Ammodytes sp.	16							
Menidia sp.			1					
Scophthalmus aquosus					2			
Pseudopleuronectes americanus								
Sphaeroides maculatus								
Unidentified larvae			2		1			
Total number	22	0	13		92		24	
Fish eggs	10	432	10184		29400		133	

FISH EGGS AND LARVAE
EPIBENTHIC SLED

Station 24 Organisms per 5 min tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			5		298			
Anguilla rostrata								
Fundulus sp.			1					
Enchelyopus cimbrius	4							
Urophycis sp.					7			
Syngnathus fuscus								
Cynoscion regalis					8			
Tautoga onitis								
Tautogolabrus adspersus								
Scomber scombrus				NOT SAMPLED		NOT SAMPLED	NOT SORTED	NOT SORTED
Triglidae								
Myoxocephalus octodecemspinosus	20							
Ammodytes sp.	10							
Menidia sp.			2					
Scophthalmus aquosus					4			
Pseudopleuronectes americanus		16						
Sphaeroides maculatus								
Unidentified larvae								
Total number	34	16	8		317			
Fish eggs	20	560	4618		12024			

FISH EGGS AND LARVAE

#0 MESH NET

Station 1 Organisms per tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes				353	668	108	15	
Anguilla rostrata	1							
Fundulus sp.								
Enchelyopus cimbrius				1				
Urophycis sp.			1					
Syngnathus fuscus					1	1		
Cynoscion regalis							2	
Tautoga onitis				3	8	9	8	
Tautogolabrus adspersus					2	12	26	
Scomber scombrus								
Triglidae								
Myoxocephalus octodecemspinosus	7	1						
Ammodytes sp.	3	2						
Menidia sp.				2				
Scophthalmus aquosus				2	5	1		
Pseudopleuronectes americanus	17	46	15					
Sphaeroides maculatus								
Unidentified larvae			7					
Total number	28	49	23	361	684	131	51	0
Fish eggs	0	339	2352	706	1152	512	13	463

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 2

Organisms per tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			3	9	22	1101	56	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.			11					
Syngnathus fuscus				2	5	2		
Cynoscion regalis						1		
Tautoga onitis				21	26	56	15	
Tautogolabrus adspersus				1	4	39	158	
Scomber scombrus				1				
Triglidae							2	
Myoxocephalus octodecemspinosus	1							
Ammodytes sp.	28		1					
Menidia sp.					2			
Scophthalmus aquosus			2	6	3	7	4	
Pseudopleuronectes americanus	5	3	3					
Sphaeroides maculatus								
Unidentified larvae				5			1	
Total number	35	3	25	45	62	1206	236	0
Fish eggs	8	186	2688	12150	19120	4328	118	382

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 3

Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Clupeiformes				210	567	541		
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius				2	1			
Urophycis sp.								
Syngnathus fuscus						4		1
Cynoscion regalis						3		
Tautoga onitis				20	8	59		
Tautogolabrus adspersus				3	2	220		
Scomber scombrus	NOT SAMPLED		NOT SAMPLED	2			NOT SAMPLED	
Triglidae						5		
Myoxocephalus octodecemspinosus								
Ammodytes sp.		3						
Menidia sp.					2			
Scophthalmus aquosus				7	6	31		
Pseudopleuronectes americanus		5						
Sphaeroides maculatus								
Unidentified larvae								
Total number		8		244	586	853		1
Fish eggs		944		16080	21014	5203		16

FISH EGGS AND LARVAE

#0 MESH NET

Station 5

Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Clupeiformes			34	269	786		27	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius					1			
Urophycis sp.			1	1	1			
Syngnathus fuscus				2	1		4	
Cynoscion regali								
Tautoga onitis			2	14	16		3	
Tautogolabrus adspersus				13	13		46	
Scomber scombrus				2				
Triglidae				1			1	
Myoxocephalus octodecemspinosus								
Ammodytes sp.		22						
Menidia sp.			4	2				
Scophthalmus aquosus				13	11		1	
Pseudopleuronectes americanus		1						
Sphaeroides maculatus								
Unidentified larvae			4	1	4		1*	
Total number		23	45	317	833		83	0
Fish eggs		3723	1216	41184	15192		0	0

