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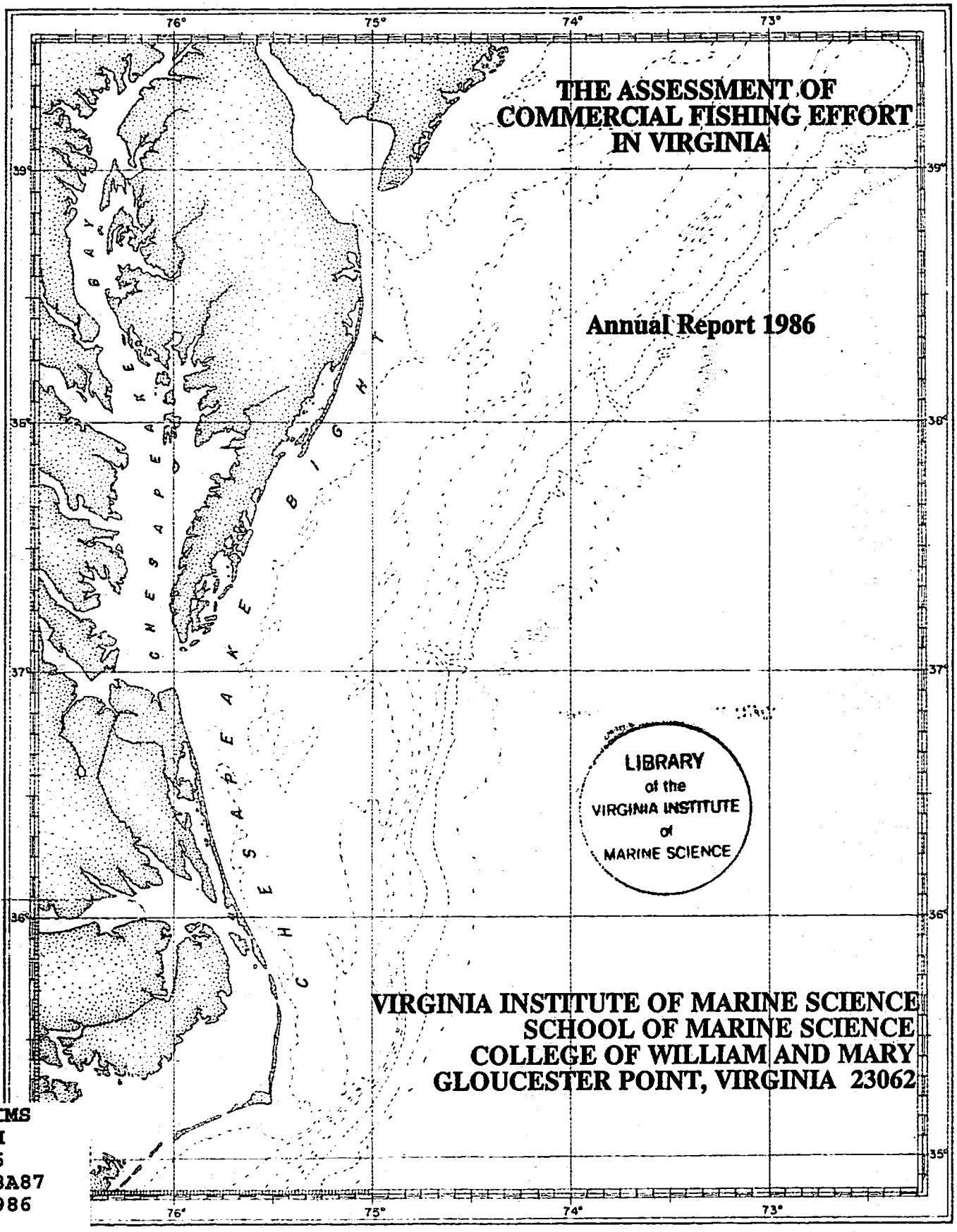
Joice S. Davis
Virginia Institute of Marine Science

James C. Owens
Virginia Institute of Marine Science

William H. Kriete Jr.
Virginia Institute of Marine Science

Joseph G. Loesch
Virginia Institute of Marine Science



THE ASSESSMENT OF COMMERCIAL FISHING EFFORT IN VIRGINIA

Annual Report 1986

VIRGINIA INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE
COLLEGE OF WILLIAM AND MARY
GLOUCESTER POINT, VIRGINIA 23062

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Prepared by

Joice S. Davis, James C. Owens,
William H. Kriete, Jr., and Joseph G. Loesch

Virginia Institute of Marine Science
School of Marine Science
College of William and Mary
Gloucester Point, Virginia 23062

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The Assessment of Commercial Fishing Effort in Virginia

INTRODUCTION

This report summarizes the assessment of commercial fishing effort in Chesapeake Bay and its Virginia tributaries during the period October 1, 1985 through December 31, 1986. Objectives of this study were: 1. to assess pound net fishing effort in Chesapeake Bay, and in the James, York and Rappahannock rivers; and 2. to assess anchor, drift, and stake gill net fishing effort in the James, York and Rappahannock rivers.

Additionally, two months of data for pound nets and anchor, drift, and stake gill nets have been included in order that the cessation of the study period would occur at a natural break in fishing effort in Virginia. Data for fyke net and haul seine fisheries have also been included.

Also included as appendices to this report are a map of Virginia waters showing pound net sites that were occupied during 1986, a VMRC map of Virginia water designations which was redrafted for clarity, and corresponding water codes which were modified slightly. These additions to the report were agreed upon at a meeting with the granting agency, VMRC, in January 1987.

Potomac River fisheries are under the jurisdiction of the Potomac River Fisheries Commission (PRFC). The Commission issues gear licenses, and describes and documents the location of each gear site when the license is issued. Because the location of each unit of gear is well documented in the Potomac River we have not included those data in this report.

METHODS

Pound Nets

Pound nets were counted by an observer during aerial surveys at low altitudes once a month during October, November and December in 1985, and January and February 1986. Semimonthly counts were made June through November 1986 and one was made in December 1986. During March, April and May 1986, semimonthly aerial surveys were conducted using a separate source of funding. These data are also incorporated in this report. A pound net is deemed to be actively fishing when the hedging (lead), heart, and head are in place. The aerial surveys do not include the northern shore of the Potomac River because of air space restrictions. Pound nets in the Potomac and its Virginia tributaries were counted by aerial survey in the lower portion of the river along the southern shore, and other areas were canvassed by telephone interviews with cooperating fishermen who hold pound net licenses, and by letters when telephone calls were unsuccessful.

We have identified areas where pound nets are located in Chesapeake Bay and its tributaries, using Virginia Marine Resources Commission (VMRC)-designated codes and names of Virginia water areas (Appendix I). Two of the VMRC water areas were further divided along the western Chesapeake Bay using VIMS aerial pound net survey designations, which are more definitive (see Appendix I and Appendix II).

Stake Gill Nets

Stake gill net effort in the James, York and Rappahannock rivers was assessed by observers in small boats during the first half of May, the end of the American shad (Alosa sapidissima) gill net fishing season. The

observer counted each active stand and the sections of nets in each stand. Data for total length of netting fished will be addressed in the 1986 report on Alosa entitled "Study of Alosa Stock Composition and Year-class Strength in Virginia." Personal interviews with cooperating fishermen were conducted at regular intervals through the year to ascertain maximum effort by half-month.

Anchor Gill Nets

Personal interviews with fishermen were utilized as a method of determining maximum anchor gill net effort per half month. Data are reported as the maximum number of commercial nets fished in each river section during each half-month.

A pilot program to determine the feasibility of counting anchor gill nets in the lower section of York River using a small out-board motor boat, an operator, and one observer in late afternoon to early evening hours was conducted in three successive half-months in late summer of 1986 to ascertain the effectiveness of this method of counting gill nets.

Drift Gill Nets

Drift gill nets are fished in the James, Pamunkey and Mattaponi rivers. Data for drift gill net effort were obtained by personal and telephone interviews with cooperating fishermen.

Fyke Nets

Observers in a small boat made a count of active fyke nets in conjunction with the stake gill net surveys in early May in the James River. A fyke net is considered active, or fishing, when the hedging (lead), heart,

and head (a long bag-shaped net, held open by a series of hoops) are in place and in good repair, and exhibiting a valid license for the current year. An aerial survey of fyke net effort in the James River was made in early June and again in early October. Personal interviews with fishermen were another source of information on this type of gear.

Haul Seines

Haul seine fisheries were active in the James, York and Rappahannock rivers and certain areas of the Chesapeake during 1986. Data on haul seine effort were collected through personal interviews with fishermen on the James, York and Rappahannock rivers.

RESULTS

Pound Nets

Chesapeake Bay Areas

Areas in Chesapeake Bay and tributaries that had minor effort (two pound nets or less) are shown in Table 1. Chesapeake Bay areas that were more heavily exploited by pound nets are shown in Figures 1-24. Data are separated by year and are shown in separate figures.

Eight pound net stands were observed in the Chesapeake Bay (Western Management Area) in the second half of October 1985. One remained fishing by the second half of November, and it had been removed by December (Fig. 1). One net was observed in January, February and the first half of March 1986, and, between that time and the first half of June, number of nets

increased to 11, which was the peak number observed. Fluctuations are reflected in Figure 2.

One net located in Fleets Bay during the second half of October 1985 had been removed by early November (Fig. 3). There was a maximum of three nets in the Fleets Bay area during 1986. Activity in that area is reflected in Figure 4.

The area from Windmill Point to New Point had 20 pound nets in October, 1985. Only one remained by the second half of November, and it had been removed by December (Fig. 5). Figure 6 reveals the maximum number of pound nets observed, by half month, in 1986.

The largest number of pound nets in the York Spit area in 1986 was observed in the second half of July (Fig. 7). The first net was observed in the first half of April and the last net was removed by early December.

The maximum number of pound nets observed in the Tue Marsh to Old Point area of Chesapeake Bay in 1986 was four. Again, the first stands were observed during the first half of April. The last fishing effort observed in this area was during the last half of August (Fig. 8).

Pound nets along the Willoughby Spit to Cape Henry area in 1986 never exceeded five. The first net observed was in place during the last half of March, and all had been removed by the early December (Fig. 9).

The lower eastern section of Chesapeake Bay had 19 pound nets in October, 22 in November and 11 December 1985 (Fig. 10). In 1986, five pound nets were still set in the first half of January, then were removed. By the second half of March, seven had been set. The count ranged from seven in March to 22 by the second half of June. There was a decline from 22 nets during the first half of July to eight nets in second half of July. Nets

ranged upward again from eight to 25 nets by the first half of November. By December the count had again declined to seven nets (Fig. 11).

Pound nets in the upper eastern section of Chesapeake Bay in 1985 numbered five in October and November. These had been removed by December (Fig. 12). One net was observed in April through July in 1986. A maximum of three nets were observed for the year (Fig. 13), and these were located just north of Craddock Creek. No other pound nets were observed in this area in 1986.

No pound net sites were observed in the Pocomoke Sound area in 1985 or 1986.

James River

The lower section of the James River has had no pound net fishery since 1984, when one net stand was located just west of the Hampton Roads Bridge-Tunnel on the north side of Hampton Roads. Pound nets have not been observed in the central section of James River since the late 1970's. Several pound nets have been reported fishing in a tributary of the upper section of the James since December 1986. A waterman who developed a market for gizzard shad has used these pound nets to supply his market (personal communication). These nets were not sighted during the aerial pound net surveys.

York River

The York River had an active pound net fishery in its lower section (Figs. 14, 15). In 1985 the last remaining net was removed by November. The first pound net of 1986 was set in lower York River in early March and

the number of nets peaked at 12 in late May. They remained at this level through the end of July and then declined in numbers until all were removed by late October. There have been no pound net fisheries in the central section in the last decade, and the upper section of the York River has had only one which was set approximately four years ago (personal communication).

There were two active pound net sites in Mobjack Bay in the second half of October 1985. One remained fishing through November and was removed by early December (Fig. 16).

In 1986, two pound nets were observed in the first half of April. Five were observed from the second half of April through early June. Four nets were set near its mouth on either side (two were west of New Point Light House and two lay near the Guinea Marshes), and one small pound net was located in shallow water near the mouth of the Severn River. Numbers ranged from the high of five nets to zero by the first half of December (Fig. 17).

Rappahannock River

The Rappahannock River pound net fishery prevailed through the fall of 1985 in the central and upper sections of the river, and had ended by late December, (Figs. 19 and 21). The central section had four active nets, October through the first half of December. The upper section had 16 nets in October and early November, but by the second half of November only nine were set to fish, and all were taken out of this section of the river by the early half of December 1985.

Pound nets were again set in all sections of the Rappahannock River in early March of 1986. A maximum of seven nets was observed in the lower section in late May through late June; one was counted from early July through early August; there was a maximum of four in September and they declined again. All were removed by early December (Fig. 18). The first pound net in the central section was set by early March and numbers of nets increased until by early June there were five active pound nets. No nets were fished through the month of July. Two nets again were fished in early August. Numbers of nets increased to a high of four by early September and they continued to be fished until November. All were removed by early December (Fig. 20). Two nets were observed during the early March survey in the upper section of the river, where the largest pound net fishery of the Rappahannock exists. The number of nets rapidly increased to a high of 21 by early May. By late July only one net remained fishing. There were 18 nets fishing in early October and by December had decreased again to one net (Fig. 22).

Potomac River

In October 1985 in the Potomac River there were 54 nets fishing but by late November the number had decreased to 28, and by the 10th of December no nets were fishing (Fig. 23). Four nets were set in early March 1986, and the maximum number of 59 nets was counted in early May. The count remained high throughout the summer months. Numbers decreased gradually during the fall and all nets and poles had been removed from the river by December 15th

(Fig. 24). A PRFC regulation requires that all pound nets and poles be removed from the river by 15 December.

Stake Gill Nets

James River

The James River stake gill net fishery was limited to the lower and central sections in 1986, with maximum effort expended in the first half of April in the lower section, and starting in the second half of March and continuing through the first half of April in the central section (Figs. 25 and 26). The nets were fished primarily for American shad, using a 4 7/8-inch to 5-inch stretched mesh size.

York River

The York River had no stake gill nets in its lower section in late 1985 or 1986.

Ten stands were set in the central section of the York River in late February 1986 and the maximum of 51 nets was reported by the first half of March. The number remained at 51 through the first half of April (Fig. 27).

There were seven stands set in the upper section of the York by late November 1985 that were fished until the first half of December and then removed (Fig. 28). Five stands were in place by early January 1986, and by early March there were 74 stands, primarily directed toward the American shad fishery. When the fishery in these sections of the river declined and dockside prices decreased, most of the nets were removed. There were only

15 stands still fishing by mid-April and by early May all nets had been removed. Fishing resumed with one active net in October and a second stand was added in November and continued fishing until the first half of December (Fig. 29).

Rappahannock River

The lower section of the Rappahannock river had no stake gill stands in 1985, and the six that were in place in the central section were removed by the first of December (Fig. 30). By early January 1986 there were three stands set, and numbers of stands increased to a maximum of eight by early April (Fig. 31). After the shad fishery had moderated, nets were pulled out and only incidental nets were set. White perch was the target species of these nets.

The Rappahannock River fall and winter stake gill net fishery has in recent years been geared toward the white perch (Morone americana) and catfish (Ictalurus catus and I. punctatus). Fishermen use net mesh sizes ranging from 2 7/8 inches to 3 1/2 inches in order to capture migrant species that come into the river during the summer.

Anchor Gill Nets

The anchor gill net fishery in Virginia is extensive, and includes full-time commercial fishermen who sell all of their catch, part-time fishermen who sell their catch (probably while holding full-time jobs and fishing on their days off), and recreational or non-commercial fishermen who

set occasional nets to supply their families and/or friends with seasonal species for personal use.

Our data relate to three major Virginia tributaries to the Chesapeake Bay, and primarily, nets set by full-time commercial fishermen. Anchor gill nets are relatively inexpensive, compared to pound nets and are easily set, and moved and set again in a different place by the individual fisherman. For this reason, it is more difficult to obtain detailed data for anchor gill nets. Data are reported as the the maximum number of commercial nets fished in each river section during each half-month.

The applicability of counting anchor gill nets during aerial pound net surveys was evaluated. We concluded that effort could not be reliably assessed during aerial surveys. The pound net surveys are usually conducted during morning to early afternoon hours; however, anchor gill nets are usually set in late evening and fished in early morning, thus precluding an accurate count during the aerial survey. In some areas crab pot floats are very numerous and can be confused with gill net floats when viewed from the plane at an altitude of several hundred feet. Also, strong winds and tides hinder the recognition of gill net floats.

James River

James River anchor gill net fishermen began setting nets in the lower section of the river during the second half of February in 1986. Peak numbers of nets were recorded in the second half of May and none were fished after the first half of October (Fig. 32). Four nets were fishing during the second half of February in the central section and the maximum for the year was reported during the first half of May. Anchor gill nets were

fished through November in the central section of the river, but by December none were being fished (Fig. 33). The season began with a maximum of four anchor gill nets fishing in the upper section of the James River during the second half of May and the fishery was over by the second half of October (Fig. 34).

York River

The York River anchor gill net fishery was more extensive than either the James River fishery or the Rappahannock River fishery. Four nets were active in the lower section of the York River during early November 1985, catching mostly gray trout (Cynoscion regalis), bluefish (Pomatomus saltatrix), and croaker (Micropogonias undulatus). Nets increased to eight by the second half of November, and then decreased by the second half of December 1985 to two nets (Fig. 35). Trout were the target species.

Two anchor gill nets were set in the lower section of the York River in early February 1986 and numbers of nets steadily increased to 64 by the first half of May (Fig. 36). Thereafter, the number of nets fluctuated until a high of 69 was reached in the first half of September. From mid-September to mid-December the number of anchor gill nets decreased from 69 to zero.

In the central section of the York River in 1985, six anchor gill nets were fished in the first half of November, three nets in the second half of November, and four nets in the first half of December (Fig. 37). In 1986, the number of anchor gill nets in the central section of the York River from the second half of January until the second half of May ranged from zero to 19 (Fig. 38). A mode of 24 nets was noted in the first half of June, and

the maximal value was repeated in the first half of August and both halves of September. After September, the number of nets rapidly decreased until none were fished in the second half of December.

There were 17 anchor gill nets fishing in the upper section of the York River in the first half of November 1985 and by early December had decreased to three nets (Fig. 39). Anchor gill nets were fished in every half month of 1986 in the upper section of the river with the exception of the first half of December (Fig. 40). A peak of 17 nets was reached in the second half of May. The period of greatest anchor gill net activity occurred from mid-February through the second half of June when numbers of nets ranged from 2 to 10, with a mode of 17 nets.

The pilot study using a small boat and observer to count anchor gill nets in the lower York River during evening hours in the late summer had the following results. During the second half of August 10 nets were counted; during the first half of September 30 nets were counted; and during the second half of September 14 nets were counted. These counts represented 21%, 43% and 23%, respectively, of counts determined through personal interviews with fishermen in those half-months.

Rappahannock River

The Rappahannock River is the northernmost river of the three major Virginia tributaries under discussion. Its spring fishery tends to begin about two to three weeks later than in the more southern rivers.

Anchor gill nets were fished in the lower section of the Rappahannock River in 1986 from late February to early December (Fig. 41). The period with the most anchor gill net activity was from early May to late September,

when the number of nets ranged from 14 to 14 with a mode of 18 nets in early June.

Anchor gill nets were fished in the central section of the Rappahannock River throughout 1986 except for early December. The period with the most nets was the first quarter of 1986 when the number of nets ranged from 6 to 13 with a mode of 14 nets in early March (Fig. 42).

In the upper section of the Rappahannock River nearly all anchor gill net fishing occurred in the first and fourth quarters of 1986 (Fig. 43). Anchor gill net fishing was particularly strong in the first quarter when the number of nets ranged from 19 to the modal value of 25.

Drift Gill Nets

James River

In the James River in 1986 only the upper section had a drift (or floating) gill net fishery. This fishery had a limited duration, late March to early May, with maximal values of 25 nets occurring in both late March and early April (Fig. 44).

Pamunkey and Mattaponi rivers

Drift gill nets are fished in the Pamunkey and Mattaponi rivers. In these localities the nets are mostly fished from small boats launched at private docks; thus, we could not assess these fisheries.

Rappahannock River

According to personal interviews with commercial fishermen there has been a very limited drift gill net fishery on the Rappahannock River in recent years, and in 1986 this trend continued. Nets were fished in the upper section of the river on a recreational or part-time basis. The decline in the American shad fishery has been a contributing factor, along with regulations regarding anadromous species in the upper portion of the river.

Fyke Nets

James River and other areas

Fyke nets were fished in the upper section of the James River in 1986 from the second half of April through the first half of August (Fig. 45). There were 12 nets fishing and a maximal value of 23 nets occurred in each half of the months of May and June, and early July. James River watermen reported that all fyke nets were removed by the second half of August (personal interviews). During an aerial survey in October over the upper James no active fyke net stands were observed.

There was one fyke net set in the upper York River during the month of July and the month of December 1986 (Table 1).

One fyke net was also observed in the mouth of Brown's Bay, a tributary of Mobjack Bay, on June 11, 1986 during an aerial pound net survey. The same net was seen on the September 22 and October 6 surveys.

Haul Seines

James River

Haul seines were fished in the James River in its central section and upper section during the spring of 1986 according to personal interviews with commercial watermen (Table 1). Catfish were probably the target species of this haul seine fishery.

York River

In the York River the haul seine fishery began in early May and continued through the latter half of September. In the lower section of the river summer species such as spot (Leiostomus xanthurus), croaker, trout, and bluefish, represented the major portion of the catches. The largest number of haul seines operated during late June through late July (Fig. 46). In the central section one haul seine was reported in operation during the months of May through September. Again, the summer species were sought after (Table 1).

Rappahannock River

The Rappahannock River had one haul seine fisherman who fished during July (Table 1) in the lower section of the river, targeting summer species such as trout, bluefish, spot and croaker.

DISCUSSION

The actual number of units of the various types of fishing gear in the Chesapeake Bay and its tributaries changes greatly during the course of a year, and usually reflects the commercial watermen's knowledge and experience concerning the particular fisheries they have targeted. However, fluctuations are influenced by, or can be the results of:

1. hydrological conditions, such as winter storms, hurricanes, droughts or flooding.
2. seasonal availability of marketable species, i.e., migratory patterns and cyclic appearances of desirable species.
3. fishery regulations resulting from depletion of stocks, or pollution.
4. market demands (domestic and foreign).

Pound Nets

Chesapeake Bay

Pound nets in Chesapeake Bay tend to be clustered in certain areas. The choice of locations is influenced by: 1) accessibility to home ports; 2) location of docking facilities and/or seafood handling facilities; 3) good launching sites; 4) areas of sufficient size for net maintenance, pole preparation and storage; and 5) fish migratory patterns. Pound net sites occupied in 1986 are indicated in Appendix II.

Pound net catches from the Chesapeake Bay (Western Management Area) and Fleets Bay area nets are probably sold to the processing plants at Reedville, Virginia. Edible species supply local retail and wholesale markets.

Nets located in the area from Windmill Point on the Rappahannock River to New Point capture edible species that are sold to local markets and are trucked to city markets. Fishes that have little or no demand in the marketplace are referred to as "scrap." These catches are sold locally as crab bait or trucked to processing plants in Reedville, Virginia.

The York Spit area is a productive fishing area and pound nets located there are set primarily for the summer and fall fisheries. Croaker, spot, bluefish, trout, summer flounder (Paralichthys dentatus) and Atlantic menhaden (Brevoortia tyrannus) are some of the species caught. The Tue Marsh-Old Point area also has two sites east of Tue Marsh and others that are situated near the mouth of Back River and Grandview-Buckroe beaches. Pound nets in these areas are fished primarily for river herring (Alosa sp.), American shad and spot and other summer species.

There are five pound net sites in the Willoughby Spit-Cape Henry area, all of which are located along the shore to the east of Lynnhaven Inlet. The nets are usually set to catch the early arriving river herring and shad, and subsequent summer species.

Pound net sites in Chesapeake Bay (Lower Eastern Section), are numerous, and most of them lie very close inshore. The northernmost pound net site in this section in 1986 was just north of Cherrystone Inlet.

James River

The James River pound net fishery has been affected by bans on fishing because of Kepone contamination since 1975. That and the high cost of setting pound nets virtually eliminated this fishery from the James until late 1986 when a fishery developed in the upper section of the James.

York River

Nets in the York River, lower section, are all located within three to four miles of the river mouth. Fish from these nets are landed nearby and are sold to wholesale buyers, shipped to retail markets or used locally as crab bait.

Rappahannock River

Pound nets in the Rappahannock River, lower section, are localized in two areas, one is the north shore near the river mouth and the other is just upriver of the Rappahannock River Bridge. In the central section they are located near Morattico, and in the upper section they can be found from mile 35 to mile 60, but most are localized around Cat Point Creek mouth to upper Payne's Island. Catfish, white perch and the anadromous fishes in season are target species. Retail and wholesale markets are the destinations of the edible catch and bait is sold to crab and eel pot fishermen.

Potomac River

The Potomac River Fisheries Commission regulates fisheries in the Potomac, and assignments of fishing gear sites are well documented by the Commission. Air space restrictions downriver of Dahlgren and along the southern shore of Maryland below the Potomac River Bridge made aerial surveys impractical. However, pound net licensees in these areas were canvassed by telephone calls and letters.

Potomac pound nets are set for catfish, white perch, and anadromous species in the spring in the upper river. In the summer, Potomac nets yield catches similar to pound nets set in the Rappahannock River, however, the seasons occur a week or two later than in the Rappahannock.

Stake Gill Nets

Generally, the stake gill net fishery begins in the spring when ice in the rivers is no longer a threat to poles and nets. The James River stake gill net season begins when American shad come into the river to spawn and is virtually over when dockside prices decrease to a point where it is unprofitable to fish the nets. Kepone bans preclude the taking of other resident species of fish in the lower and central sections of the river.

The York River has an extensive stake gill net fishery in its central and upper sections. Like the James River, the York-Pamunkey-Mattaponi river system is a spawning ground for anadromous fishes, and fishermen exploit the American shad in the spring in these sections of the river. They remove their nets when shad are scarce or dockside prices are low. Other types of

fisheries replace the stake gill net fishery. White perch and catfish are sought-after species through the late fall and winter months.

The Rappahannock River also has a stake gill net fishery, though it is not as extensive as that in the York River. The same species are targeted.

Stake gill nets are subject to fouling by marine organisms, grass and other detritus. These conditions can affect landings to the point that fishermen often raise the nets on the poles in order that they may be cleaned and allow the fouling organisms to die.

Anchor Gill Nets

In the spring the American shad anchor gill net fishery begins at Rudee Inlet in the Atlantic Ocean, and progresses toward Lynnhaven and Ocean View as the shad migrate to their spawning grounds. Buckroe and Grandview beaches and the area offshore of Back River also support a fishery. Mobjack Bay has a limited fishery for American shad.

An anchor gill net fishery operates around the Rappahannock River mouth and middle of Chesapeake Bay during the summer and fall. Boats are equipped with hydraulic gill net winders which enable fishermen to utilize nets that can be set at greater depths.

Some nets are set in the early spring in the Bay south of Cape Charles on the Eastern Shore. These gill nets target early migrations coming into the Bay similar to that at Lynnhaven, and they are set again in the fall when seaward migrations occur.

We are aware of anchor gill net fisheries in other areas within Chesapeake Bay, but the logistics of studying these scattered fisheries is beyond the allotted resources of the present project. We anticipate collecting more data on these fisheries in the coming seasons.

Gill nets are a selective gear type. Fishermen target particular species and sizes by varying the mesh size in their gill nets, and by regulating the depths at which they fish. The versatility of this gear type enhances its usefulness to fishermen in all of the Virginia rivers.

Drift Gill Nets

Drift gill nets are a type of selective gear that can readily be fished using small boats launched from private docks. They are usually fished in the upper sections of rivers where long reaches ensure a good drift without entanglement. It is difficult to assess this fishery because of the highly mobile nature of the gear. However, our data indicate an American shad fishery utilizing this gear occurs in the upper section of the James River and in the Pamunkey and Mattaponi rivers during late March and April each year.

Fyke Nets

Fyke nets have been a popular type of non-selective gear used by fishermen in the upper James River, but are rarely used in the York or Rappahannock. Only one fyke net was reported in the York system in 1986. The fishing style of a fyke net is similar to that of the pound net but utilizes less space. Catfish probably make up the bulk of the catch of these nets.

Haul Seines

The haul seine is a non-selective gear used in seasonal fisheries in Chesapeake Bay and its tributaries. The lower York River had more haul seines in 1986 than the other rivers, where they were operated from early

May through September for summer species such as spot, grey trout, croaker, and bluefish. Occasionally, haul seines that were usually set in the York River area also were fished in Mobjack Bay or its tributaries, when seasonal fisheries warranted the move. Two haul seines were reported in operation in Chesapeake Bay offshore of Poquoson, and others operated in adjacent areas but data are sparse concerning these.

RECOMMENDATIONS

Fishing effort data play an important part in the formulation of management plans of the fisheries of Virginia, and are usually cited when attempts are made to explain changes in a fishery's catch or calculate catch-per-unit-effort (CPUE) statistics.

Our methods of data acquisition, personal interviews and telephone conversations with commercial watermen and seafood dealers, yielded a considerable amount of pertinent data concerning Virginia fisheries. In future assessment studies we recommend devoting additional technical time toward personal contacts and telephone interviews with cooperating fishermen and seafood dealers to further enhance our data base.

The pilot study using small boats and observers to assess anchor gill net activity in the lower York River in 1986 revealed that it was not feasible to collect adequate data in this manner. The times of day that the majority of these nets are set and fished (late evening-early morning), and the expanse of river areas to be covered in a given time period by small boats would require an unrealistic amount of vessel time and personnel and still would not assure adequate coverage. Thus, monies directed toward this assessment approach would possibly be better directed toward other areas of

assessment such as increased time and personnel to contact fishermen in the field and by telephone interviews.

In the past each aerial pound net survey was accomplished in one day unless bad weather or other circumstances beyond our control forced a change of plans. An additional pound net fishery developed in late 1986 in the upper James River above Hopewell. This is the first pound net activity reported in this section since the river was closed to fishing in 1975 due to kepone contamination. This upriver area as well as the upper York and upper Potomac would be more adequately assessed if the aerial survey were divided in two segments in each half-month.

The locations of stationary fishing devices such as pound nets and fyke nets are generally licensed for the same positions year after year, and could be identified and documented by the use of LORAN, a navigational aid. Such documentation would enable VMRC district inspectors to more accurately locate pound nets for future licensing. It may also prove useful as an aid in arbitration concerning disputes over net locations. Our last recommendation concerns VMRC gill net licensing policy.

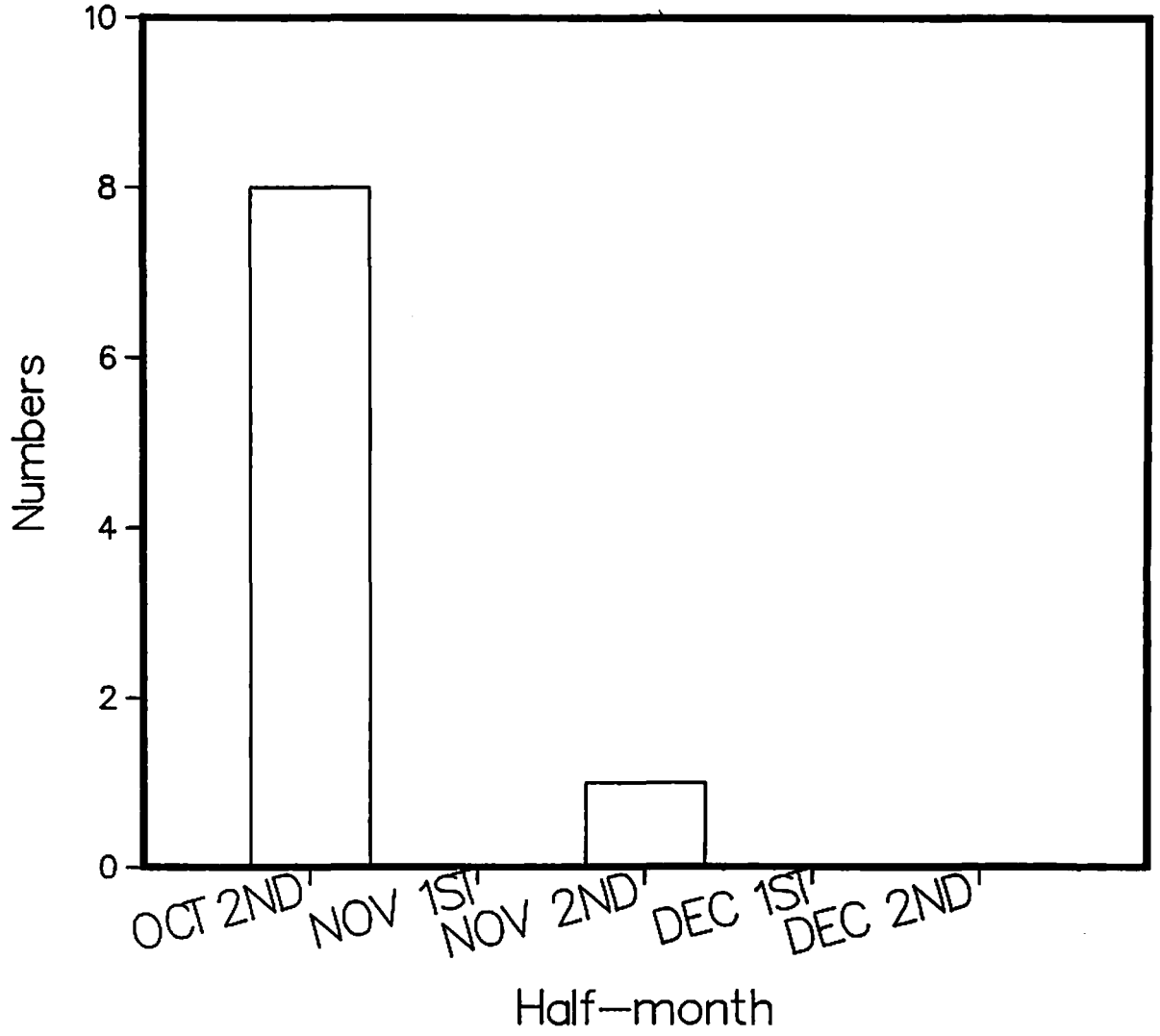
At present, VMRC makes no distinction between a drift gill net and an anchored gill net as they are sold under the same heading "Drift net License." The drift net and anchored net are generally targeting different species, are fished in different salinity regimes, and in different depths in relation to the water column; therefore, data collected from the two different types of gear are not compatible. We therefore recommend that anchored gill nets and drift gill nets be licensed separately. Additionally, we suggest a further subdivision of anchored gill nets. In recent years there has been an increase in noncommercial use of anchored gill nets, and such landings may be considerable but would never be

introduced into commercial landings statistics. Such landings, however, should be included in the total harvest from Virginia waters.

Table 1. Minor contributions of fishing effort, by gear, by half-month, in specific water areas in Virginia, Fall 1985, and 1986.

Month	1985		1986																					
	Oct	Nov	Feb	Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec	
Half-month	2	2	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Pound Net																								
Code Water Body																								
003 Back River						1		1	1	2	2	2	2	1	1	1								
017 Coan River	1									1		1	1	1	1	1	1							
069 Piankatank River				1	1	1		1	1	1	1	1		1		1	1	1	1	1				
074 Potomac Creek	1			1	1	2		2	2	2	1			1		1	1		1	1	1			
084 Tangier Sound	1							1	1	1	2	2	2	2	2	1	2	2	2	2	2			
088 West Tangier Mgmt. Area								1	1	1	1	1	1	1			1	1	1	1				
093 Yeocomico River	1	2			1	1		1	1	1	1	1	1	2	2	2	2	2	2	2	2	2		
Haul Seine																								
Code Water Body																								
237 James River, Cent				1	1	1																		
295 York River, Cent									1	1	1	1	1	1	1	1	1	1						
337 James River, Upper			1	1	1	1		1	1	1														
177 Rappahannock River, Lower												1	1											
Fyke Net																								
Code Water Body																								
395 York River, Upper												1	1									1	1	

Fig. 1. Pound nets in the Chesapeake Bay Western Management Area 1985.



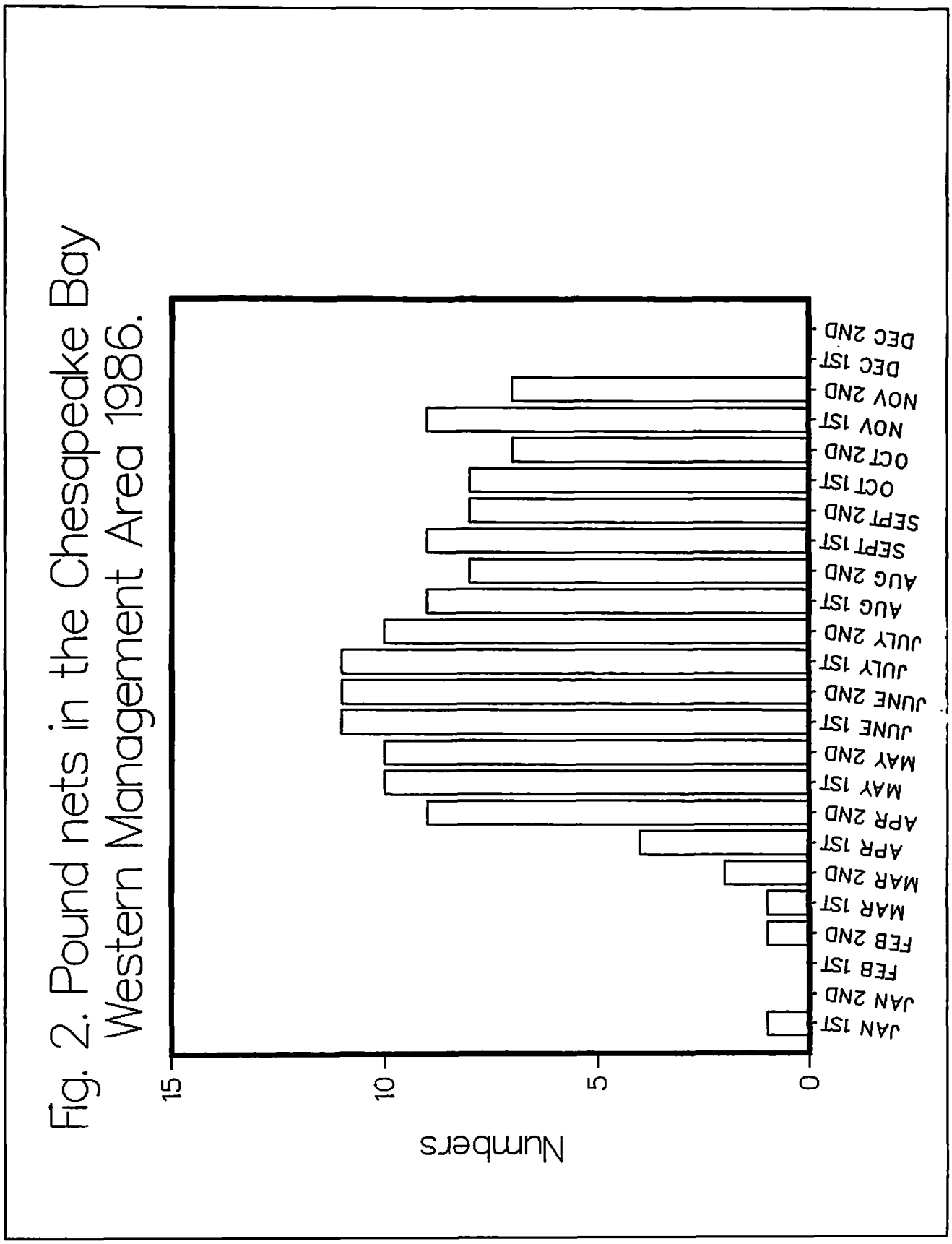


Fig. 2. Pound nets in the Chesapeake Bay
Western Management Area 1986.
Numbers
0
5
10
15
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND

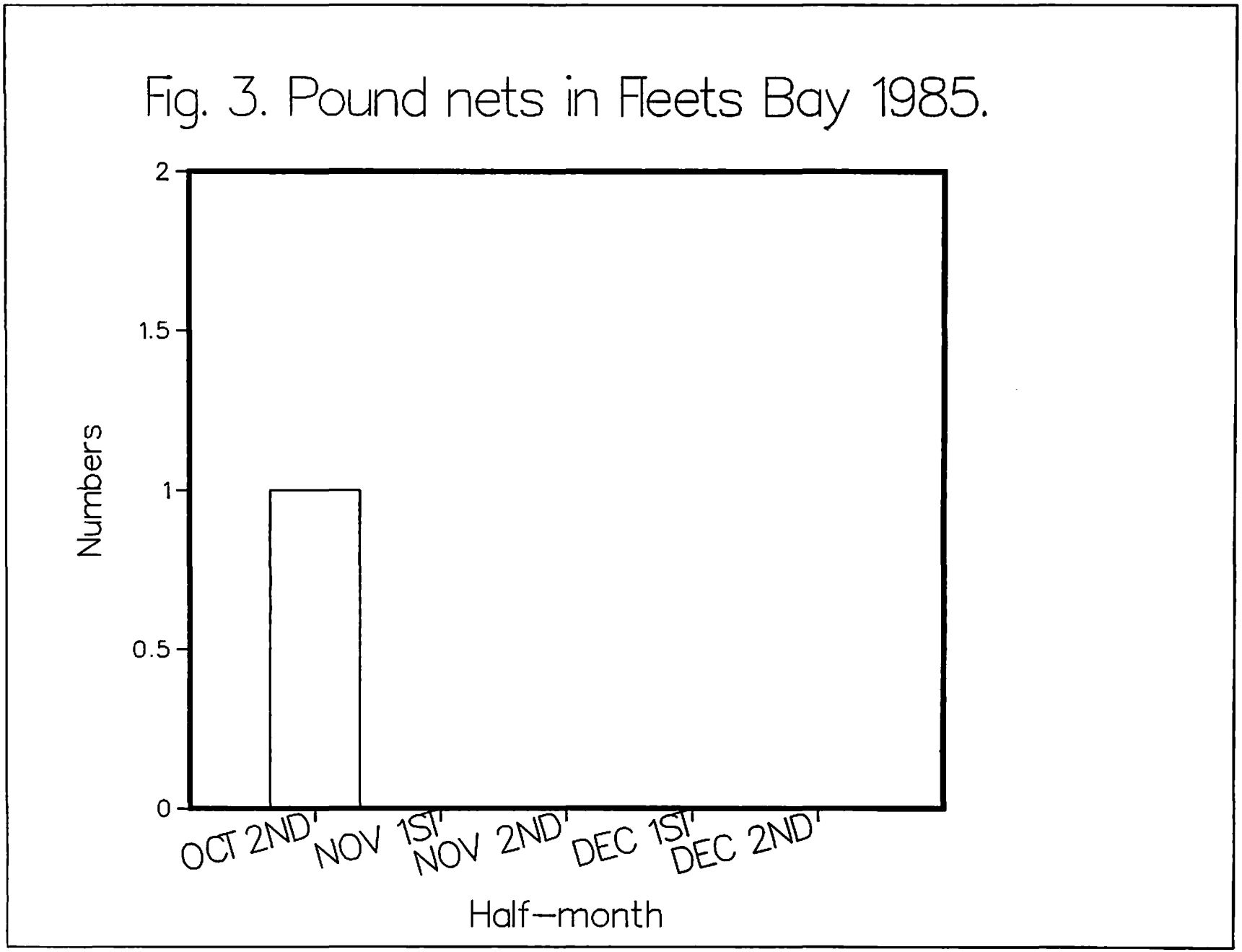


Fig. 3. Pound nets in Fleets Bay 1985.
Numbers
2
1.5
1
0.5
0
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

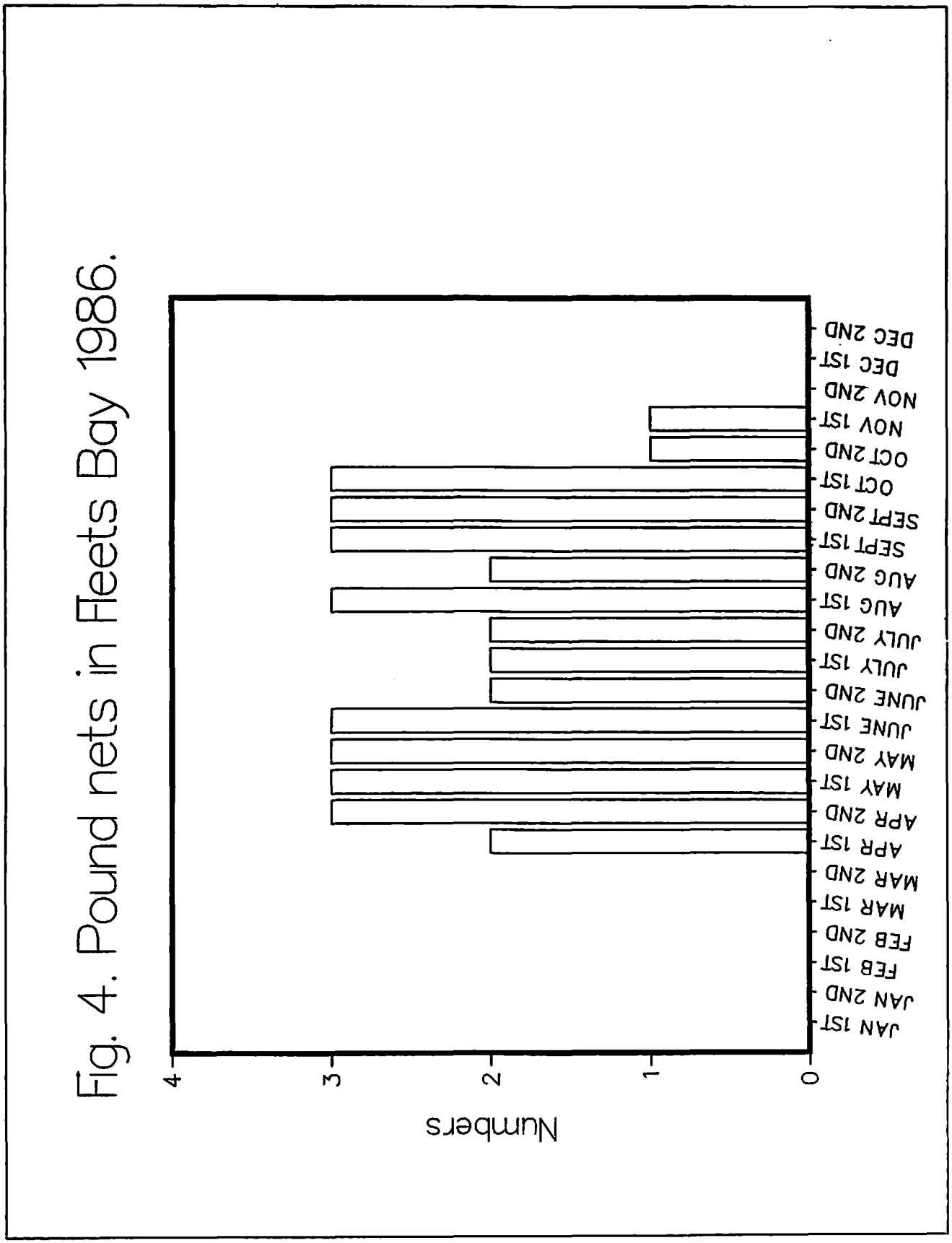


Fig. 4. Pound nets in Fleets Bay 1986.

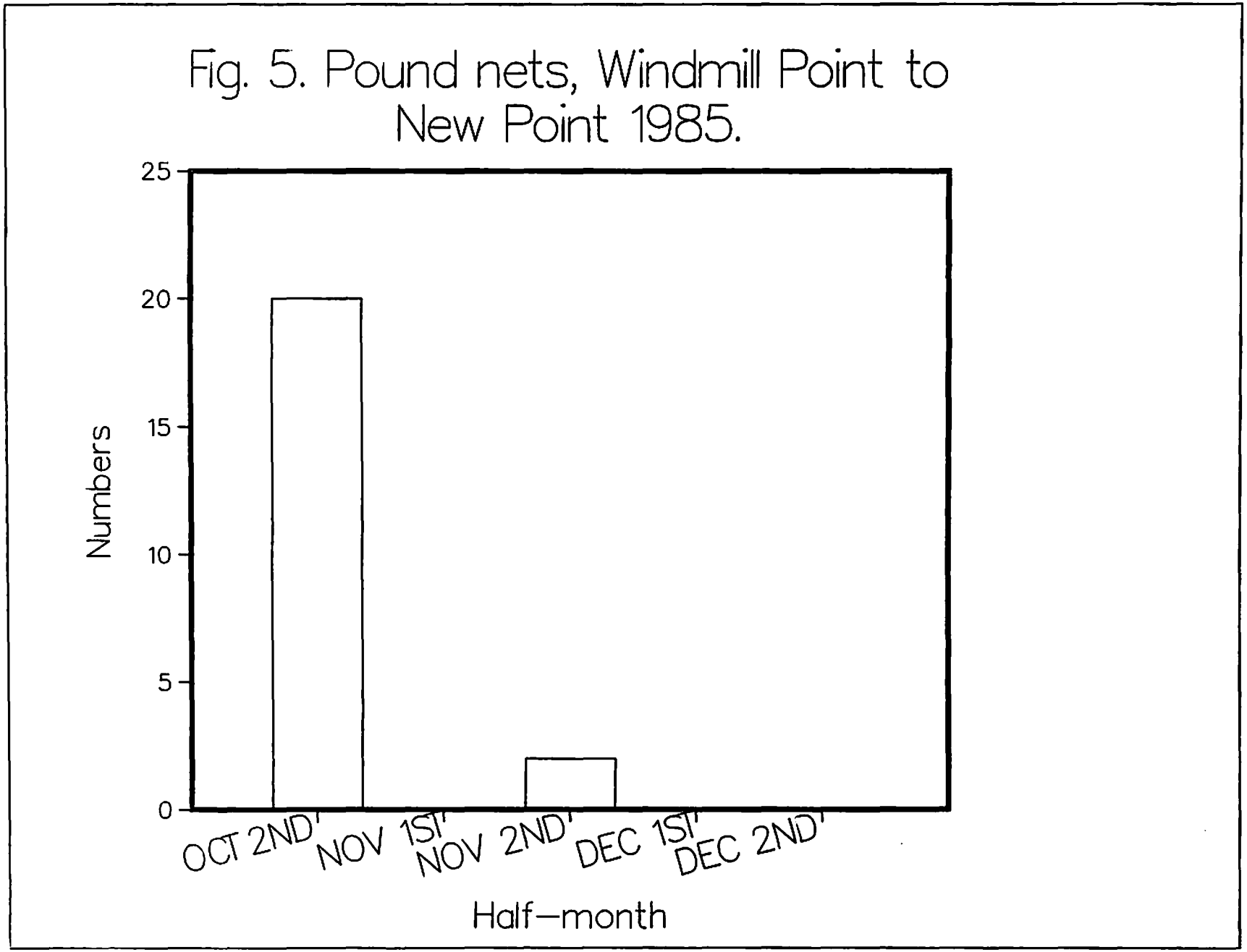


Fig. 5. Pound nets, Windmill Point to New Point 1985.
25
20
15
10
5
0
Numbers
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