NOT SAMPLED

NOT SAMPLED

NO LARVAE OR EGGS COLLECTED

* Juvenile Peprilus triacanthus

FISH EGGS AND LARVAE

#0 MESH NET

Station 6 Organisms per tow

	CRUISES 1	2	3	4	5	6	7	8
Clupeiformes			14	60	893	3003	25	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.			7					
Syngnathus fuscus				1	3	2	4	
Cynoscion regalis						9		
Tautoga onitis				16	32	275	6	
Tautogolabrus adspersus				5	28	356	49	
Scomber scombrus				1				
Triglidae								
Myoxocephalus octodecemspinosus								
Ammodytes sp.	25							
Menidia sp.				1	2			
Scophthalmus aquosus			8	11	8	8		
Pseudopleuronectes americanus	8	14						
Sphaeroides maculatus							1	
Unidentified larvae			1		2	2		
Total number	33	14	30	95	968	3655	85	0
Fish eggs	4	8093	5360	17560	5184	6416	68	146

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 9-23

Organisms per tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			56	162	163	1003	5	
Anguilla rostrata								
Fundulus sp.			1					
Enchelyopus cimbrius								
Urophycis sp.						3		
Syngnathus fuscus				3	1	2		
Cynoscion regalis					1	20		
Tautoga onitis			1	10	14	81	1	
Tautogolabrus adspersus				7	2	131	11	
Scomber scombrus								
Triglidae					1			
Myoxocephalus octodecemspinosus	11							
Ammodytes sp.	21	11						
Menidia sp.			22	5				
Scophthalmus aquosus				7	3	4		
Pseudopleuronectes americanus	27	1						
Sphaeroides maculatus								
Unidentified larvae			6		1	1		
Total number	59	12	86	194	186	1245	17	0
Fish eggs	9	127	3449	13568	18232	19072	578	28

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 24

Organisms per tow

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes				139	778	191		
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.								
Syngnathus fuscus				1	2			
Cynoscion regalis						3		
Tautoga onitis			1	8	12	12		
Tautogolabrus adspersus				4	10	35		
Scomber scombrus				1			NOT SAMPLED	NO LARVAE COLLECTED
Triglidae								
Myoxocephalus octodecemspinosus	3							
Ammodytes sp	2	7						
Menidia sp.			23	2	1			
Scophthalmus aquosus			2	2				
Pseudopleuronectes americanus	8	2						
Sphaeroides maculatus								
Unidentified larvae				2				
Total number	13	9	26	159	803	241		0
Fish eggs	3	65	2400	14176	18208	15120		9

FISH EGGS AND LARVAE

#0 MESH NET

Station 1

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes				428	1088		18	
Anguilla rostrata	2							
Fundulus sp.								
Enchelyopus cimbrius				1				
Urophycis sp.			1					
Syngnathus fuscus					2			
Cynoscion regalis							2	
Tautoga onitis				4	13	NO FLOW METER READING	10	NO LARVAE COLLECTED
Tautogolabrus adspersus					3		32	
Scomber scombrus								
Triglidae								
Myoxocephalus octodecemspinosus	15	1						
Ammodytes sp.	6	2						
Menidia sp.				2				
Scophthalmus aquosus				2	8			
Pseudopleuronectes americanus	36	36	10					
Sphaeroides maculatus								
Unidentified larvae			5					
Total number	59	39	16	437	1114		62	0
Fish eggs	0	263	1593	857	1876		16	1206

FISH EGGS AND LARVAE
#0 MESH NET

Station 2

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			2	12	38	2256	102	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.			8					
Syngnathus fuscus				3	9	4		
Cynoscion regalis						2		
Tautoga onitis				28	45	115	27	
Tautogolabrus adspersus				1	7	80	287	
Scomber scombrus				1				
Triglidae							4	
Myoxocephalus octodecemspinosus	2							
Ammodytes sp.	71		1					
Menidia sp.					3			
Scophthalmus aquosus			1	8	5	14	7	
Pseudopleuronectes americanus	15	8	5					
Sphaeroides maculatus								
Unidentified larvae				6			2	
Total number	88	8	17	59	107	2471	429	0
Fish eggs	20	504	1841	15945	32909	8869	214	624

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 3

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes				210	768	650		
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius				2	1			
Urophycis sp.								
Syngnathus fuscus						5		2
Cynoscion regalis						4		
Tautoga onitis				20	11	71		
Tautogolabrus adspersus				3	3	264		
Scomber scombrus				2				
Triglidae	NOT SAMPLED		NOT SAMPLED			6	NOT SAMPLED	
Myoxocephalus octodecemspinosus								
Ammodytes sp.		3						
Menidia sp.					3			
Scophthalmus aquosus				1	3	37		
Pseudopleuronectes americanus		5						
Sphaeroides maculatus								
Unidentified larvae								
Total number		8		244	794	1037		2
Fish eggs		910		16096	28474	6250		39