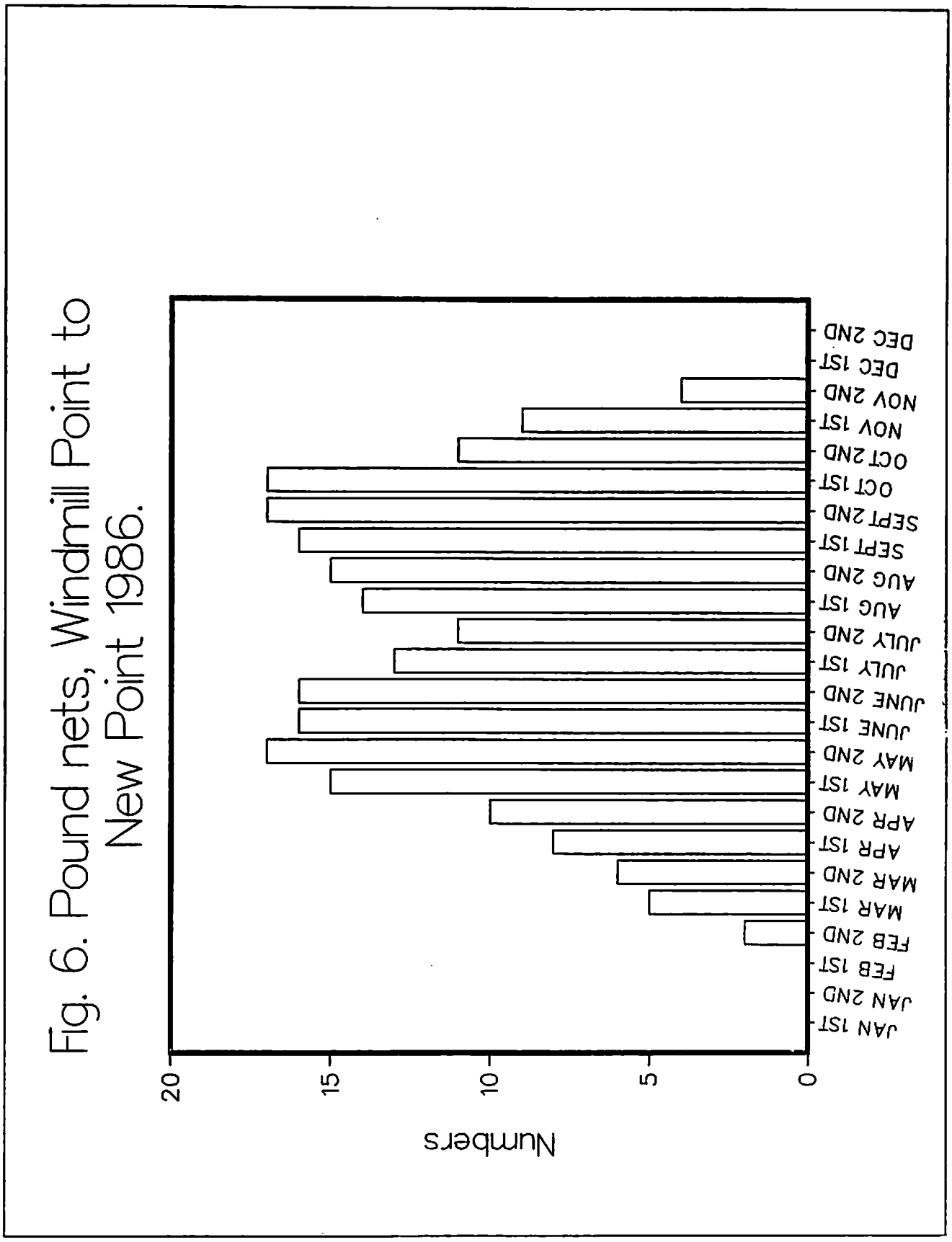
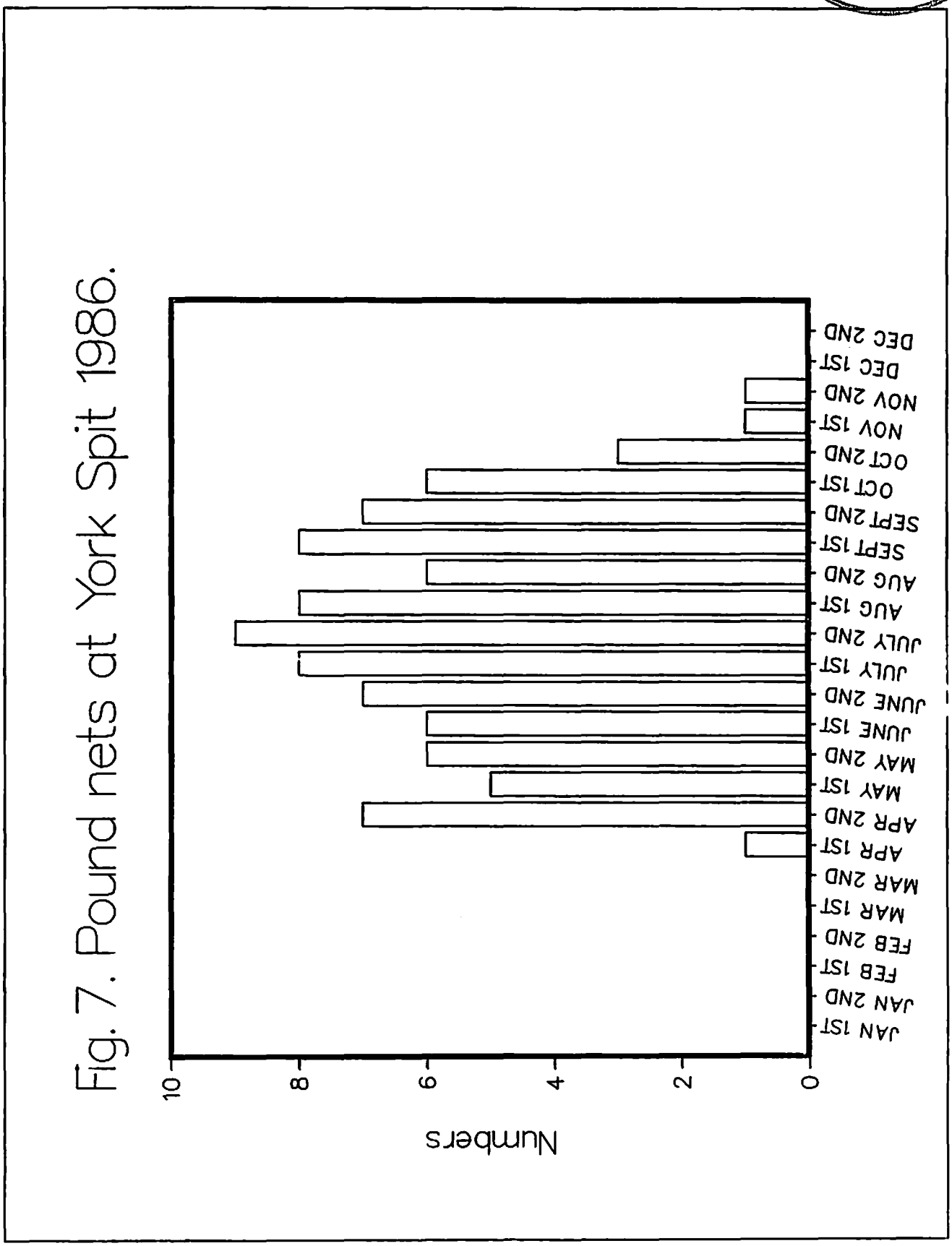


Fig. 6. Pound nets, Windmill Point to New Point 1986.
Numbers
0
5
10
15
20
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND



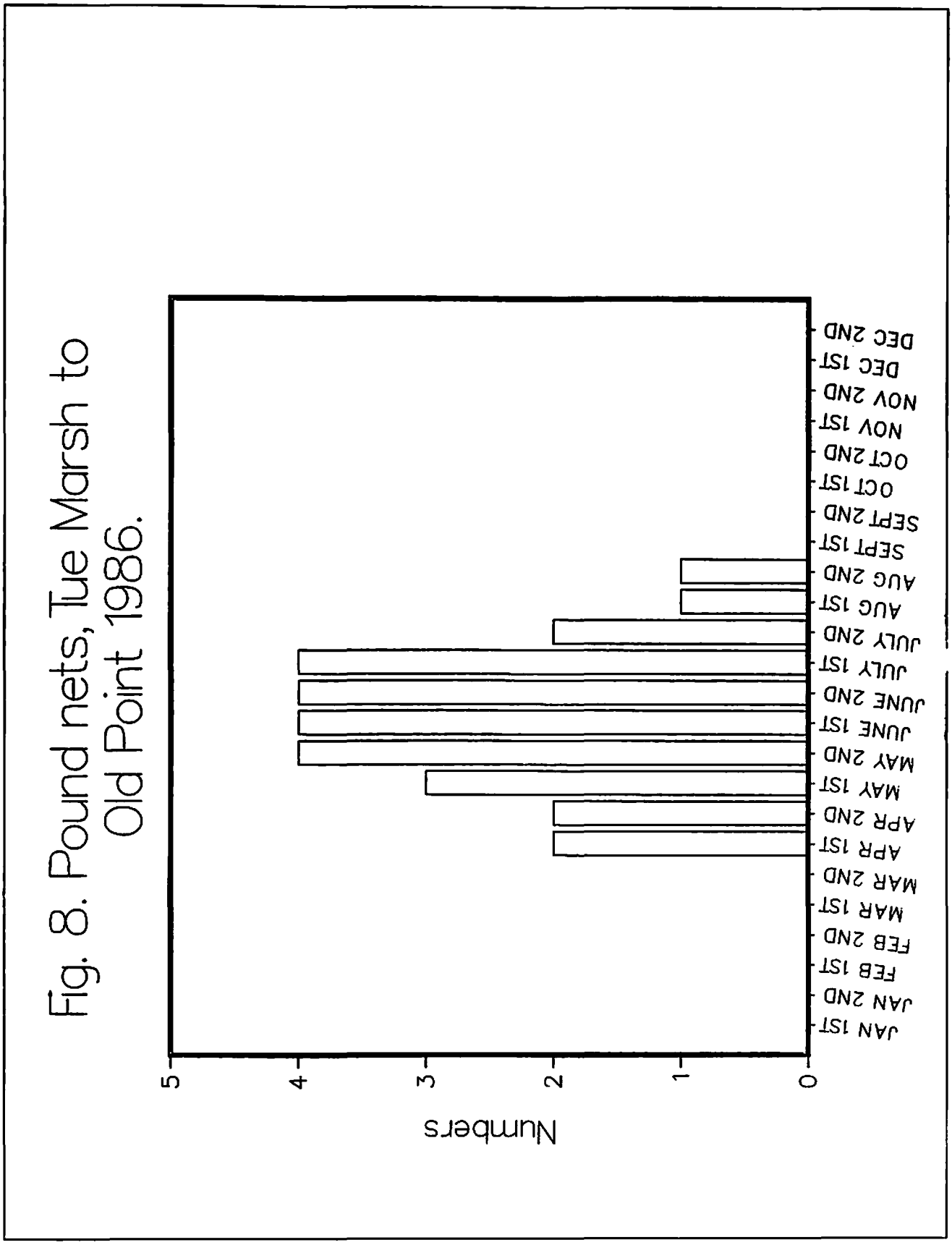


Fig. 8. Pound nets, Tue Marsh to Old Point 1986.

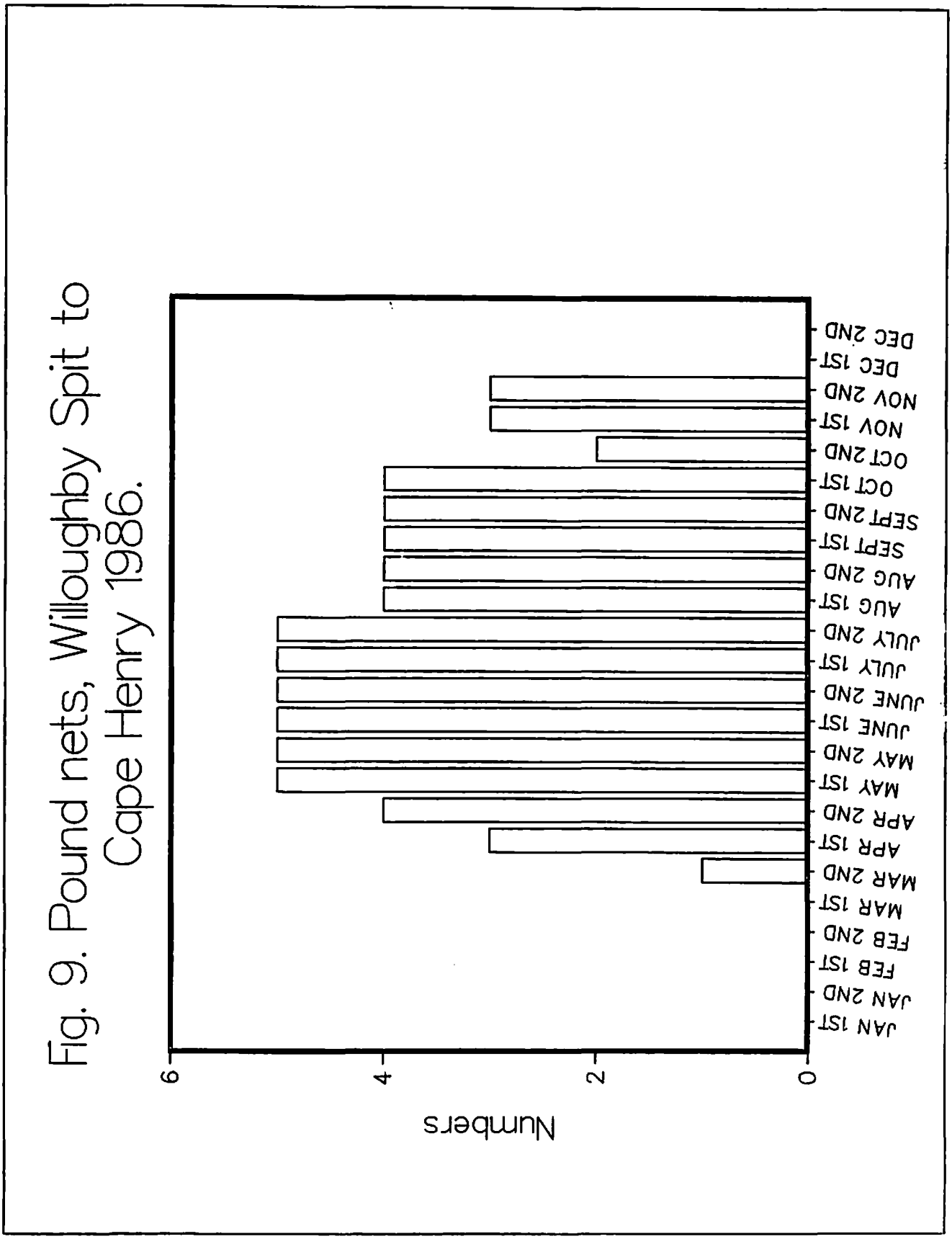
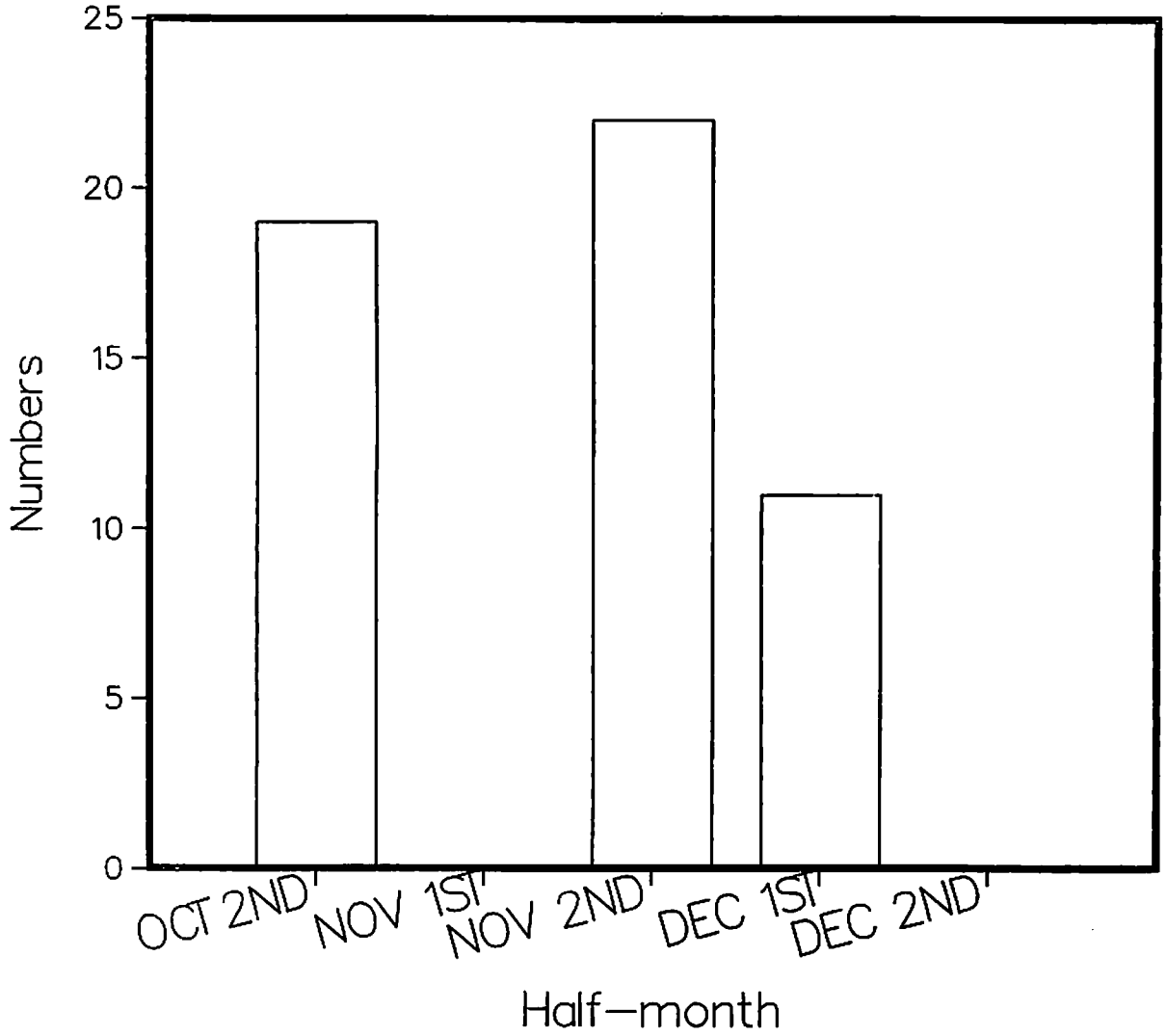


Fig. 9. Pound nets, Willoughby Spit to Cape Henry 1986.

Fig. 10. Pound nets in the lower eastern section of the Chesapeake Bay 1985.



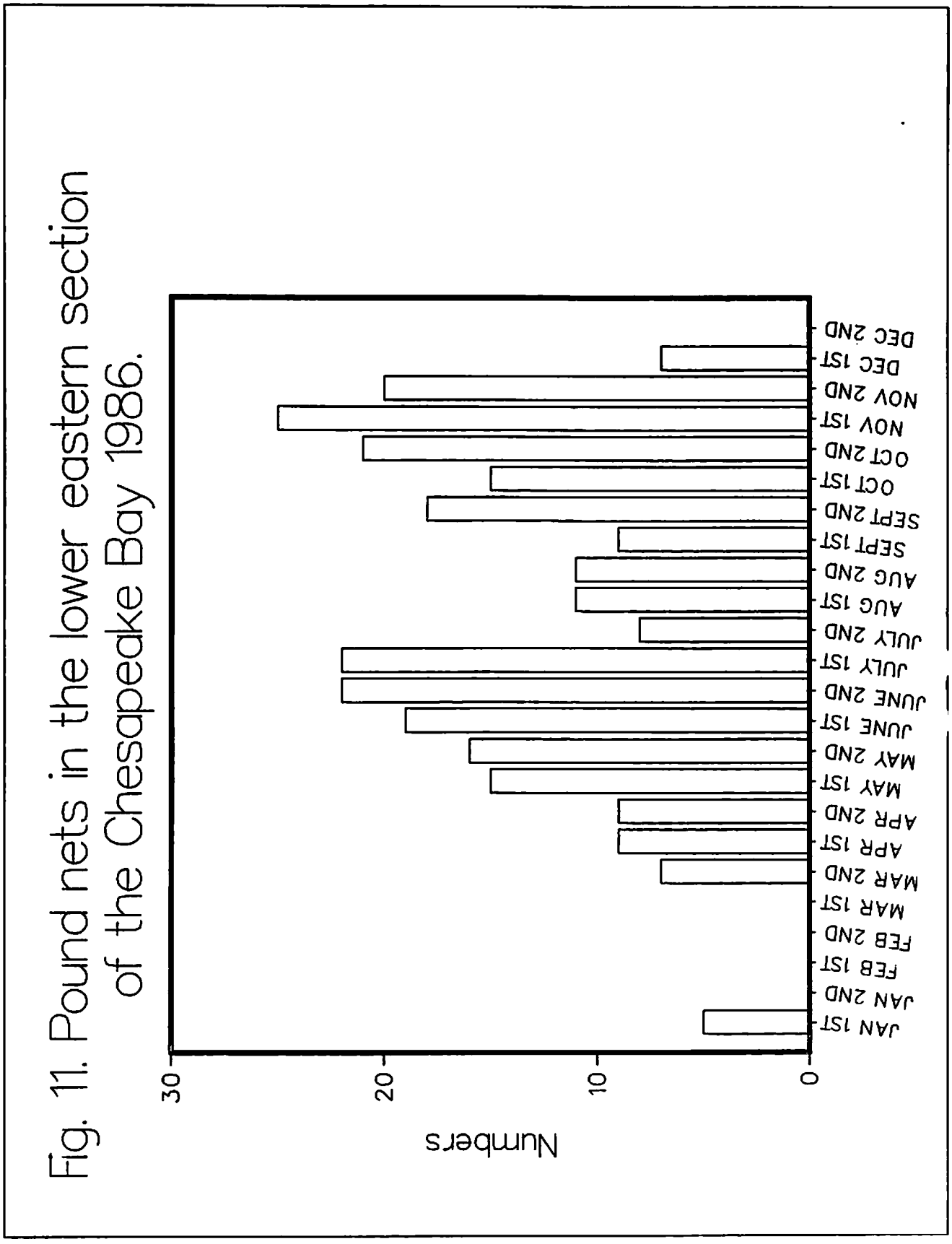
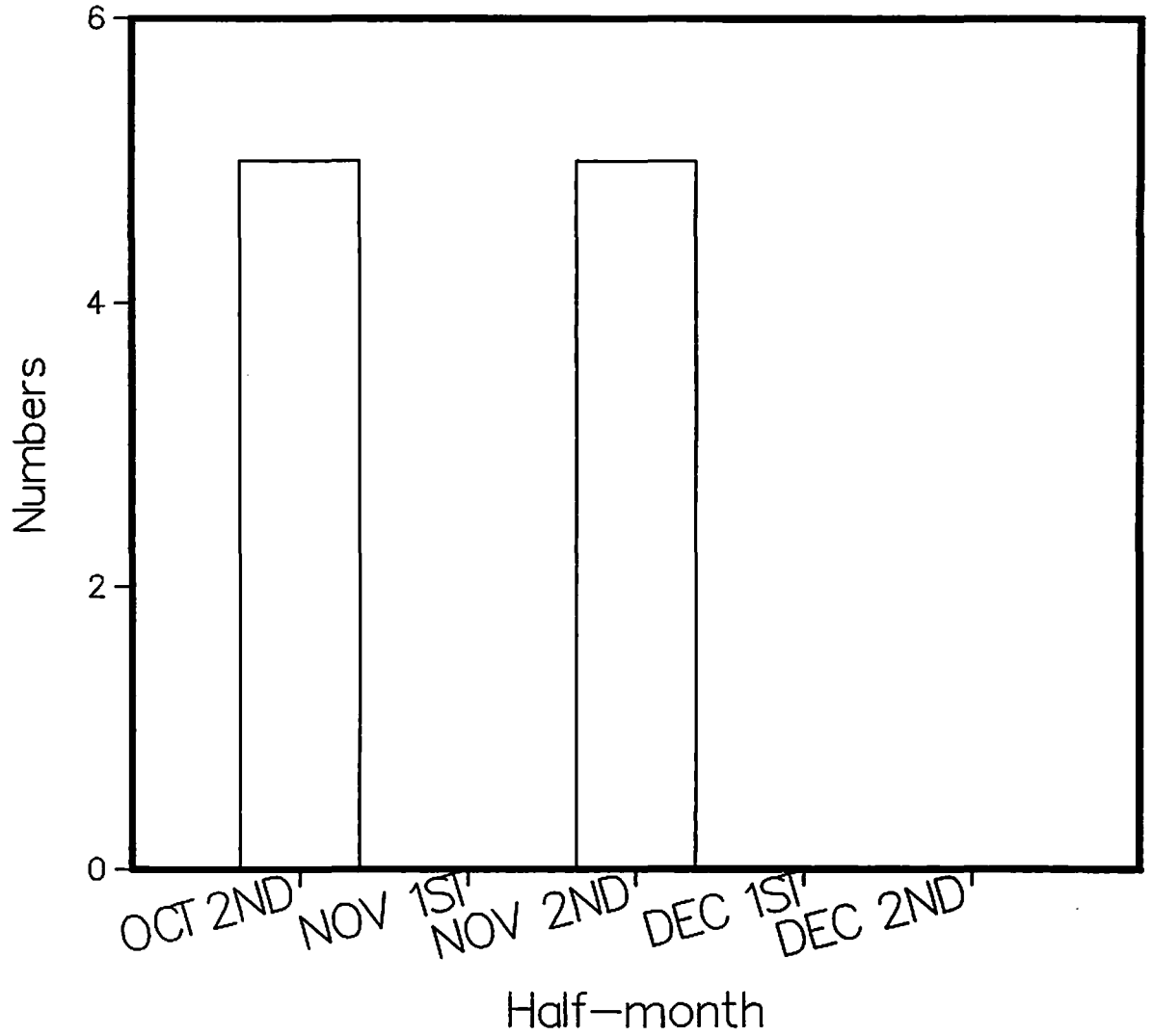


Fig. 11. Pound nets in the lower eastern section of the Chesapeake Bay 1986.

Fig. 12. Pound nets in the upper eastern section of the Chesapeake Bay 1985.



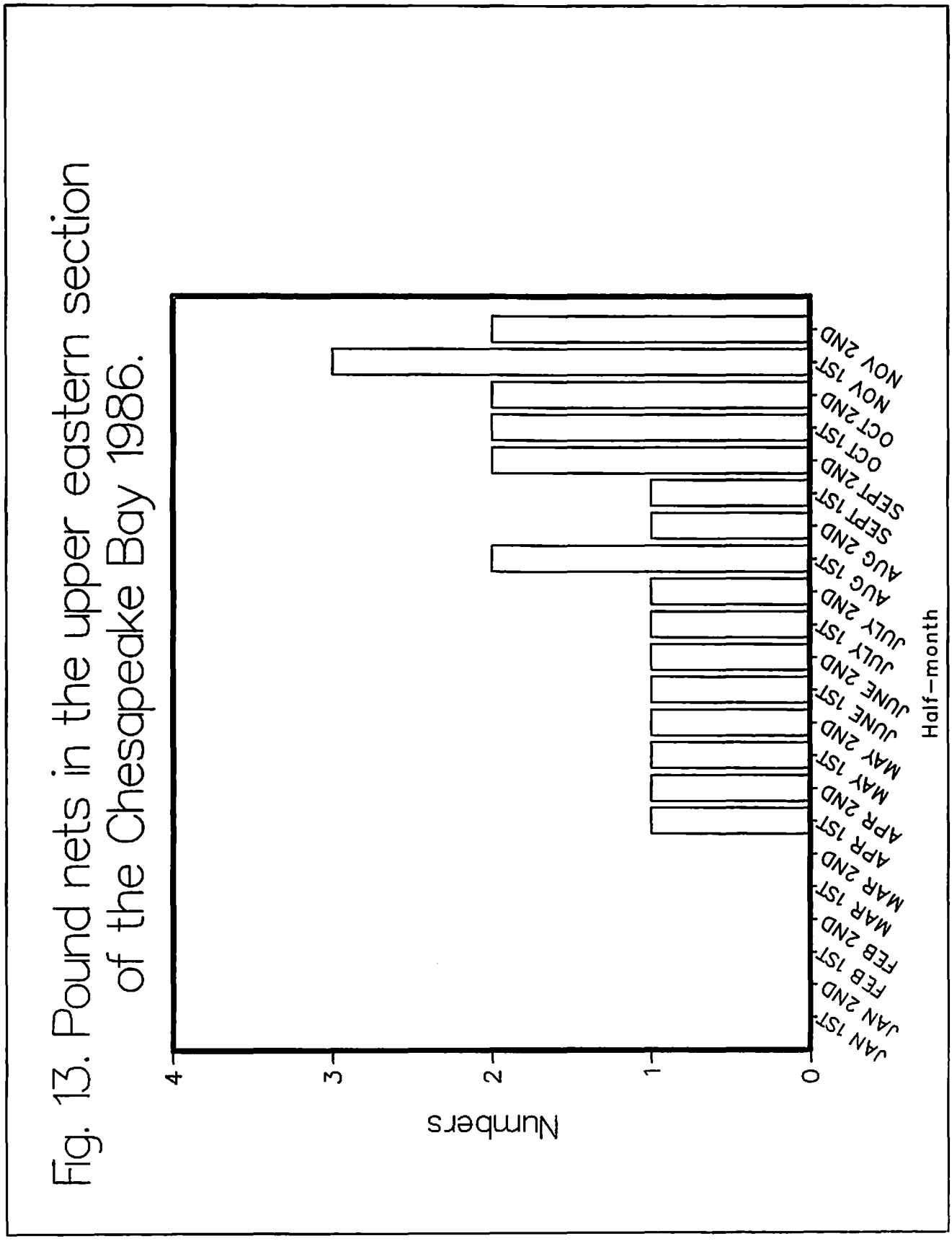


Fig. 13. Pound nets in the upper eastern section of the Chesapeake Bay 1986.