FISH EGGS AND LARVAE

#Ó MESH NET

Station 5

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			35	1228	1174		163	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius					1			
Urophycis sp.			1	4	1			
Syngnathus fuscus				9	1		24	
Cynoscion regalis								NO LARVAE OR EGGS COLLECTED
Tautoga onitis			2	64	24		18	
Tautogolabrus adspersus				59	19		279	
Scomber scombrus	NOT SAMPLED			9		NOT SAMPLED		
Triglidae				4			6	
Myoxocephalus octodecemspinosus								
Ammodytes sp.		34						
Menidia sp.			4	9				
Scophthalmus aquosus				59	16		6	
Pseudopleuronectes americanus		2						
Sphaeroides maculatus								
Unidentified larvae			4	4	6		6*	
Total number		36	46	1449	1242		502	0
Fish eggs		5761	1250	188054	22708		0	0

* Juvenile Peprilus triacanthus

FISH EGGS AND LARVAE

#0 MESH NET

Station 6

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			15	120	1976	5634	68	
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.			8					
Syngnathus fuscus				2	7	4	11	
Cynoscion regalis						17		
Tautoga onitis				32	71	516	16	
Tautogolabrus adspersus				10	62	668	133	
Scomber scombrus				2				
Triglidae								
Myoxocephalus octodecemspinosus								
Ammodytes sp.	35							
Menidia sp.				2	4			
Scophthalmus aquosus			9	22	18	15		
Pseudopleuronectes americanus	11	20						
Sphaeroides maculatus							3	
Unidentified larvae			1		4	4		
Total number	46	20	34	190	2142	6858	231	0
Fish eggs	6	11611	6262	35120	11469	12037	184	348

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 9-23

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes			82	261	232	2055	21	
Anguilla rostrata								
Fundulus sp.			1					
Enchelyopus cimbrius								
Urophycis sp.						6		
Syngnathus fuscus				5	1	4		
Cynoscion regalis					1	41		
Tautoga onitis			1	16	20	166	4	
Tautogolabrus adspersus				11	3	268	45	
Scomber scombrus								
Triglidae					1			
Myoxocephalus octodecemspinosus	16							
Ammodytes sp.	30	22						
Menidia sp.			32	8				
Scophthalmus aquosus				11	4	8		
Pseudopleuronectes americanus	38	2						
Sphaeroides maculatus								
Unidentified larvae			9		1	2		
Total number	84	24	125	312	263	2550	70	0
Fish eggs	13	250	50277	21849	26008	39082	2388	97

NO LARVAE COLLECTED

FISH EGGS AND LARVAE

#0 MESH NET

Station 24

Organisms per 100 m^3

	CRUISES							
	1	2	3	4	5	6	7	8
Clupeiformes				254	1184	565		
Anguilla rostrata								
Fundulus sp.								
Enchelyopus cimbrius								
Urophycis sp.								
Syngnathus fuscus				2	3			
Cynoscion regalis						9		
Tautoga onitis			2	15	18	36		
Tautogolabrus adspersus				7	15	104		
Scomber scombrus				2				
Triglidae								
Myoxocephalus octodecemspinosus	9							
Ammodytes sp.	6	18						
Menidia sp.			40	4	2			
Scophthalmus aquosus			3	4				
Pseudopleuronectes americanus	25	5						
Sphaeroides maculatus								
Unidentified larvae				4				
Total number	40	23	45	292	1222	714		3
Fish eggs	9	171	4152	25963	27714	44733		51

FISH COLLECTED WITH GILL NETS

Date	Time (EST)	Species	Number
31 Aug. 1971	1700-1900	Tautoga onitis	2
		Alosa sp.	7
1 Sept. 1971	0700-1700		0
1 Sept. 1971	1700-1900	Tautoga onitis	1
		Tautogolabrus adspersus	15
1 Sept. 1971	1900-		
2 Sept. 1971	-0700	Tautoga onitis	1
		Tautogolabrus adspersus	13