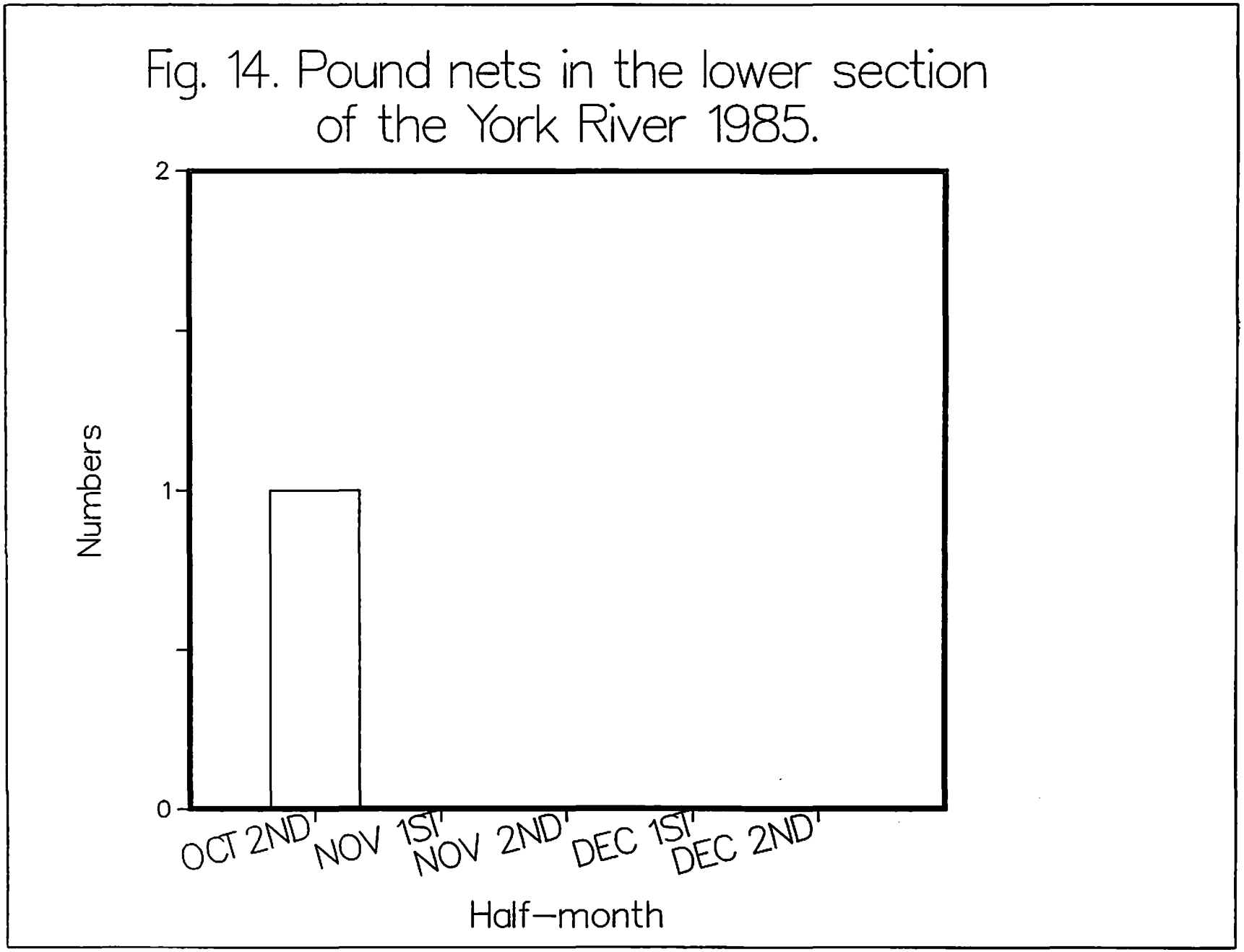


Fig. 14. Pound nets in the lower section of the York River 1985.
2
1
0
Numbers
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

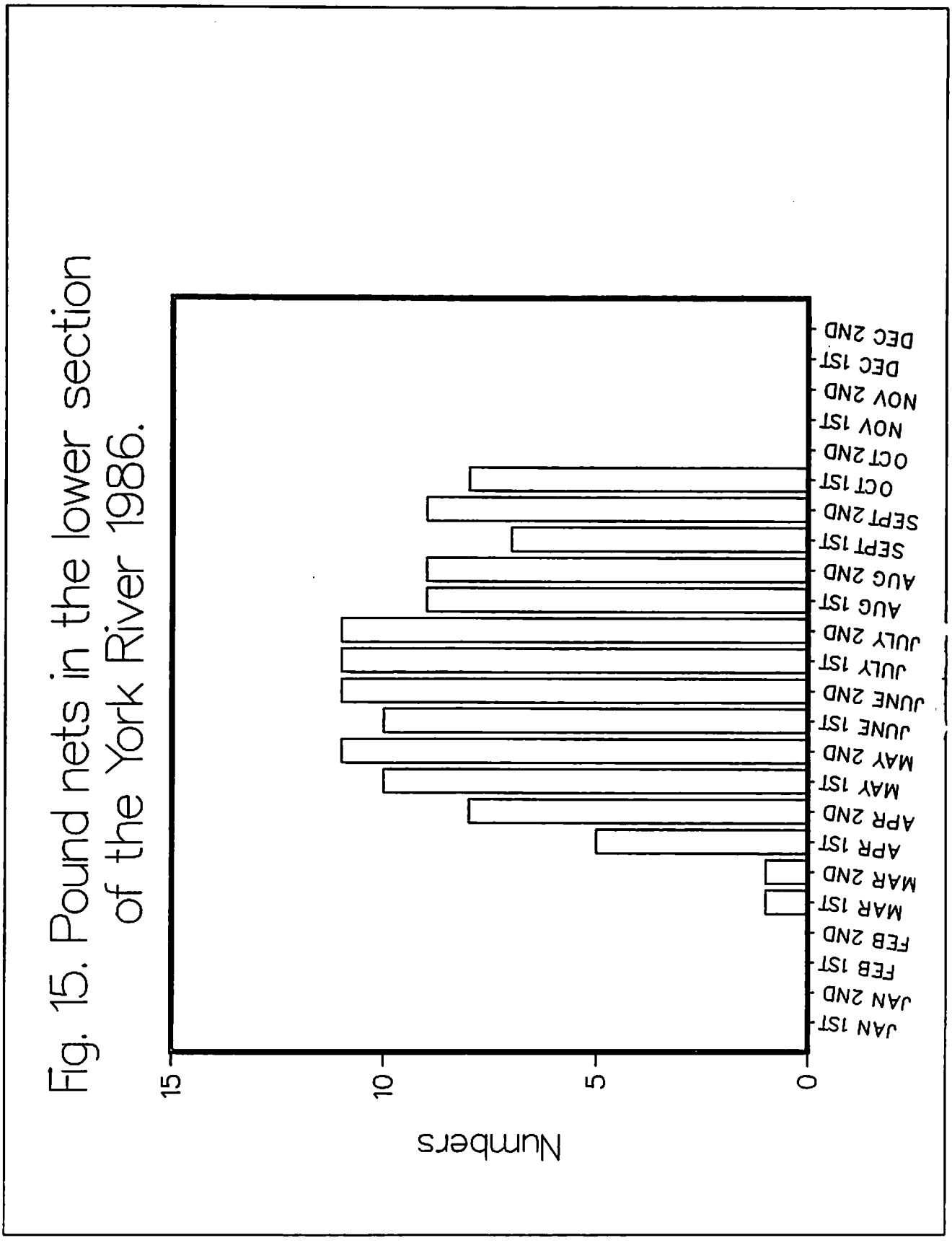
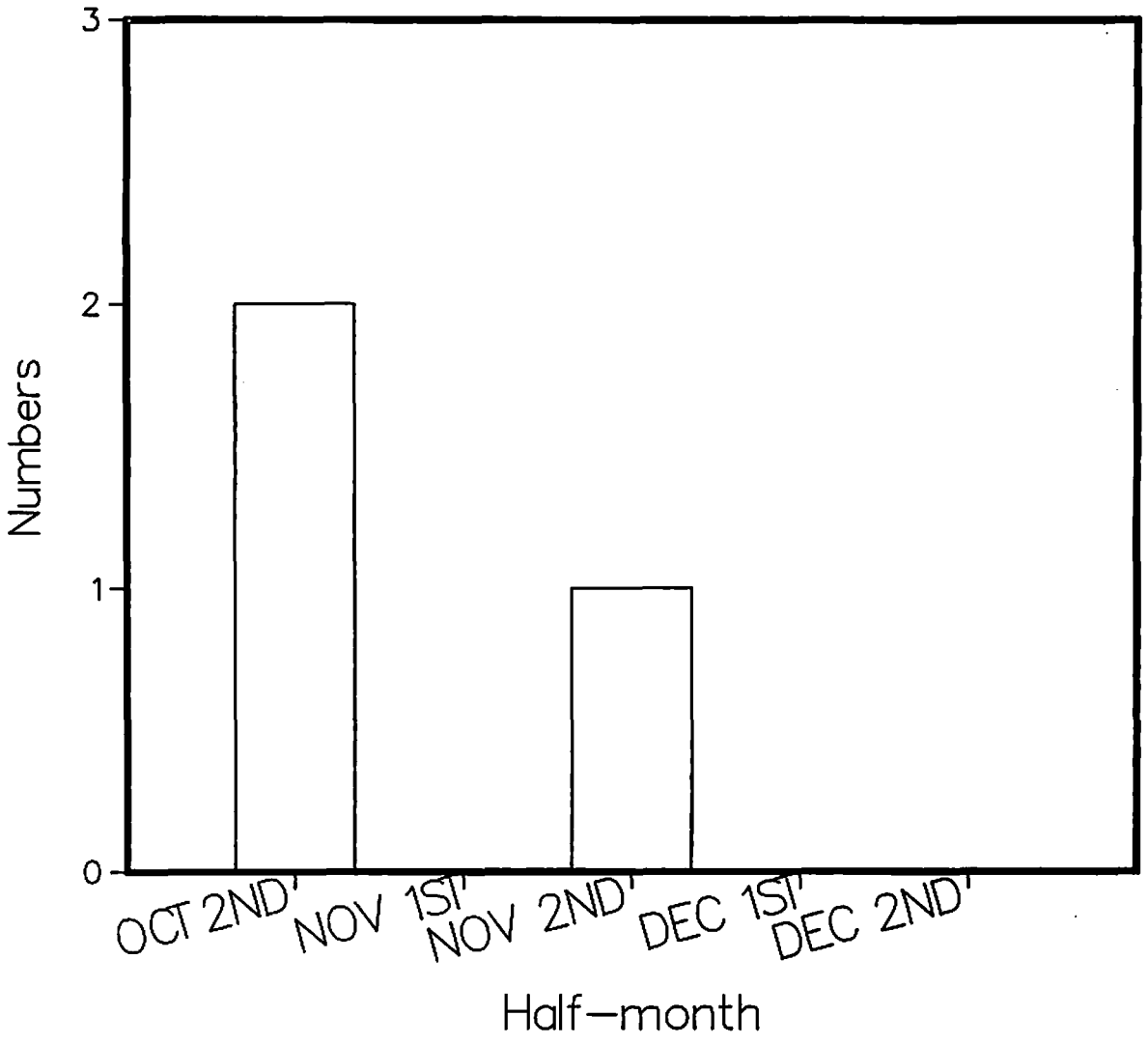


Fig. 15. Pound nets in the lower section of the York River 1986.

Fig. 16. Pound nets in Mobjack Bay 1985.



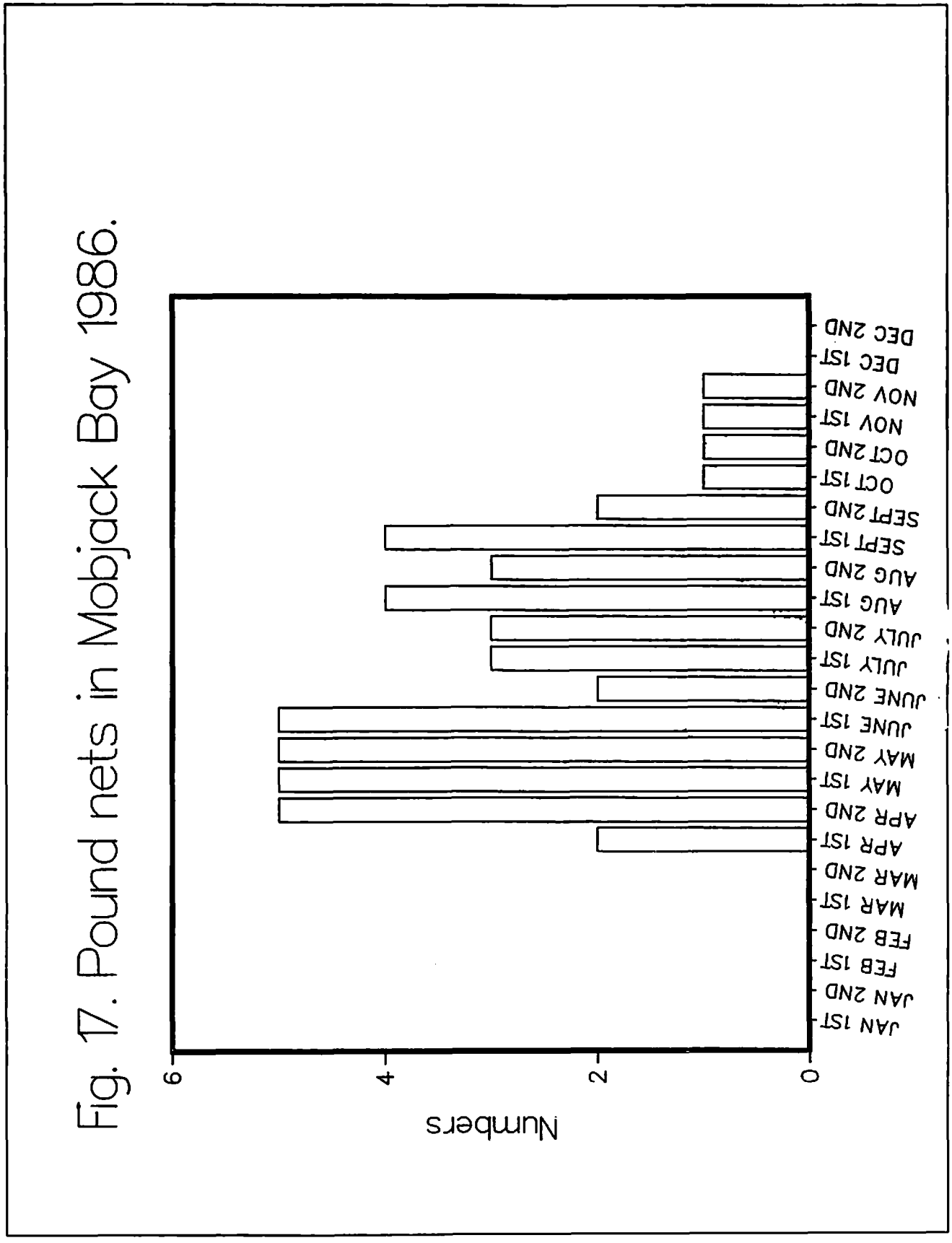


Fig. 17. Pound nets in Mobjack Bay 1986.

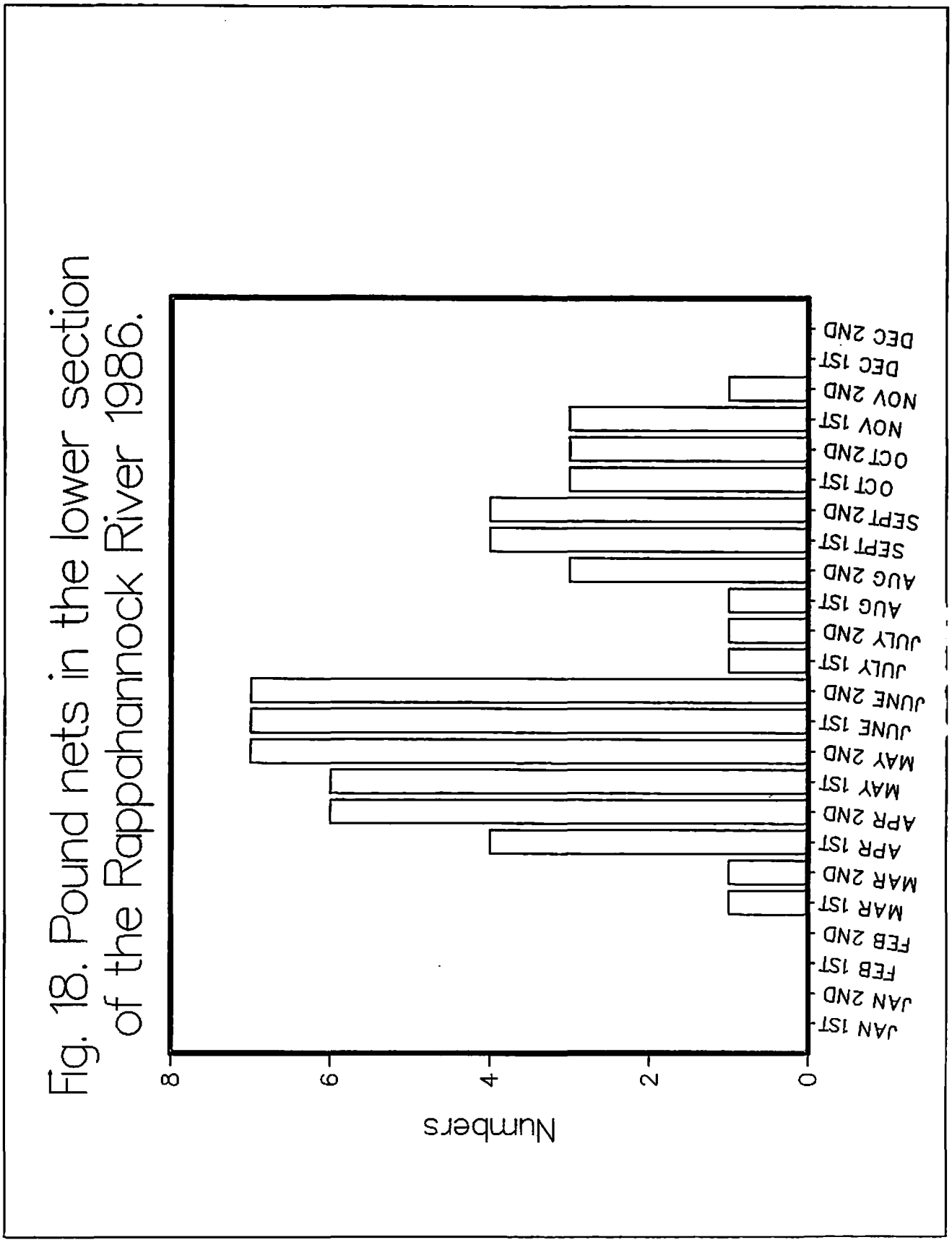


Fig. 18. Pound nets in the lower section of the Rappahannock River 1986.

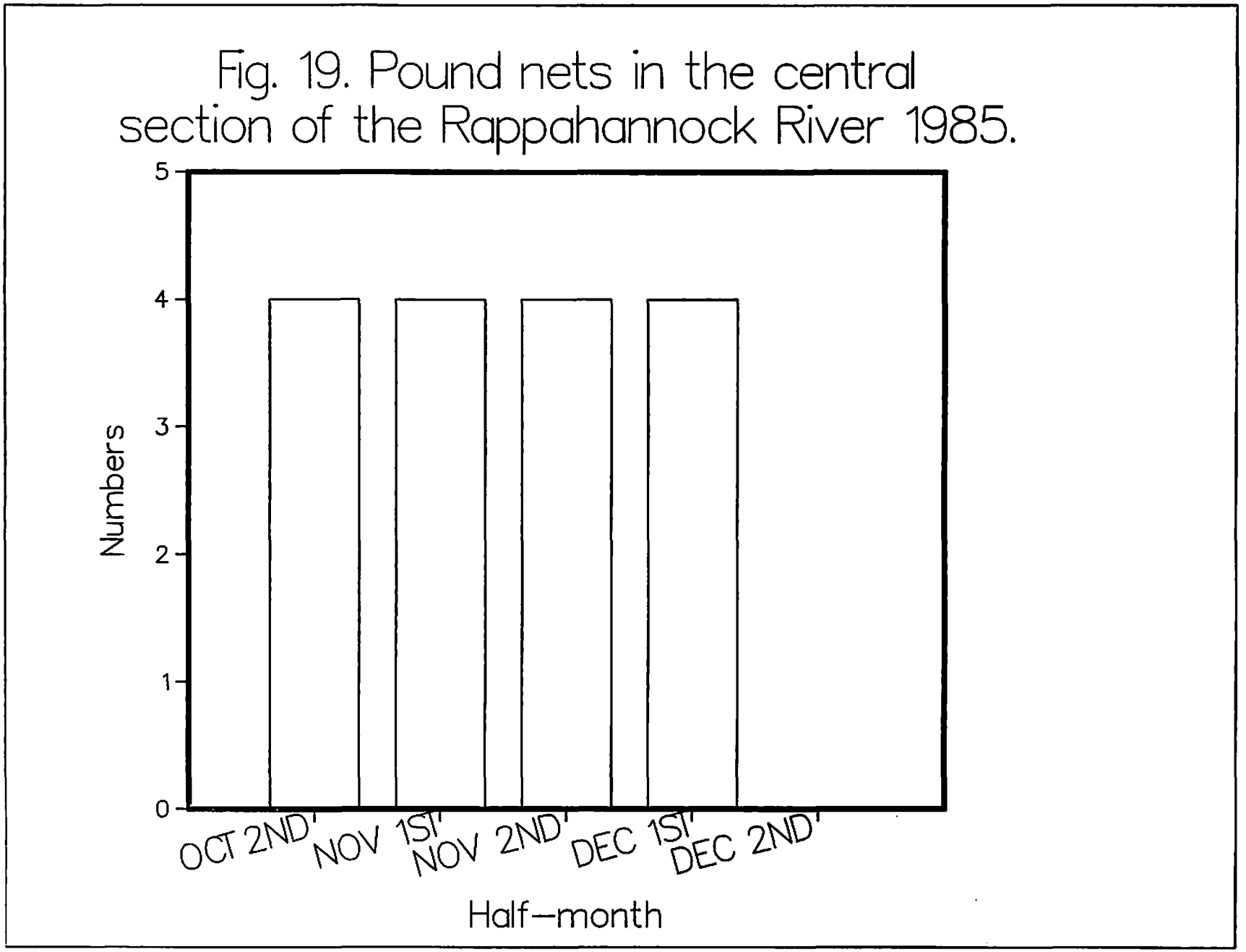


Fig. 19. Pound nets in the central section of the Rappahannock River 1985.
Numbers
0
1
2
3
4
5
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

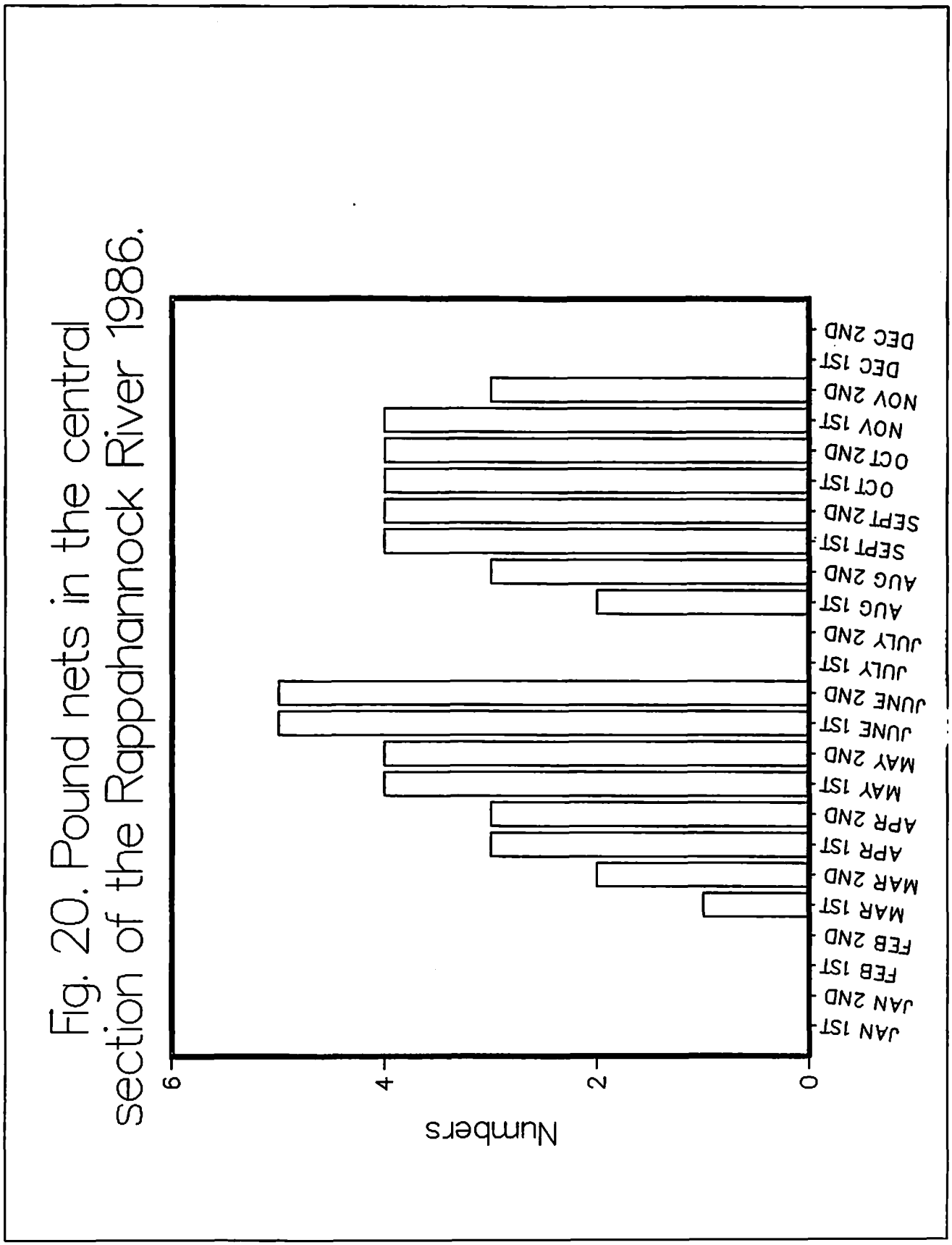


Fig. 20. Pound nets in the central section of the Rappahannock River 1986.