U. S. FISH AND WILDLIFE SERVICE, COMMERCIAL FISHING STATISTICS
Long Island Sound 1954-1969 (no data for 1963, 1966)

	1954	1955	1956	1957	1958	1959	1960	1961	1962	1964	1965	1967	1968	1969
Bluefish											55,750	24,073	67,227	167,870
Bonito												262	370	3,949
Butterfish	10,400	15,300	24,300	13,100	13,300	73,400	2,500	20,500	11,700	12,700	18,200	40,909	64,131	51,708
Cod													132	341
Eel (common)												100		172
Flounders: blackback	77,400	82,500	54,300	39,700	29,000	200,450	59,400	76,000	50,600	19,800	64,500	106,750	74,630	64,959
fluke			1,850	1,000	24,800	7,600	57,200	96,100	93,700	75,200	97,200	32,547	45,917	13,021
Herring, sea												2,230	1,174	1,310
King whiting (kingfish)												2,950	3,575	1,754
Mackerel												17,667	20,660	67,107
Menhaden												135,640	58,000	207,244
Porgy	176,500	1,194,400	1,070,100	504,000	443,600	815,500	179,500	244,400	289,000	232,800	340,100	89,137	153,638	100,268
Sea bass			15,000	11,400	10,500	61,800	11,800	16,500	48,200	27,700	44,200	1,612	339	3,448
Sea robin												4,620	4,435	3,005
Sea trout (weakfish)	900	11,200	12,700	35,100	5,300	7,200		3,000	6,400	7,500	12,100	9,843	11,876	12,373
Shad												228		1,080
Sharks (dogfish)										9,700		25,781	10,590	11,896
Skates												1,527	1,348	877
Striped bass							3,000		3,200		12,560	104,606	81,316	113,950
Sturgeon	847	3,100	600	900	5,000	1,500		1,900	5,700	2,700	2,425	3,950	400	1,375
Swellfish (blowfish)												27,960	12,838	27,531
Tautog (blackfish)												22,960	12,101	6,665
Tuna (albacore)													1,341	4,083
Whiting	800		600								2,500			
Unclassified	7,000	18,500	8,200	21,500	7,300	23,600	9,200	15,500	11,000	19,300	22,900	16,687	11,489	5,105
TOTAL	273,847	1,325,000	1,187,650	626,700	538,700	1,260,050	322,600	473,900	519,500	407,400	672,435	672,019	637,527	871,091

Table 63

ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND
September 29 - October 3, 1969

Station	Depth, ft	Temp, °C	BOD, mg/l	Coliform, MPN/100 ml	
				Total	Fecal
1 Surface	10.0	19.8	3.0	27,000	5,600
1 Bottom	64.0	19.9	2.6	15,000	3,500
2 S	10.0	19.8		18,000	6,600
2 B	57.0	19.8	2.0	14,000	3,300
3 S	10.0	19.7	3.0	3,000	640
3 B	58.0	19.8	1.5	2,800	480
4 S	5.0	19.6		600	140
4 B	70.0	19.9		150	50
5 S	5.0	19.9	3.1	28*	2*
5 B	60.0	19.9		290	
6 S	5.0	19.9		6*	2
6 B	41.0	19.9		8*	2*
24 S	8.5	19.6		12,000	4,200
25 S	5.0	19.8	2.0	180	12*
26 S	5.0	19.8	3.7	4*	2*
26 B	27.0	19.5		4*	2
35 S	5.5	18.4	4.2	210	32*
36 S	5.0	20.0	1.9	390	80
37 S	5.0	19.7	3.3	100	38*
37 B	21.0	19.5		2,800	230
38 S	5.0	20.1	3.9	320	40*
39 S	5.0	19.7		420	230
39 B	26.0	19.7	3.4	1,200	380

* Greater than

ENVIRONMENTAL PROTECTION AGENCY
SURVEY OF LONG ISLAND SOUND
July 18-19, 1970

Station	Depth, ft	Temp, °C	5-Day BOD, mg/l	Coliform, MPN/100 ml	
				Total	Fecal
NS1	5	18.7		35,000	11,000
NS2	5	17.9		11,000	1,700
NS2A	5	18.4		3,500	280
NS3	5	18.1		2,400	1,300
NS4	5	19.8		330	130
NS5	5	22.0		2,400*	1,600
NS6	5	17.6		79	33
NS7	5	18.3		79	23
NS8	5	18.3	2.2	70	70
NS9	5	17.6		33	33
NS9A	5	18.1	3.2	330	230
NS10	5	17.3		49	14
NS10A	5	19.4	2.0	46	13
NS11	5	19.8	3.5	170	49
NS12	5	18.3		330	230