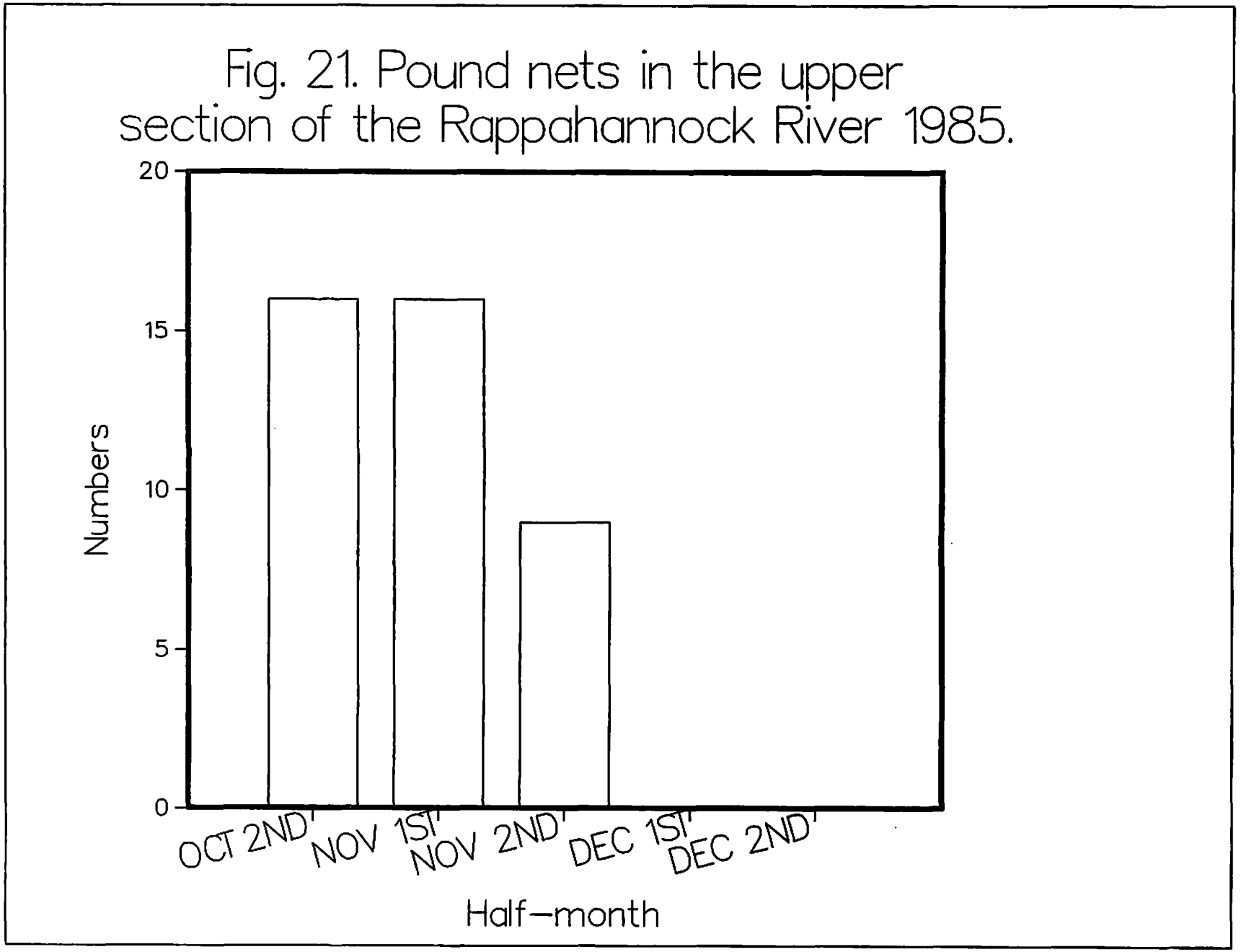


Fig. 21. Pound nets in the upper section of the Rappahannock River 1985.
20
15
10
5
0
Numbers
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND
Half-month

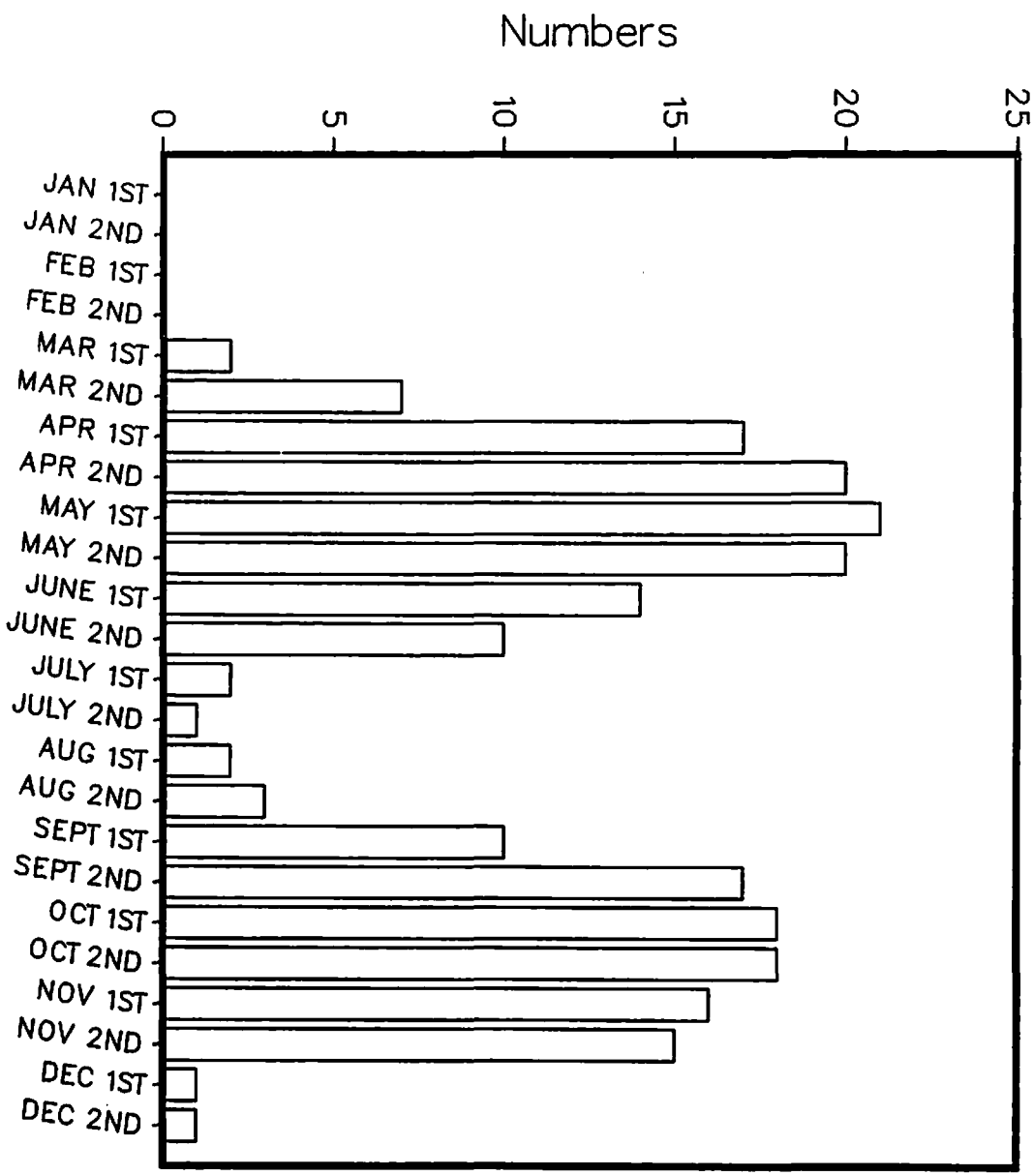
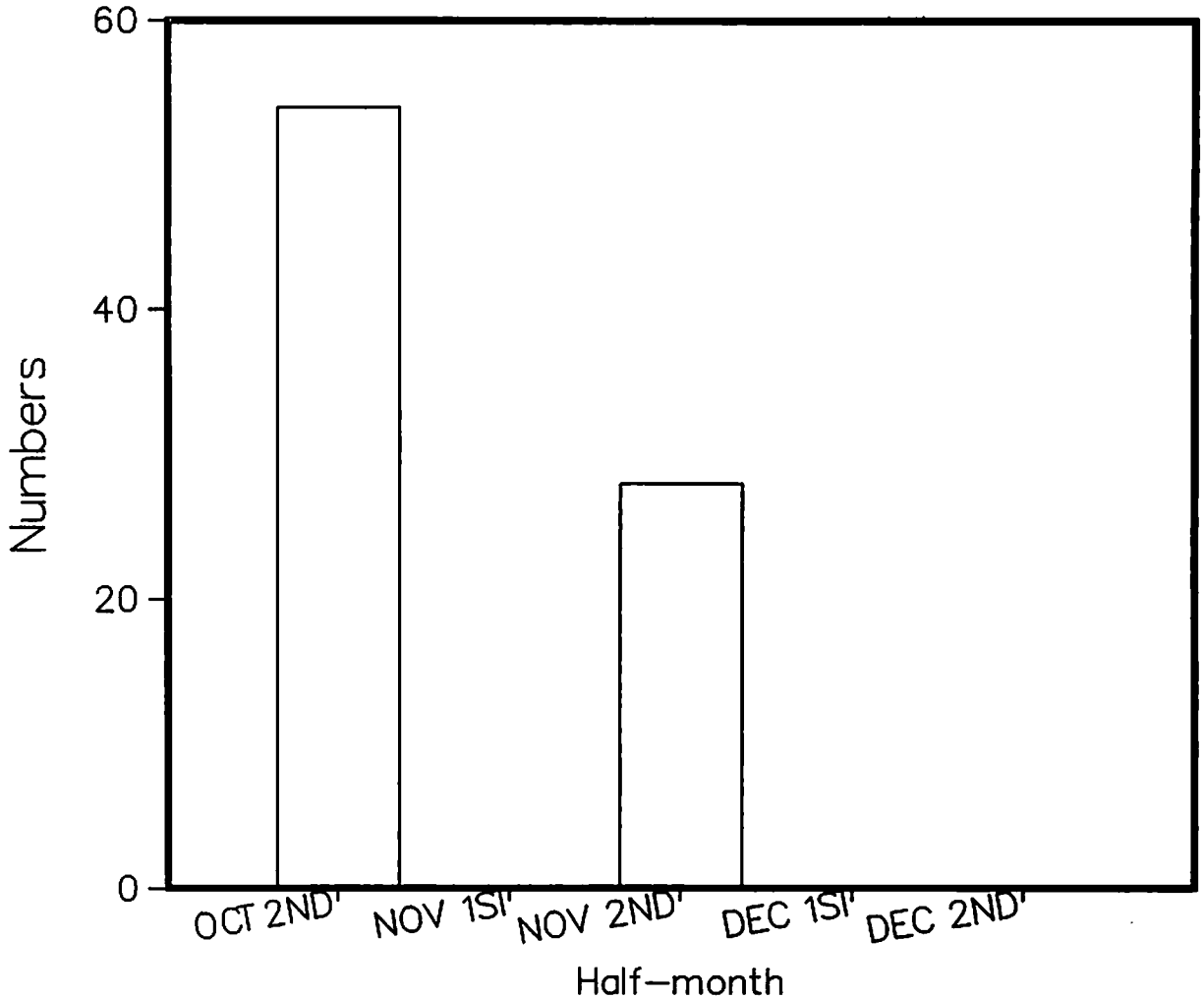


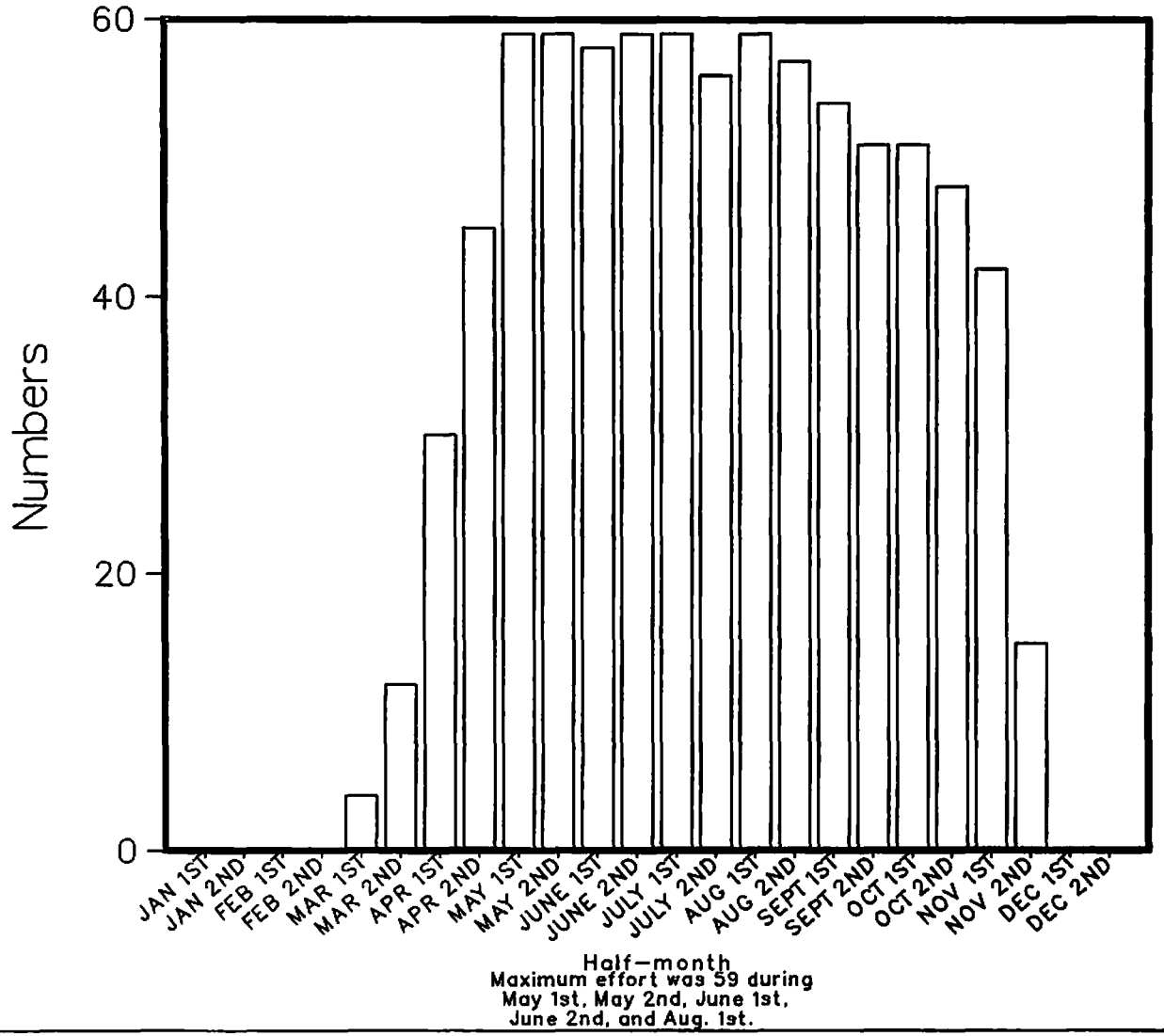
Fig. 22. Pound nets in the upper section of the Rappahannock River 1986.

Fig. 23. Pound nets in the Potomac River 1985.



Maximum effort was 54 during Oct. 2nd.

Fig. 24. Pound nets in the Potomac River 1986.



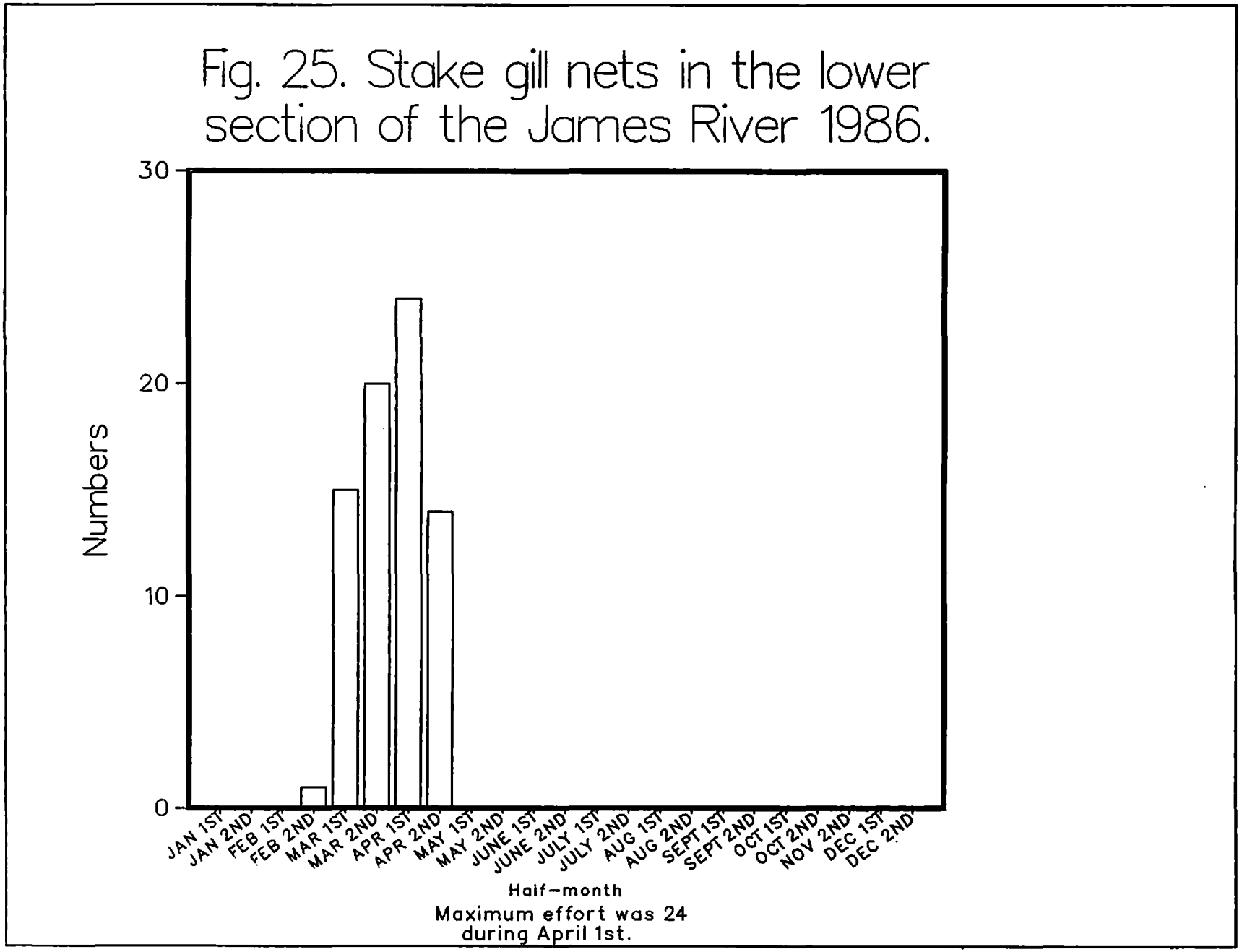


Fig. 25. Stake gill nets in the lower section of the James River 1986.
Numbers
30
20
10
0
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 2ND
DEC 1ST
DEC 2ND
Half-month
Maximum effort was 24
during April 1st.

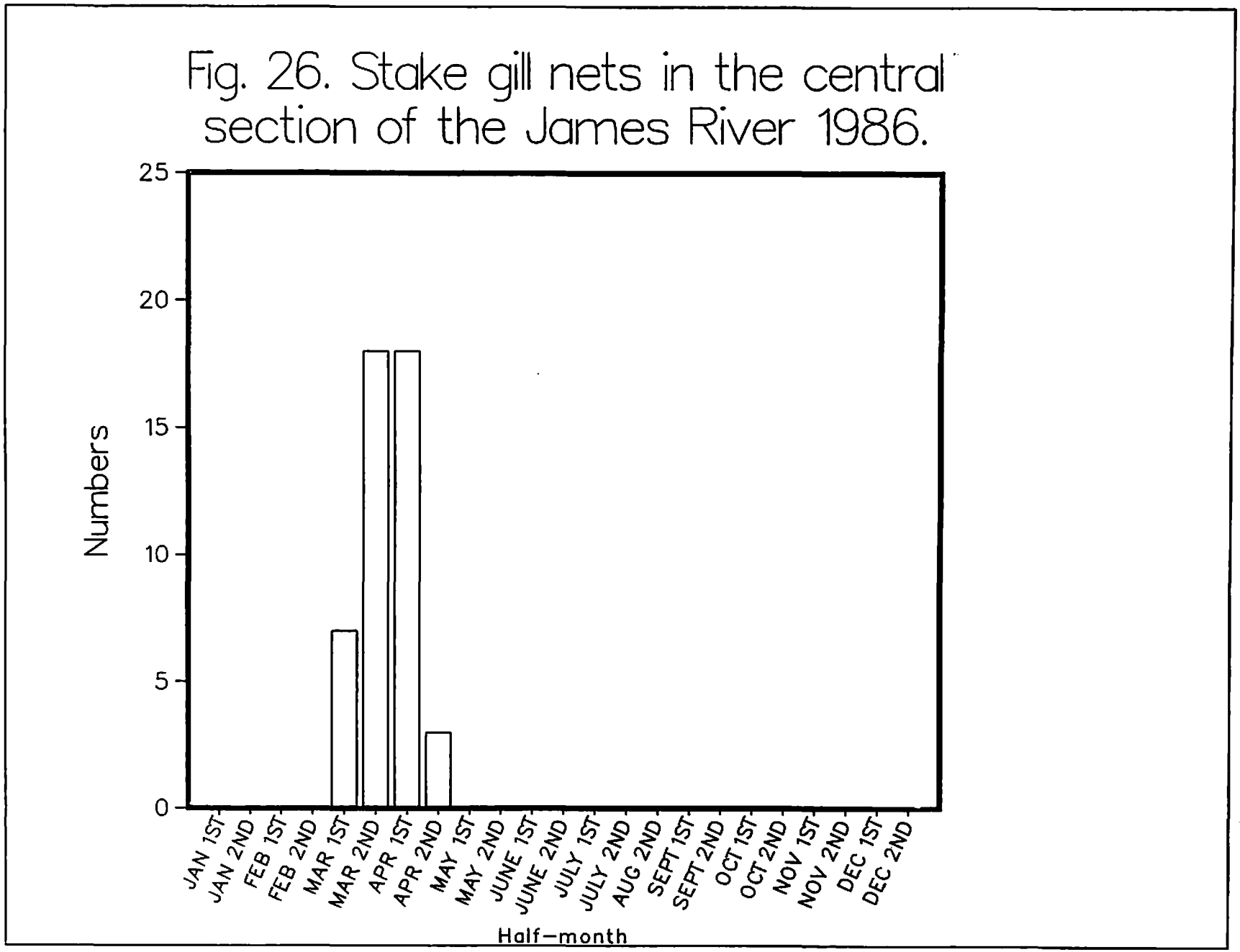


Fig. 26. Stake gill nets in the central section of the James River 1986.
Numbers
25
20
15
10
5
0
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND
Half-month

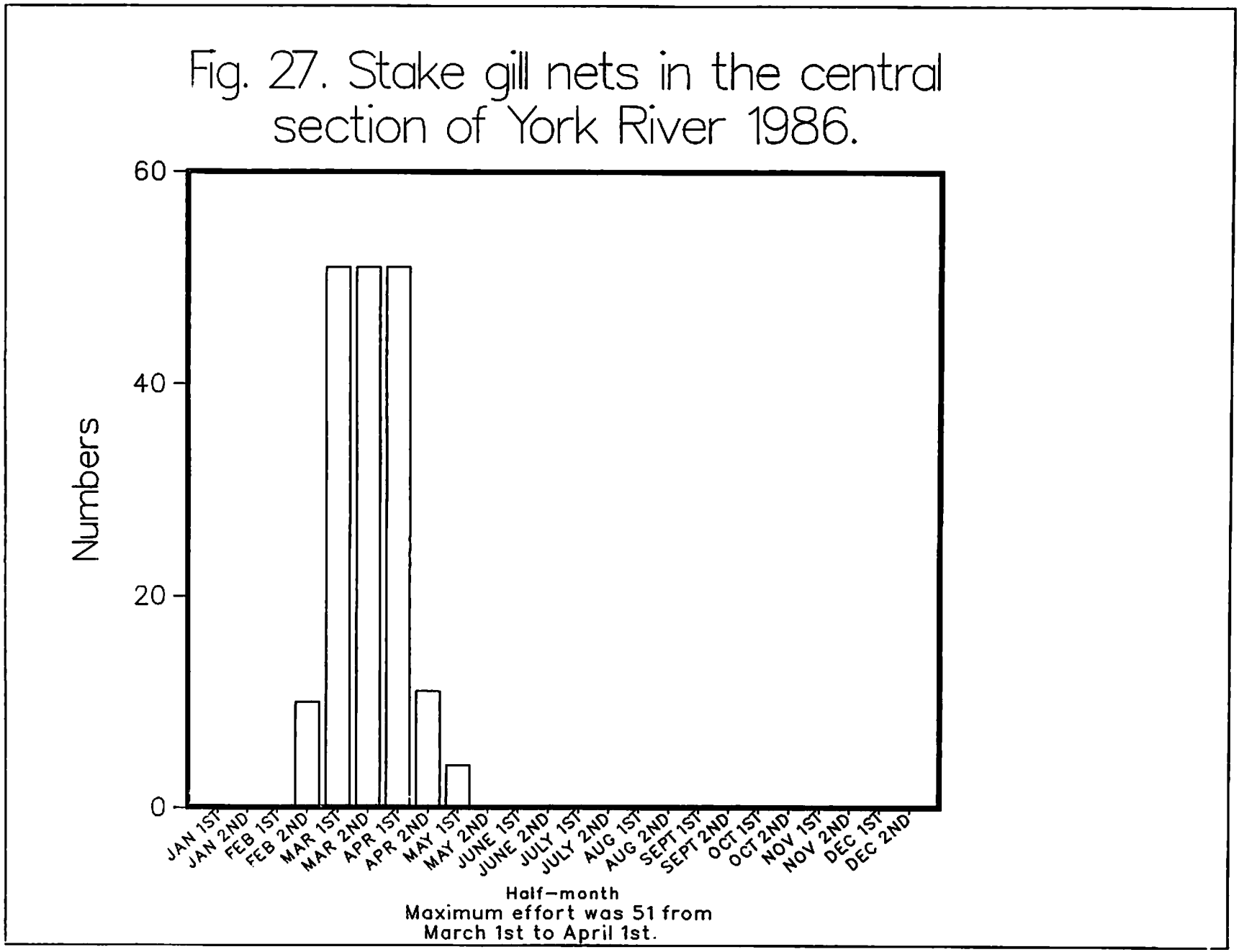
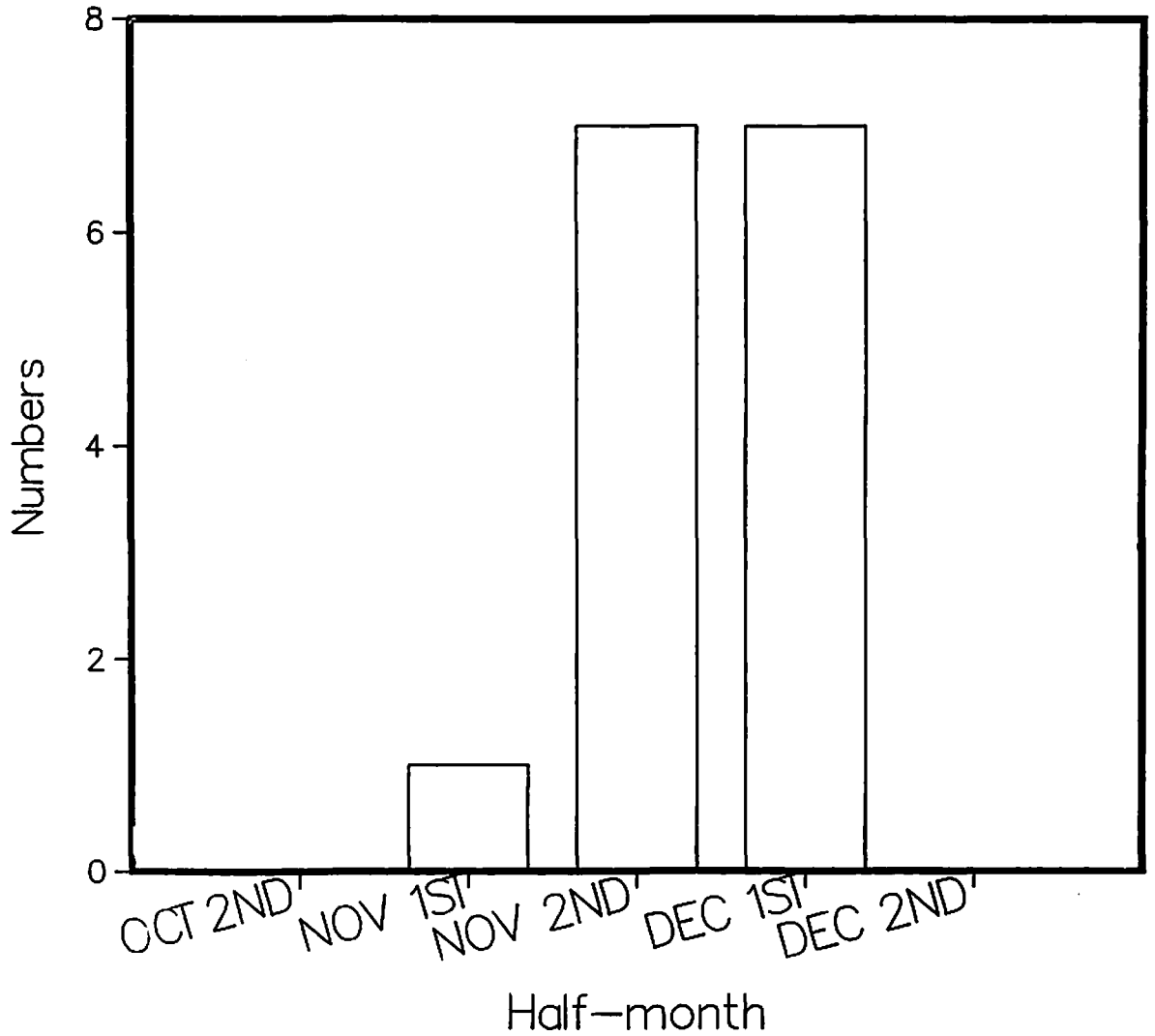


Fig. 27. Stake gill nets in the central section of York River 1986.
Numbers
60
40
20
0
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND
Half-month
Maximum effort was 51 from March 1st to April 1st.

Fig. 28. Stake gill nets in the upper section of the York River 1985.



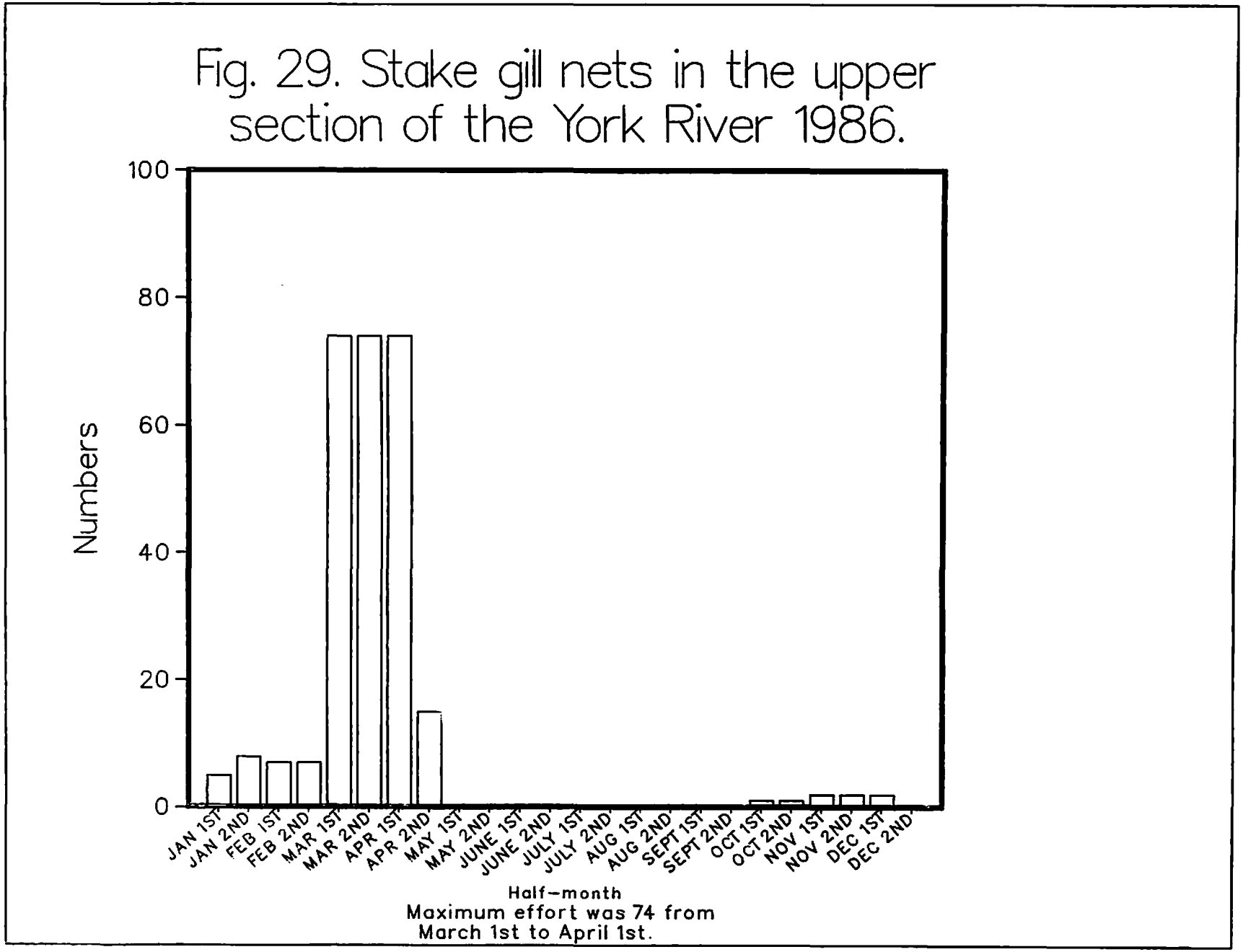


Fig. 29. Stake gill nets in the upper section of the York River 1986.
Numbers
100
80
60
40
20
0
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND
Half-month
Maximum effort was 74 from
March 1st to April 1st.

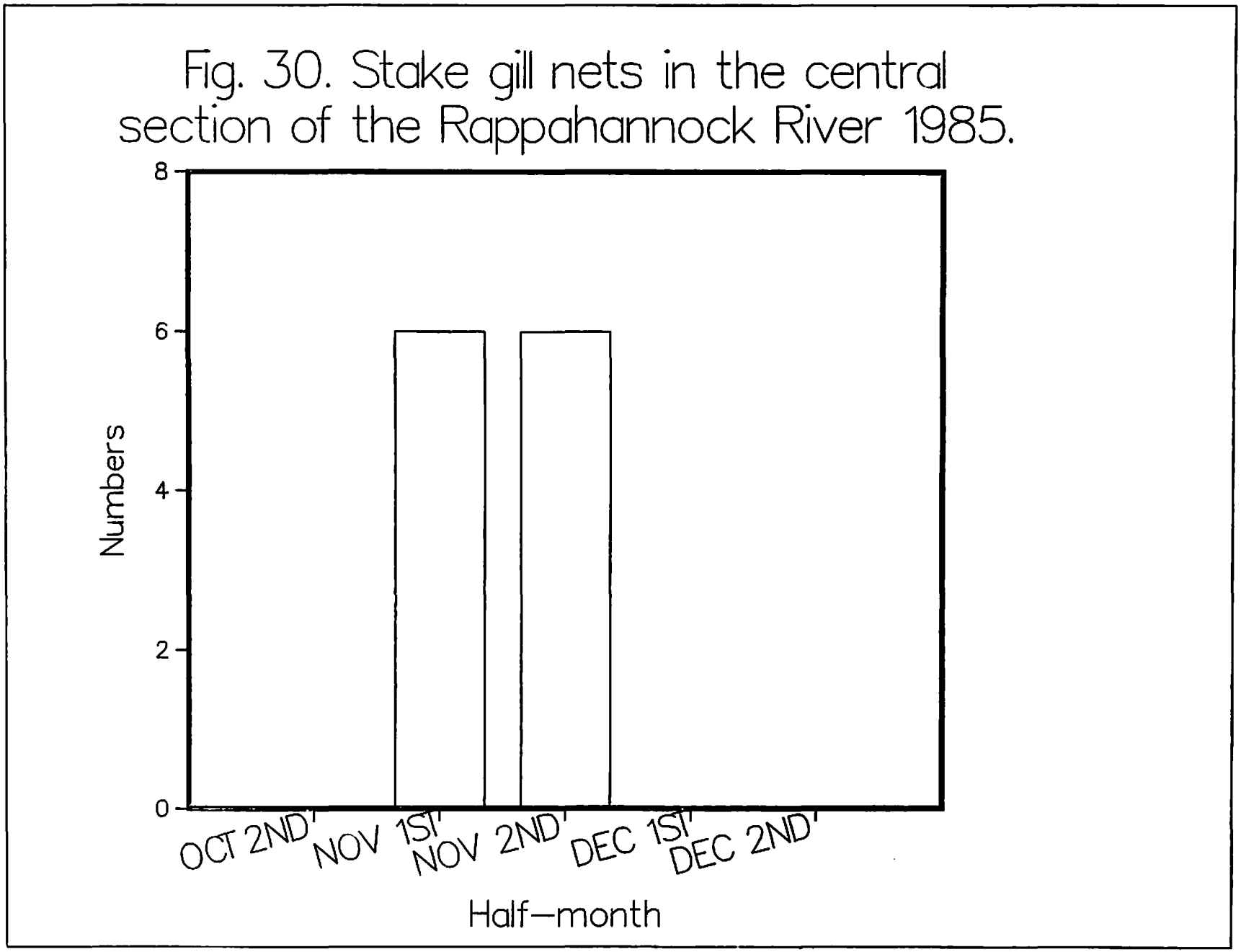


Fig. 30. Stake gill nets in the central section of the Rappahannock River 1985.
8
6
4
2
0
Numbers
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

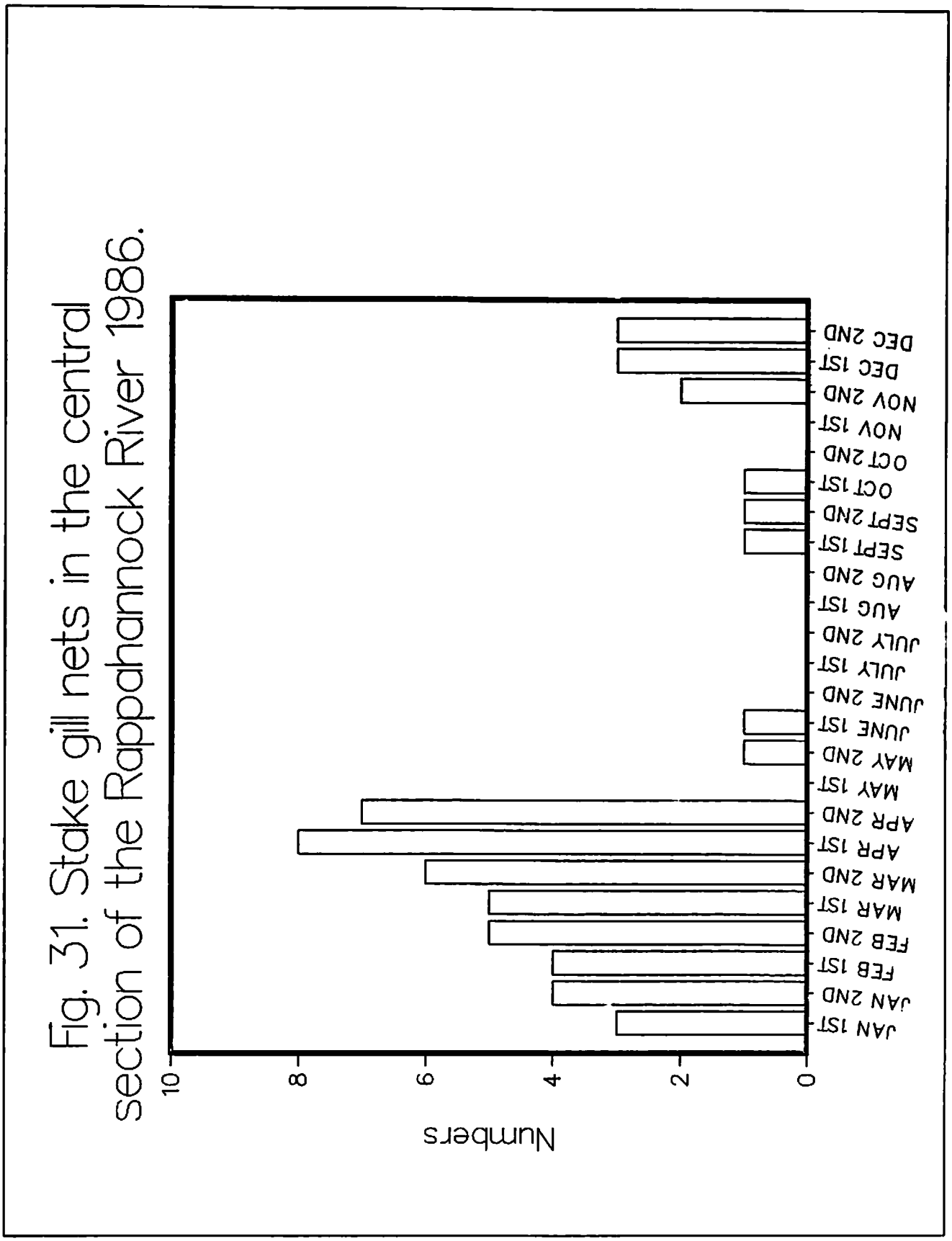


Fig. 31. Stake gill nets in the central section of the Rappahannock River 1986.

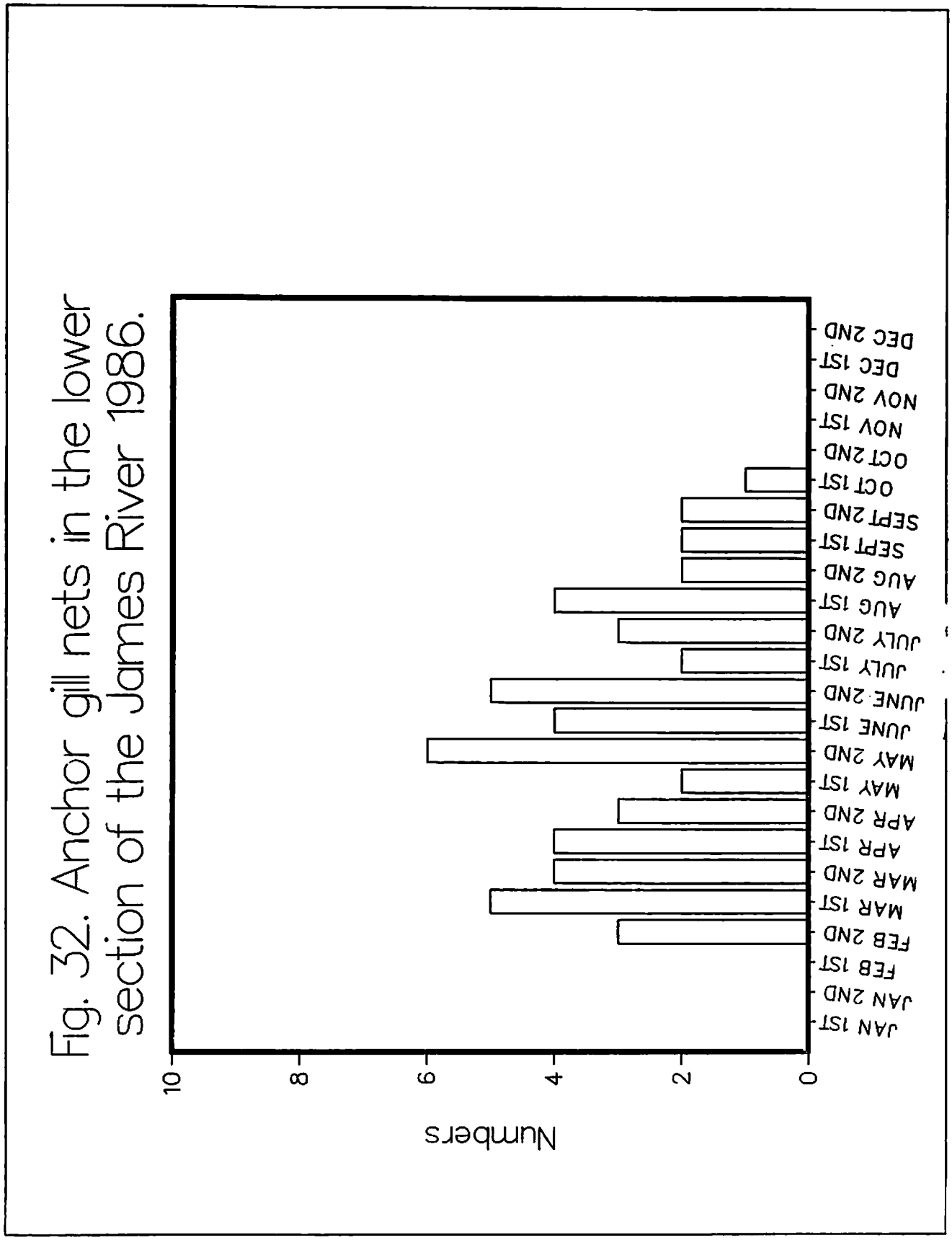


Fig. 32. Anchor gill nets in the lower section of the James River 1986.

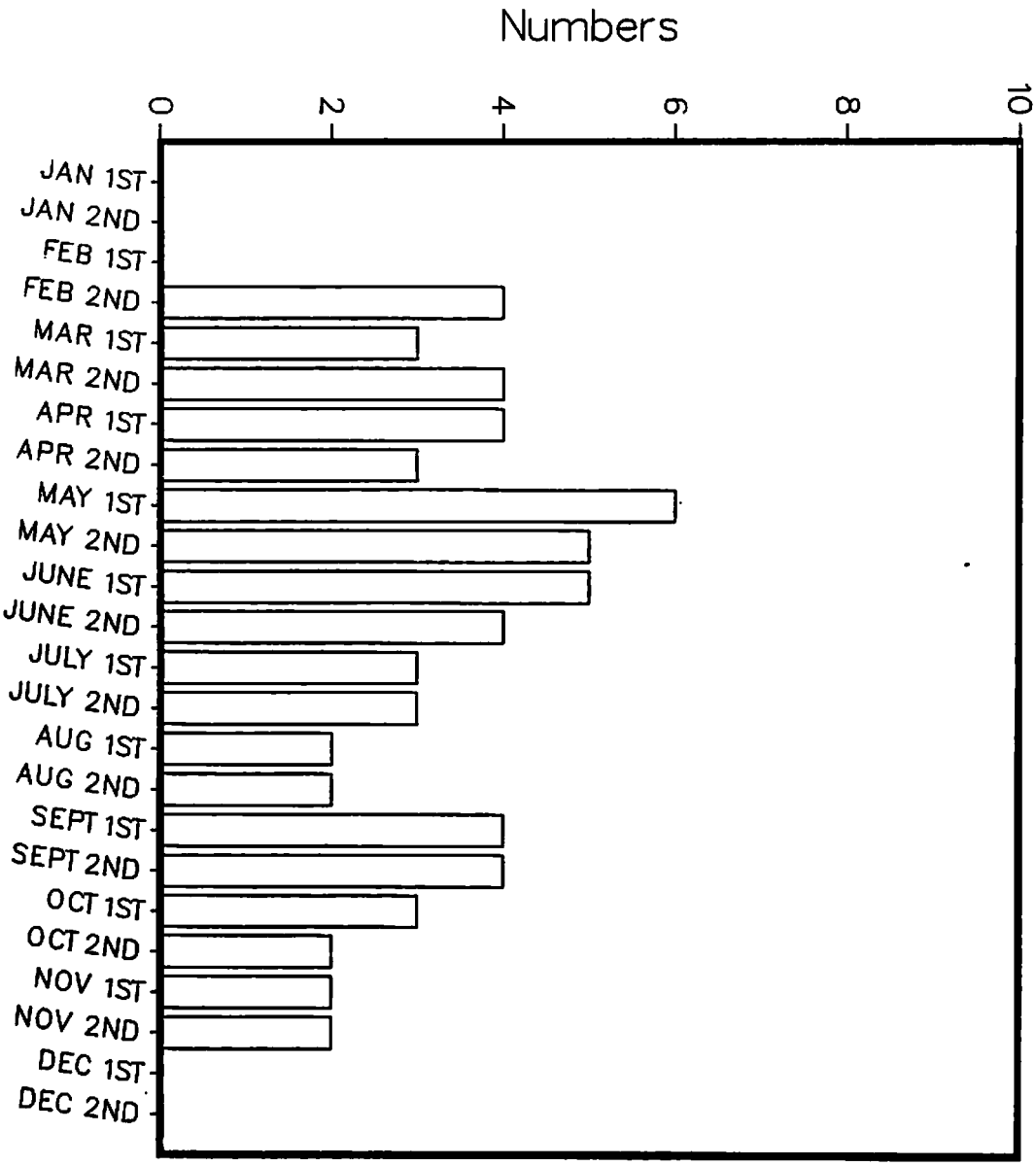


Fig. 33. Anchor gill nets in the central section of the James River 1986.

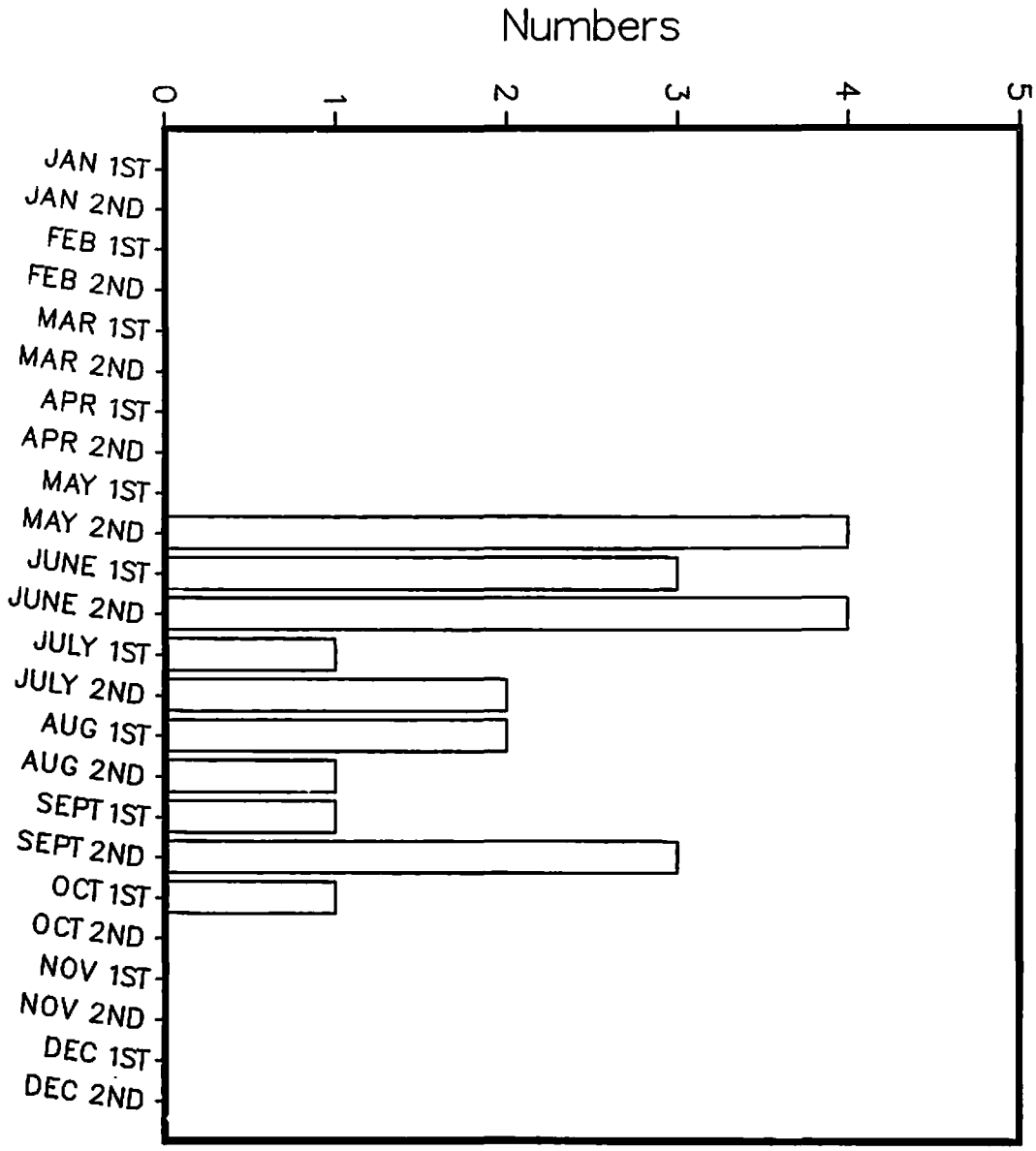


Fig. 34. Anchor gill nets in the upper section of the James River 1986.