* Greater than

NEW YORK CITY HARBOR POLLUTION SURVEY
Hart Island, Western Long Island Sound

Year	Dates	Mean Temp, °C		Mean 5-Day BOD, mg/l		Coliforms, MPN/100 ml			
		Top	Bottom	Top	Bottom	Top		Bottom	
						Mean*	Range	Mean*	Range
1970	6/08- 9/24	68.0	67.2	3.4	2.8	1,570	10- 9,200	1,300	230-16,000
1969	6/09- 9/22	68.6	68.1	3.8	3.6	2,620	330-35,000+	2,970	330-35,000+
1968	6/03- 9/05	66.7	66.1	4.2	3.3	4,890	490-35,000+	3,090	450-35,000+
1967	5/31- 9/14	65.4	64.4	3.9	3.5	1,350	130-35,000+	2,130	40-16,000
1966	6/20- 9/19	69.9	69.0	3.0	2.7	1,380	230- 9,200	680	70-16,000
1965	6/08- 8/30	67.7	66.3	2.4	1.4	1,680	330-16,000	860	130- 3,500
1964	6/08- 9/10	67.9	66.5	3.7	2.8	1,170	230-11,000	1,000	230-11,000
1963	6/10- 9/09	70.4	68.2	2.6	1.5	1,370	230-11,000	630	230- 4,600
1962	6/04- 8/27	70.3	68.6	2.5	1.3	1,360	230-46,000+	730	230- 4,600
1961	6/05- 9/06	69.7	67.3	2.9	1.7	1,050	210-11,000	470	0- 4,600
1960	6/06- 8/29	69.8	67.7	2.6	1.1	1,330	390- 4,600	580	90-11,000
1959	6/23- 9/23	70.6	69.4	1.6	1.0	3,660	430-46,000+	830	230-11,000
1958	6/09- 9/03	66.7	65.3	1.8	0.8	710	0-11,000	390	0- 9,300
1957	6/20-10/01	70.0	69.0	2.0	0.9		30- 430		36- 430
1956	6/19- 9/04	68.0	66.0	3.1	2.1		91- 930		91- 930

+ Equal to or greater than number shown, which was the highest number obtainable with procedure used.

* Geometric mean,= nth root of the product of n numbers. All other means are arithmetic.

Table 66

NEW YORK CITY HARBOR POLLUTION SURVEY
Stepping Stones, Western Long Island Sound

Year	Dates	Mean Temp, °C		Mean 5-Day BOD, mg/l		Coliforms, MPN/100 ml			
		Top	Bottom	Top	Bottom	Top		Bottom	
						Mean*	Range	Mean*	Range
1970	6/08- 9/24	68.1	67.3	2.6	2.6	2,430	230-16,000	1,810	110-16,000
1969	6/09- 9/22	68.5	68.4	3.8	3.5	5,750	330-35,000+	8,760	2,200-35,000+
1968	6/03- 9/05	66.3	66.3	3.7	3.3	7,400	1,300-35,000+	7,710	790-35,000+
1967	5/31- 9/14	65.8	64.9	3.8	4.0	2,300	130-16,000	3,250	330-16,000
1966	6/20- 9/19	69.8	68.7	3.0	2.7	2,390	330-16,000	1,450	490- 9,200
1965	6/08- 8/30	67.8	66.3	1.9	1.4	2,400	110-35,000+	1,320	70- 9,200
1964	6/08- 9/10	68.8	66.9	3.6	3.0	5,380	430-46,000+	1,830	230-46,000+
1963	6/10- 9/09	70.3	69.0	2.7	1.6	2,440	230-46,000+	1,960	430-11,000
1962	6/04- 8/27	70.3	68.3	2.8	1.7	3,540	430-46,000+	970	70-11,000
1961	6/05- 9/06	70.3	67.8	3.0	1.7	1,630	30-46,000+	1,610	390-11,000
1960	6/06- 8/29	70.1	67.9	2.4	1.7	2,550	230-46,000+	950	230-15,000
1959	6/23- 9/23	70.8	69.6	1.8	1.3	2,470	240-11,000	990	230- 4,600
1958	6/09- 9/03	66.6	65.6	1.6	0.9	1,240	0-11,000	610	0- 4,600
1957	6/20-10/01	70.0	69.0	1.9	1.0		120-11,000		36- 430
1956	6/19- 9/04	68.0	66.0	3.1	.4		120-11,000		150- 930

* Geometric mean,= nth root of the product of n numbers. All other means are arithmetic.

+ Equal to or greater than number shown, which was the highest number obtainable with procedure used.

Table 67