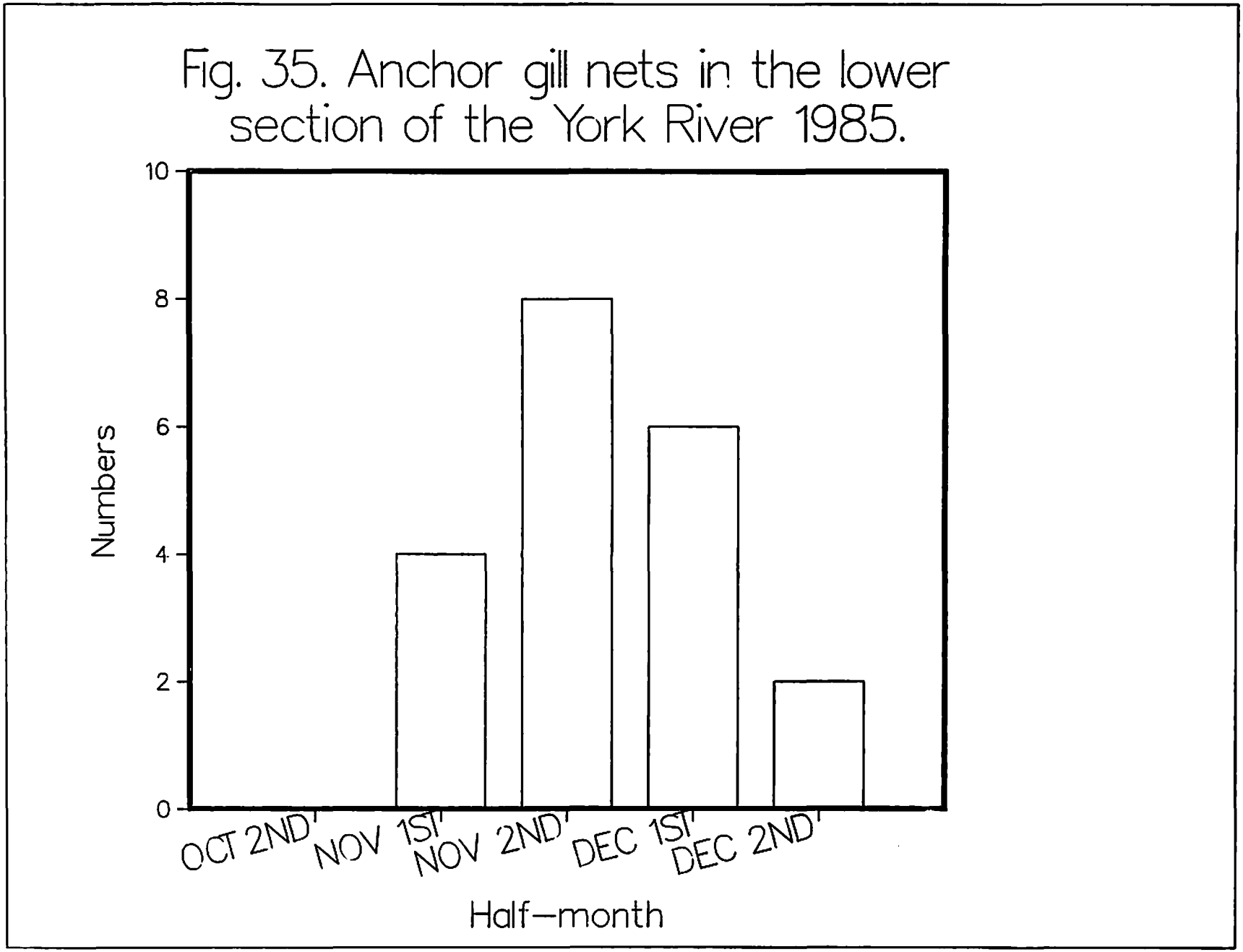


Fig. 35. Anchor gill nets in the lower section of the York River 1985.
10
8
6
4
2
0
Numbers
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

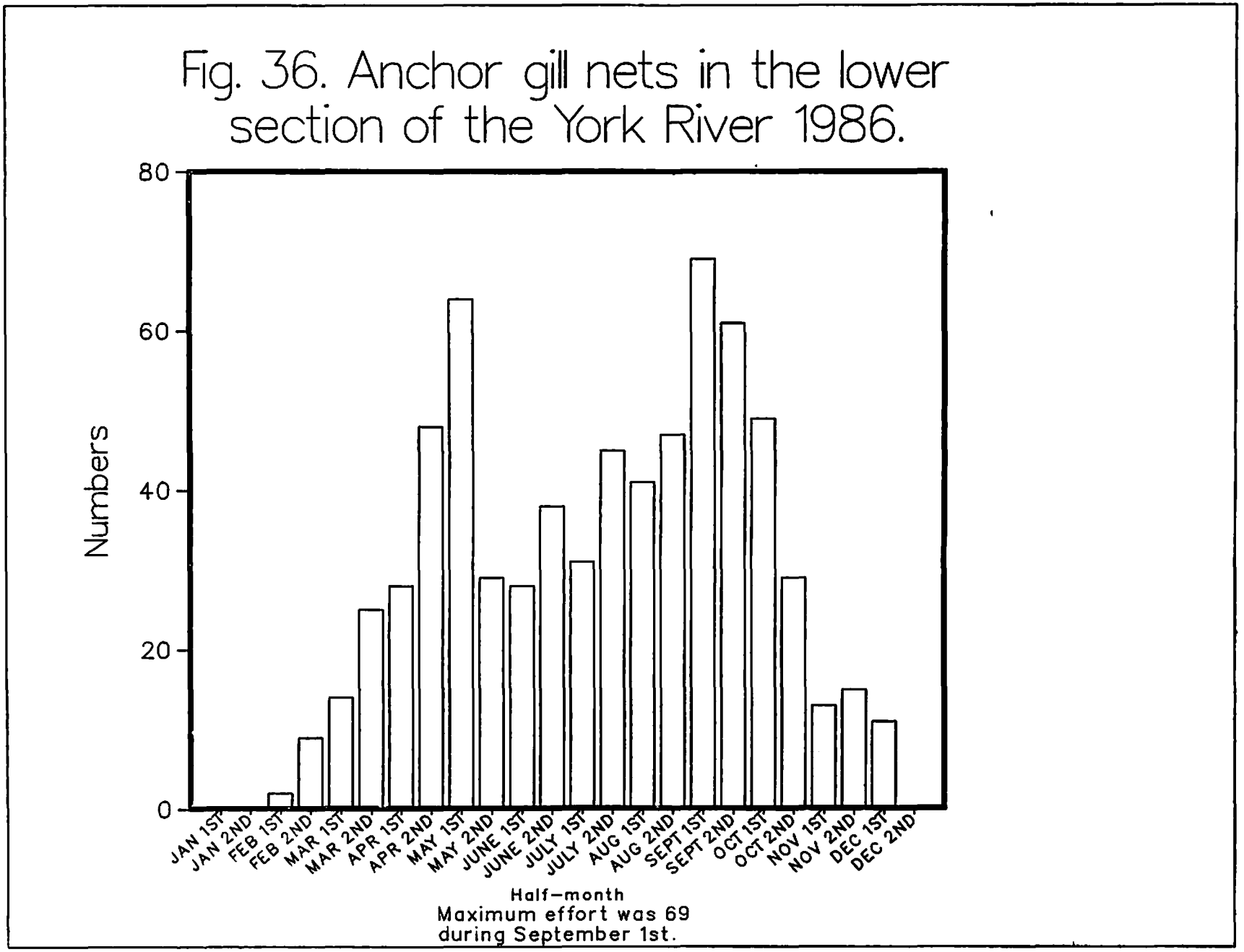


Fig. 36. Anchor gill nets in the lower section of the York River 1986.
Numbers
80
60
40
20
0
JAN 1ST
JAN 2ND
FEB 1ST
FEB 2ND
MAR 1ST
MAR 2ND
APR 1ST
APR 2ND
MAY 1ST
MAY 2ND
JUNE 1ST
JUNE 2ND
JULY 1ST
JULY 2ND
AUG 1ST
AUG 2ND
SEPT 1ST
SEPT 2ND
OCT 1ST
OCT 2ND
NOV 1ST
NOV 2ND
DEC 1ST
DEC 2ND
Half-month
Maximum effort was 69
during September 1st.

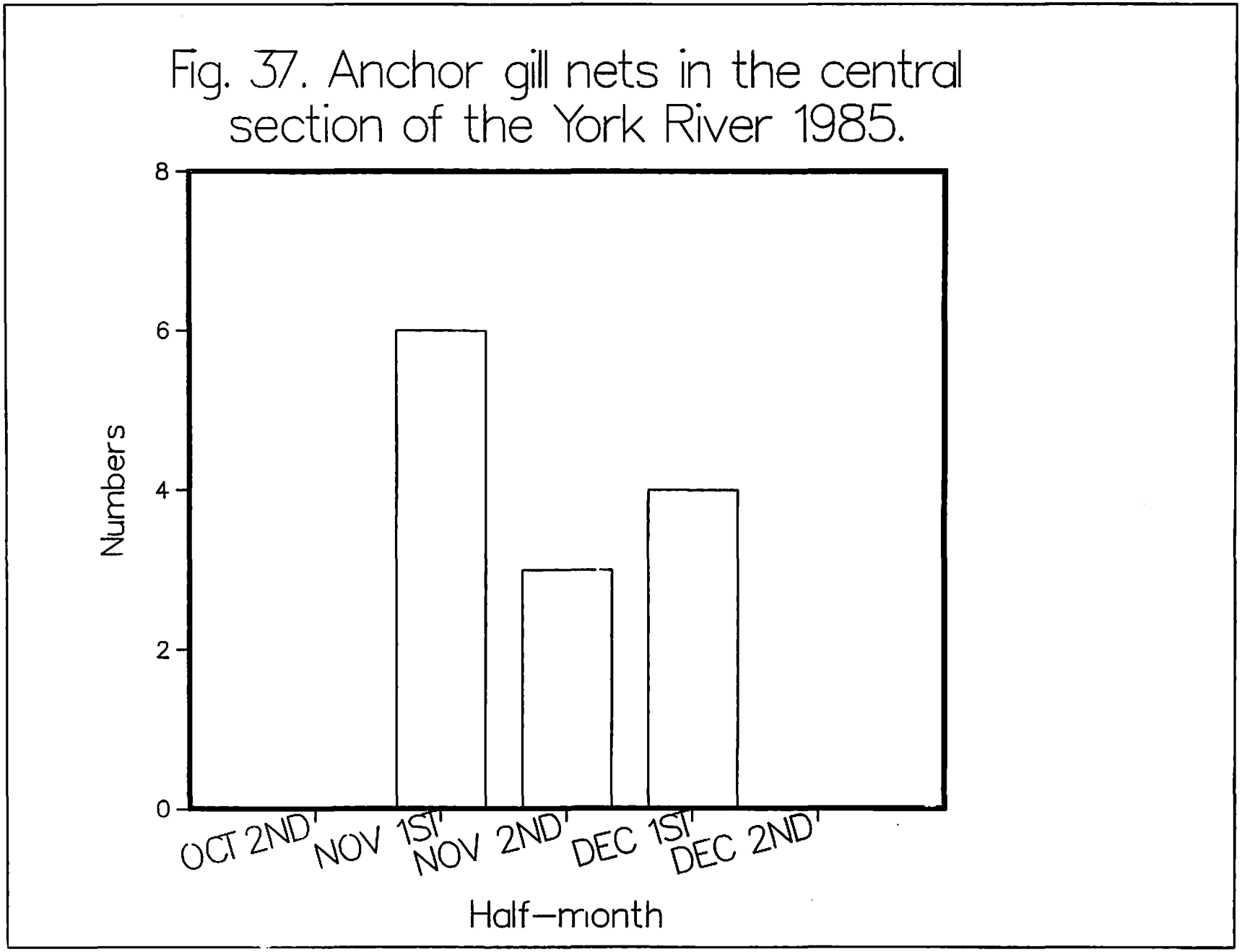


Fig. 37. Anchor gill nets in the central section of the York River 1985.
Numbers
8
6
4
2
0
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

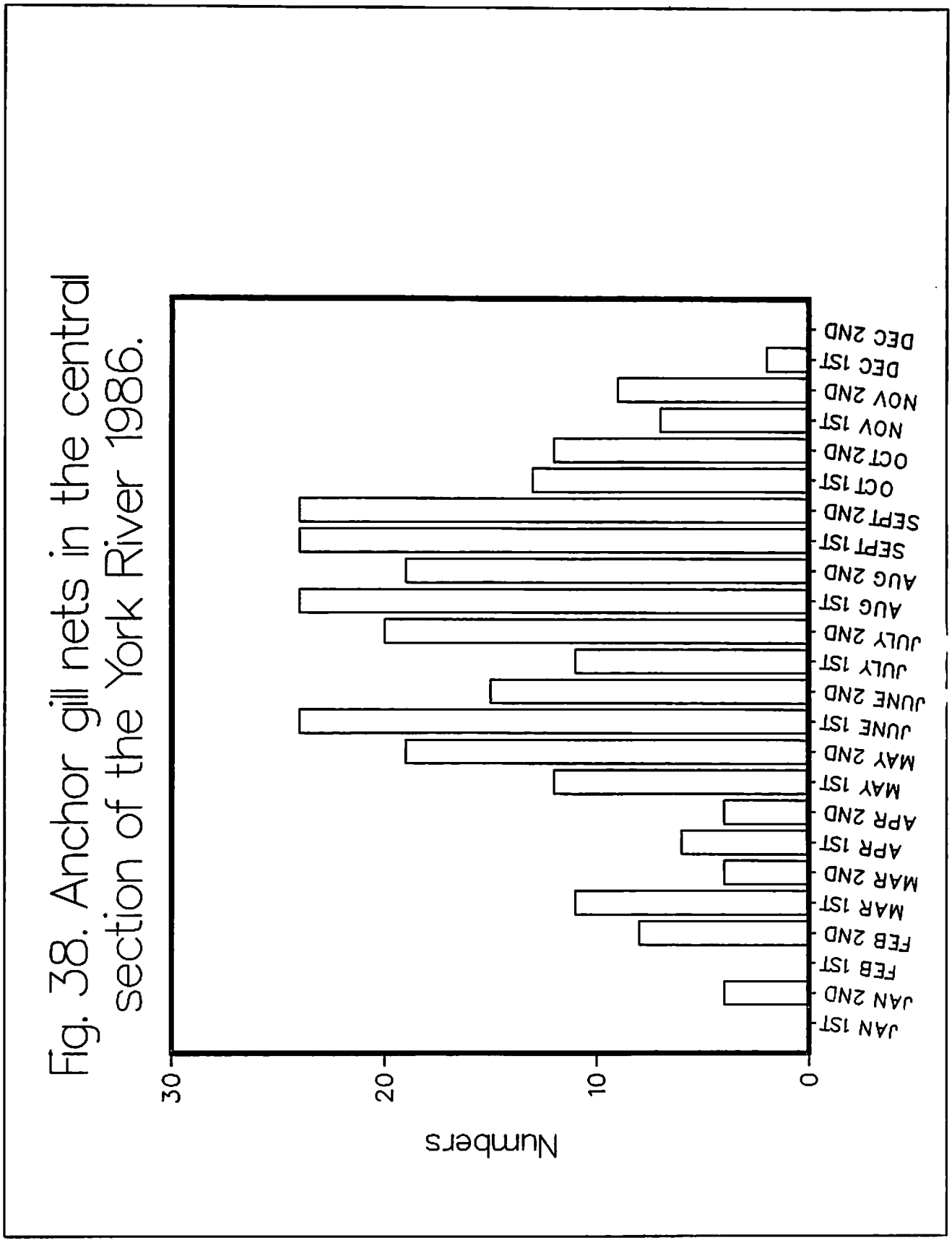


Fig. 38. Anchor gill nets in the central section of the York River 1986.

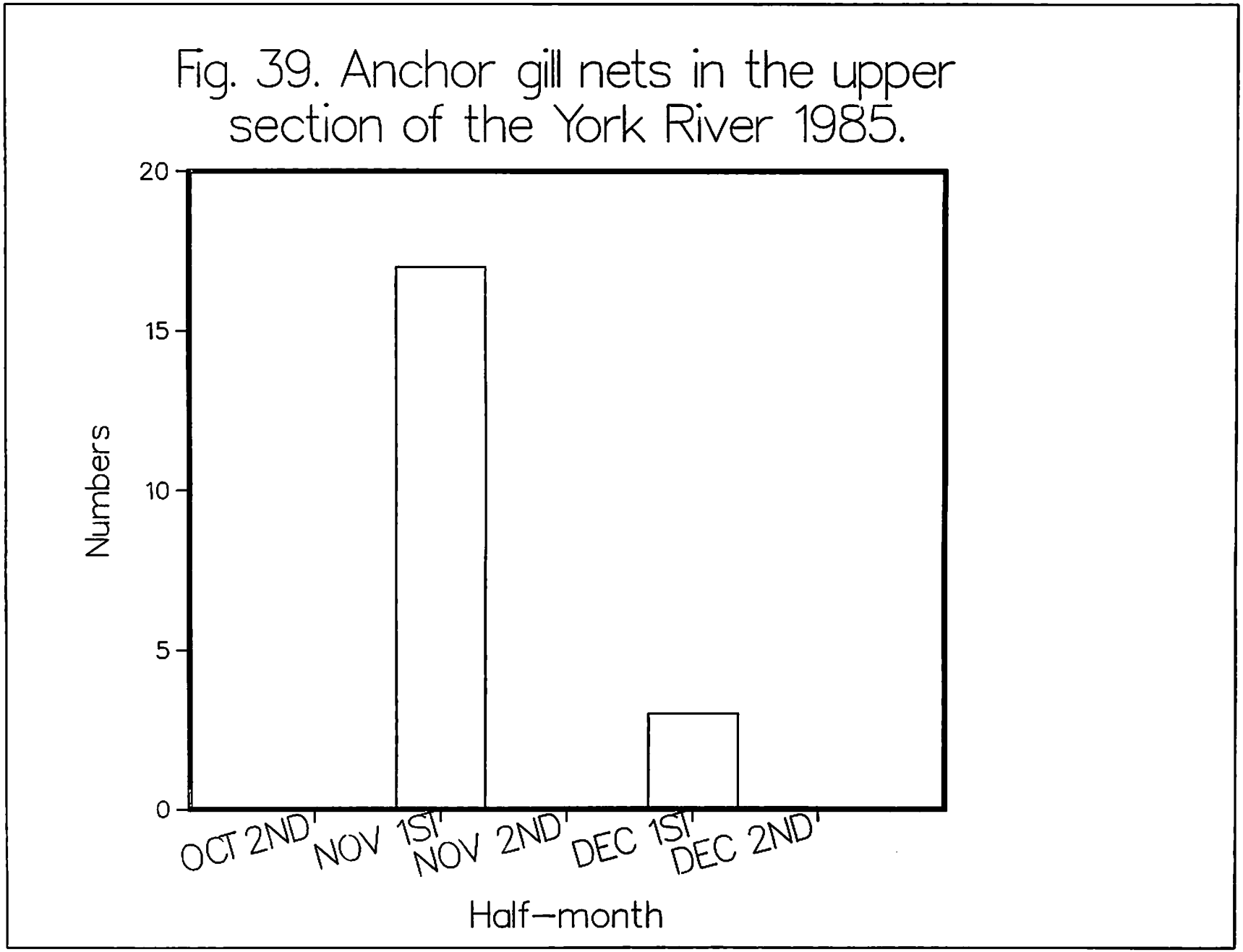


Fig. 39. Anchor gill nets in the upper section of the York River 1985.
20
15
10
5
0
Numbers
OCT 2ND'
NOV 1ST'
NOV 2ND'
DEC 1ST'
DEC 2ND'
Half-month

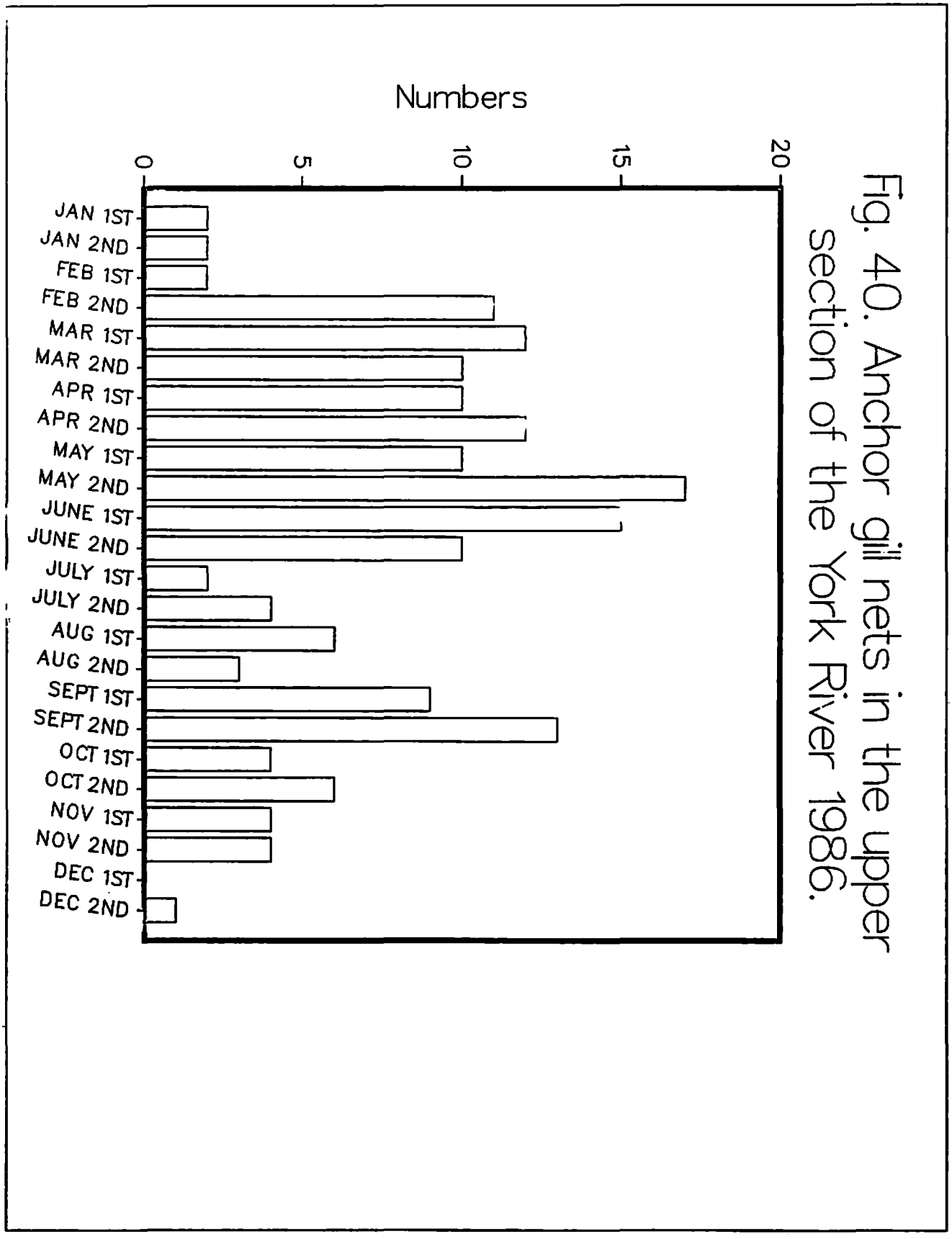


Fig. 40. Anchor gill nets in the upper section of the York River 1986.

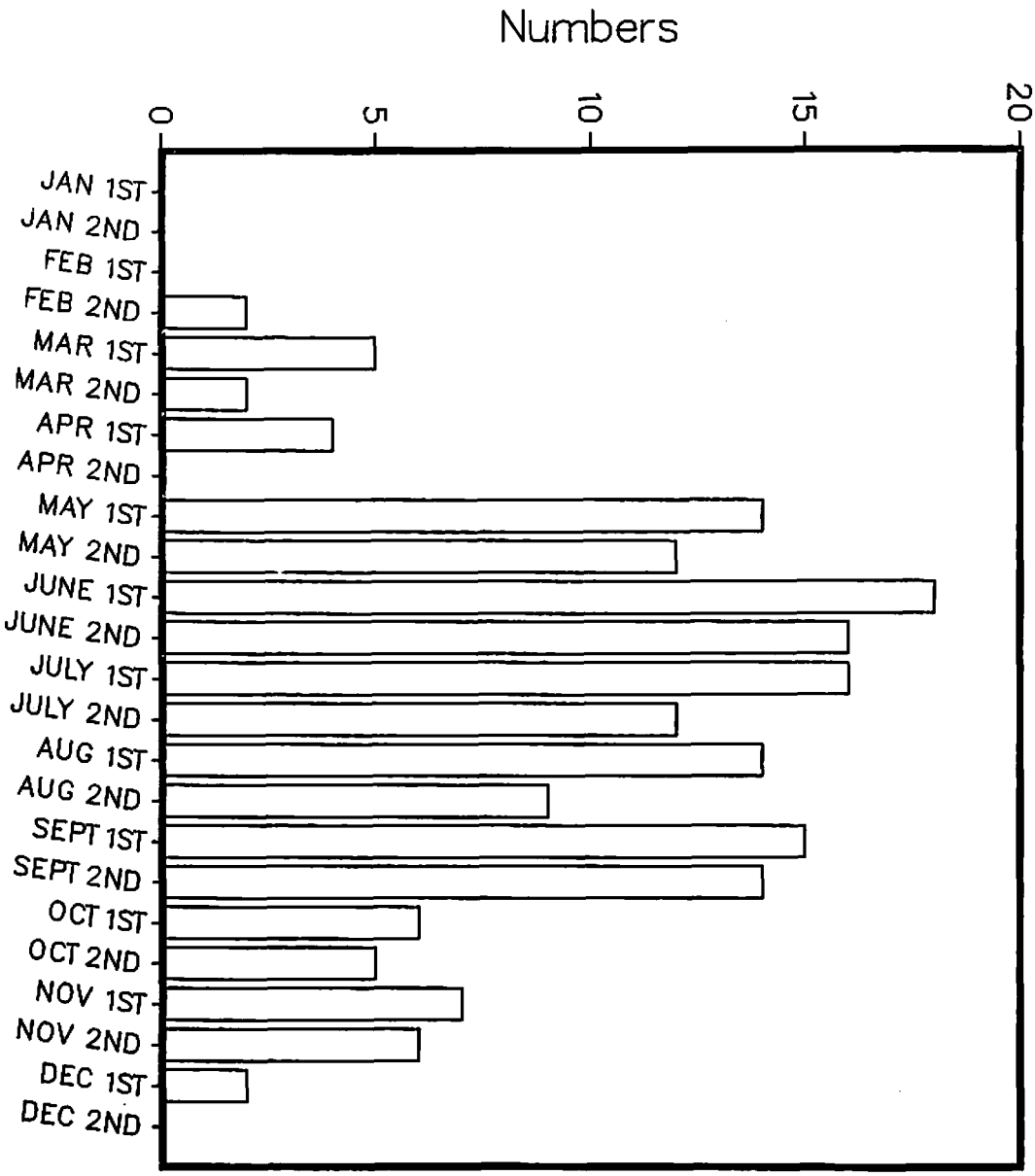


Fig. 41. Anchor gill nets in the lower section of the Rappahannock River 1986.

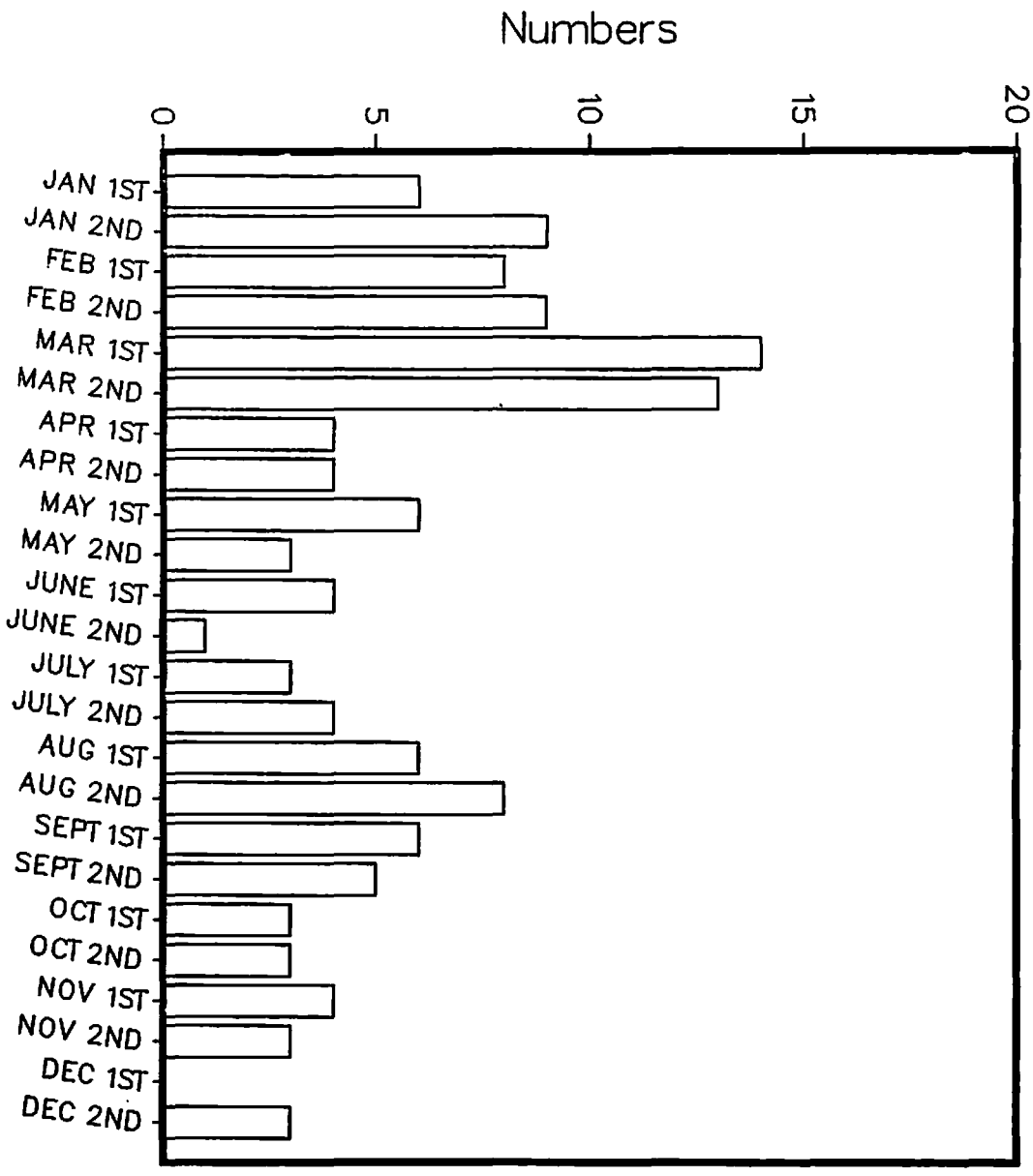


Fig. 42. Anchor gill nets in the central section of the Rappahannock River 1986.

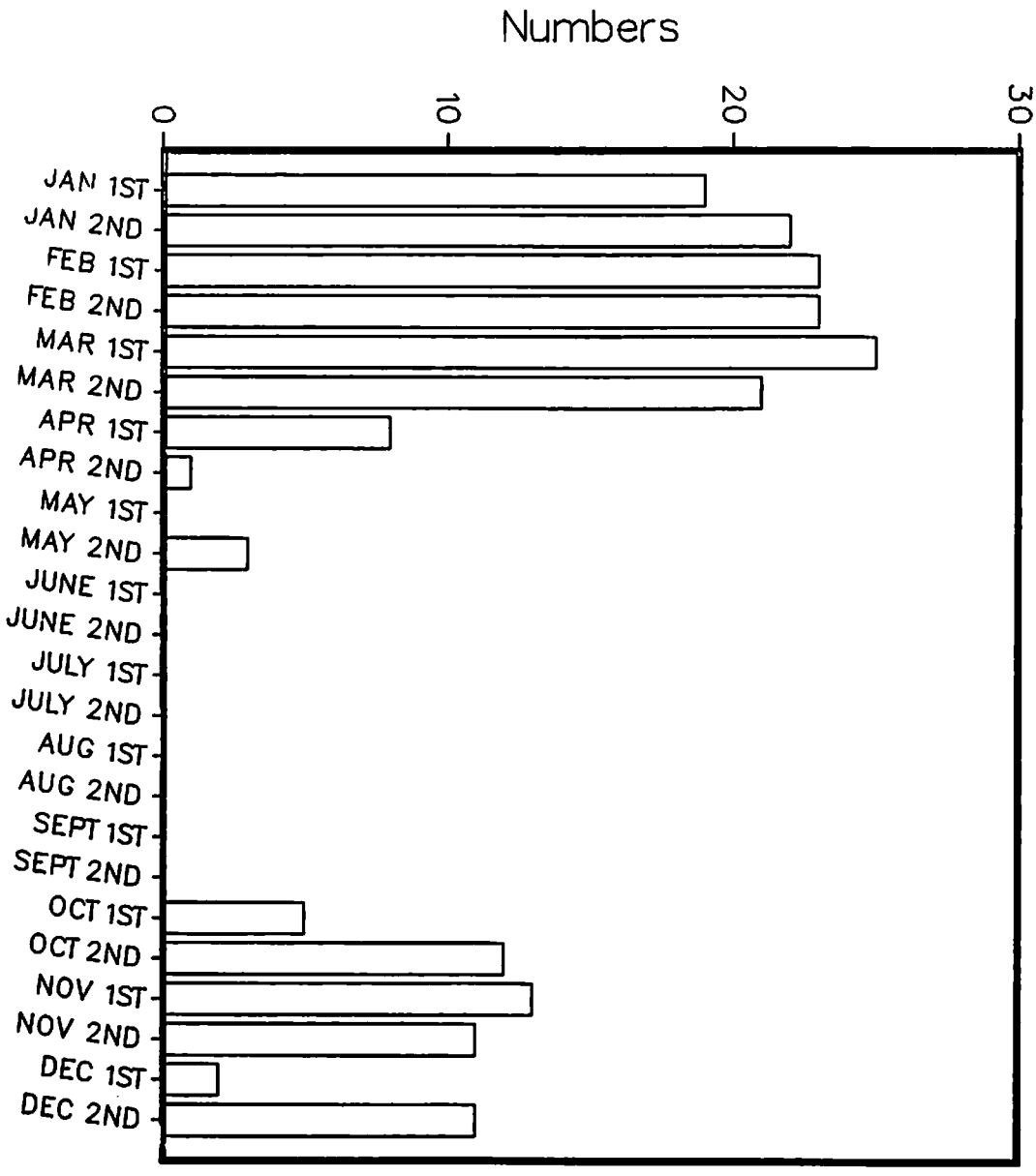


Fig. 43. Anchor gill nets in the upper section of the Rappahannock River 1986.

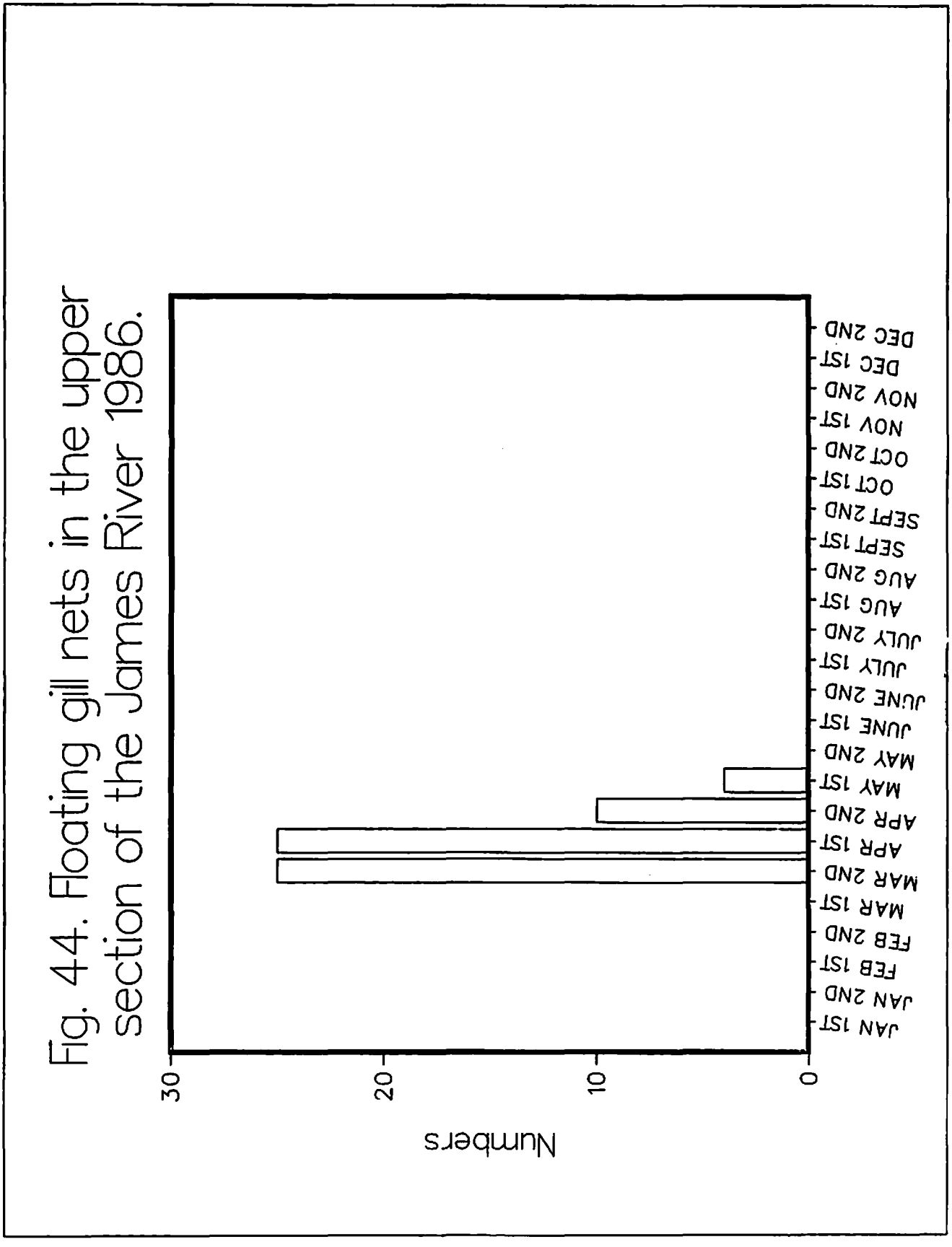


Fig. 44. Floating gill nets in the upper section of the James River 1986.

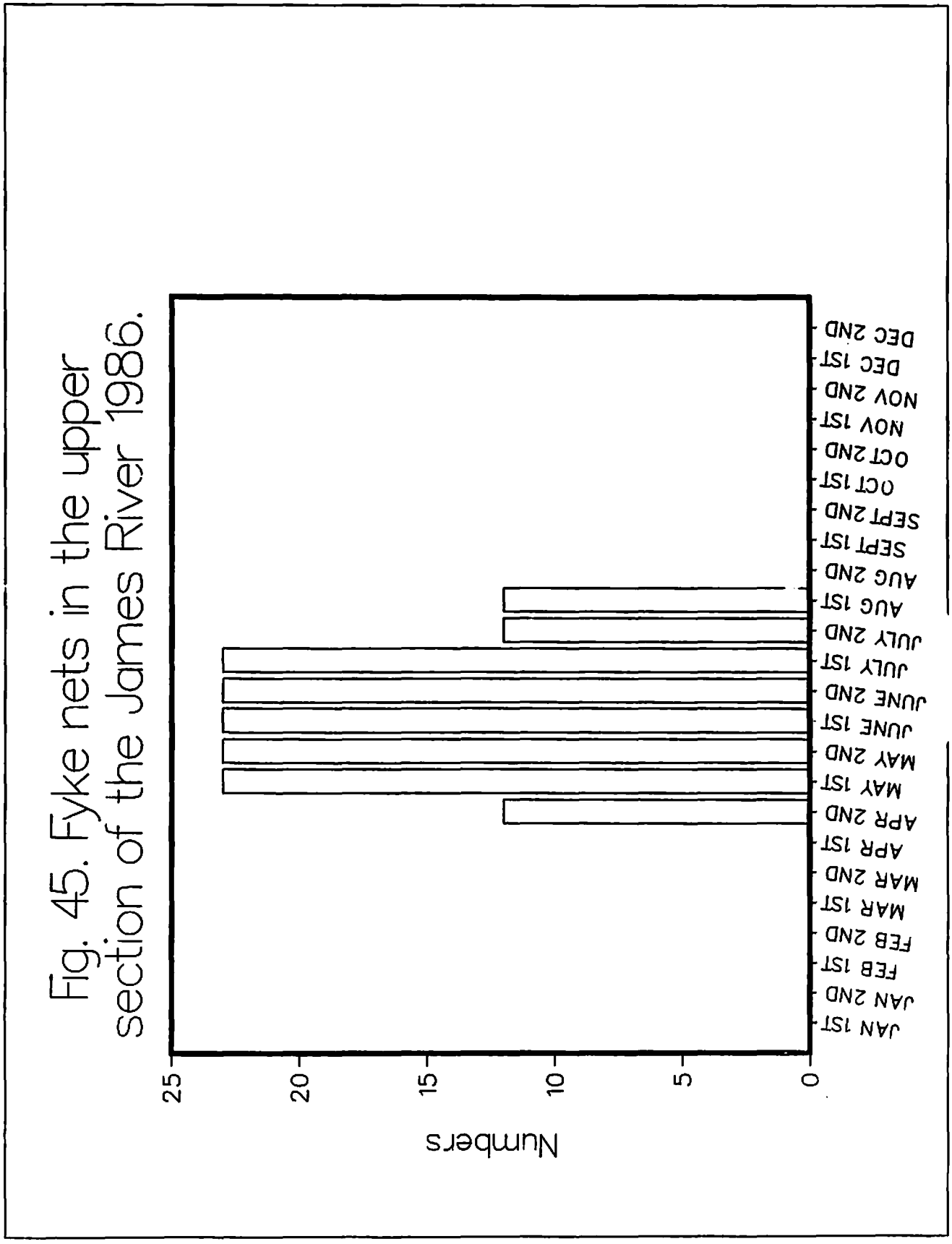


Fig. 45. Fyke nets in the upper section of the James River 1986.

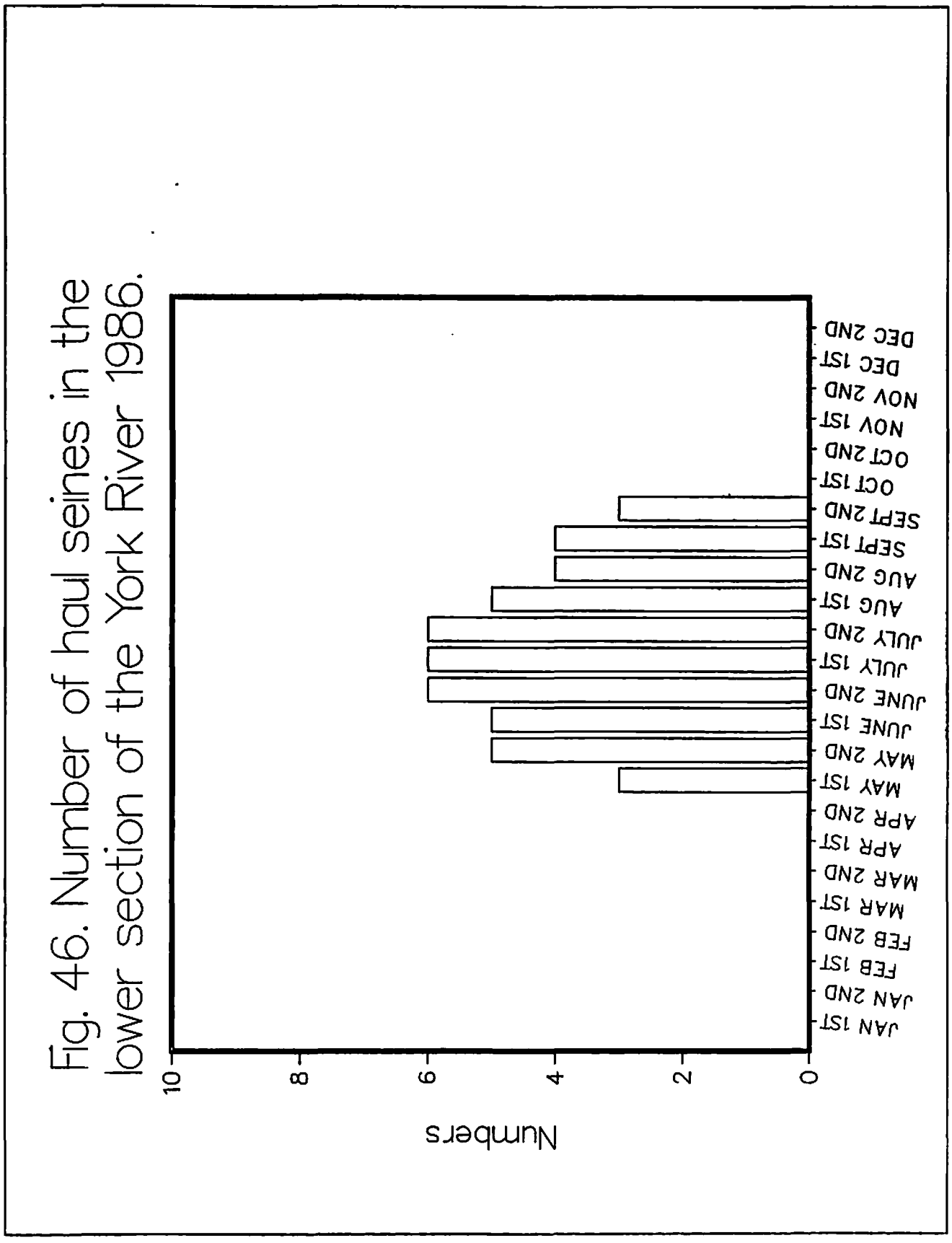


Fig. 46. Number of haul seines in the lower section of the York River 1986.

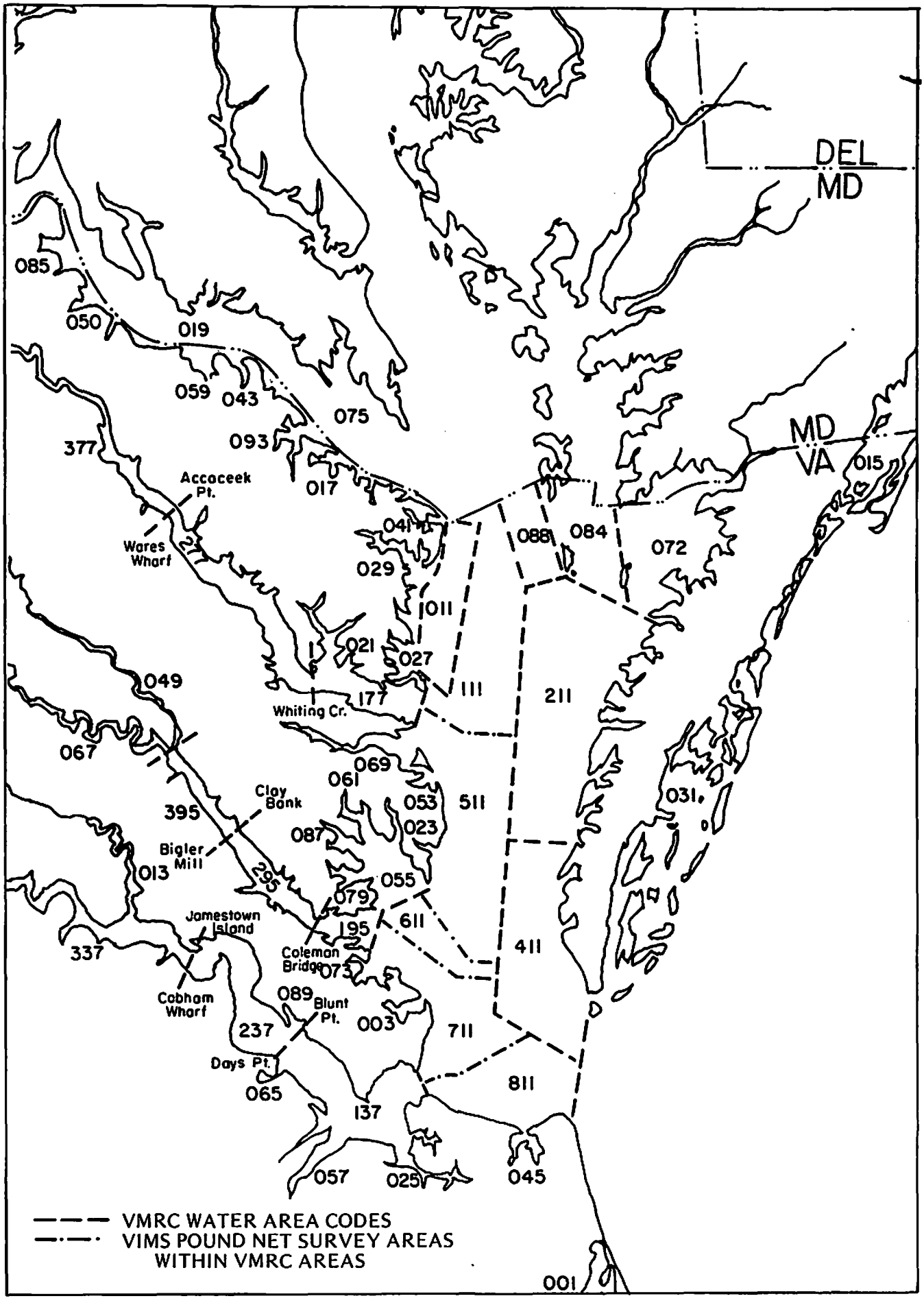
Appendix I. Virginia Marine Resources Commission water areas and modifications.

CODE	BODY OF WATER
001	Back Bay
003	Back River
005	Bogue Bay
007	Bradford Bay
009	Burton's Bay
011	Chesapeake Bay (Western Mgt Area)
*111	Chesapeake Bay (Upper Western Section)
211	Chesapeake Bay (Upper Eastern Section)
*311	Chesapeake Bay (Lower Western Section)
411	Chesapeake Bay (Lower Eastern Section)
013	Chickahominy River
015	Chincoteague Bay
017	Coan River
018	Cobb Bay (Seaside Eastern Shore)
019	Currioman Bay
021	Corrotoman River
023	East River
025	Elizabeth River
027	Fleets Bay
028	Gargathy Bay (Seaside Eastern Shore)
029	Great Wicomico River
031	Hog Island Bay
033	Horn Harbor
137	James River (Lower Section)
237	James River (Central Section)
337	James River (Upper Section)
038	Kegotank Bay (Seaside Eastern Shore)
039	Lafayette River
041	Little Wicomico River
043	Lower Machodoc Creek
045	Lynnhaven Bay
047	Magothy Bay
049	Mattaponi River
050	Mattox Creek (Potomac Rv. Trib.)
051	Metomkin Bay
053	Milford Haven
055	Mobjack Bay
057	Nansemond River
059	Nomini Bay
061	North River
063	Outlet Bay
064	Oyster Bay (Seaside Eastern Shore)
065	Pagan River
067	Pamunkey River
069	Piankatank River
070	Pocomoke River
072	Pocomoke River
073	Poquoson River
074	Potomac Creek (Potomac Rv. Trib.)
075	Potomac River, unclassified
175	Potomac River (Lower Section)
275	Potomac River (Lower Central Section)
375	Potomac River (Upper Central Section)
475	Potomac River (Upper Section)
076	Potomac River Trib. (Unclassified)
177	Rappahannock River (Lower Section)
277	Rappahannock River (Central Section)
377	Rappahannock River (Upper Section)
078	Rosier Creek (Potomac Rv. Trib.)
079	Severn River
081	South Bay
083	Swash Bay
084	Tangier Sound
088	West Tangier Management Area
085	Upper Machodoc Creek
086	Upshur Bay (Seaside Eastern Shore)
087	Ware River
089	Warwick River
090	Watts Bay (Seaside Eastern Shore)
091	Willoughby Bay
092	Winter Harbor (Chesapeake Bay Tributary)
093	Yeocomico River
195	York River (Lower Section)
295	York River (Central Section)
395	York River (Upper Section)
097	Unclassified Seaside Bays and Rivers
099	Unclassified Tributaries of Chesapeake Bay

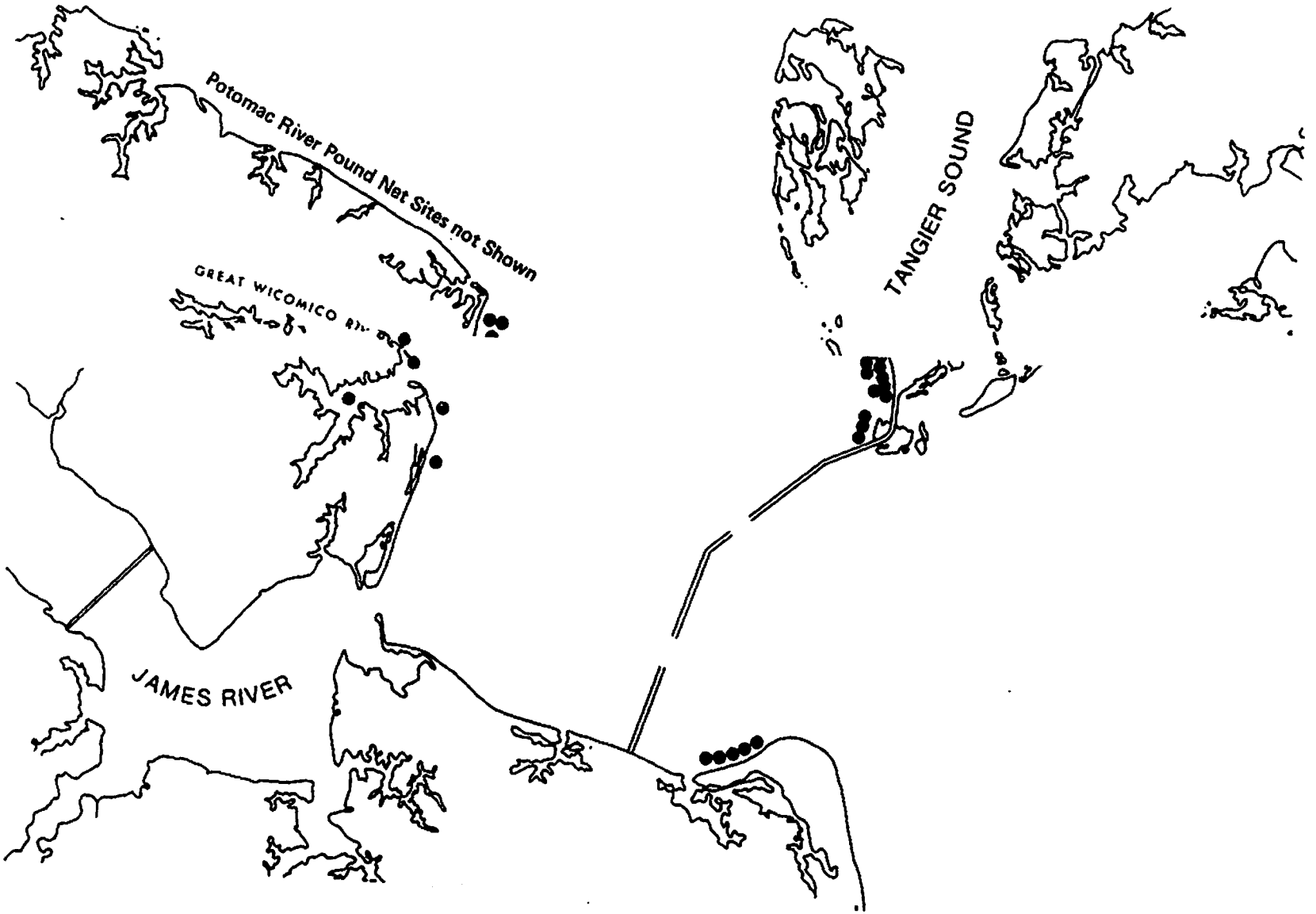
*These areas have been sub-divided to correspond to VIMS aerial pound net count designations, as follows:

511	Windmill Point - New Point
611	York Spit
711	Tue Marsh - Old Point
811	Willoughby Spit - Cape Henry

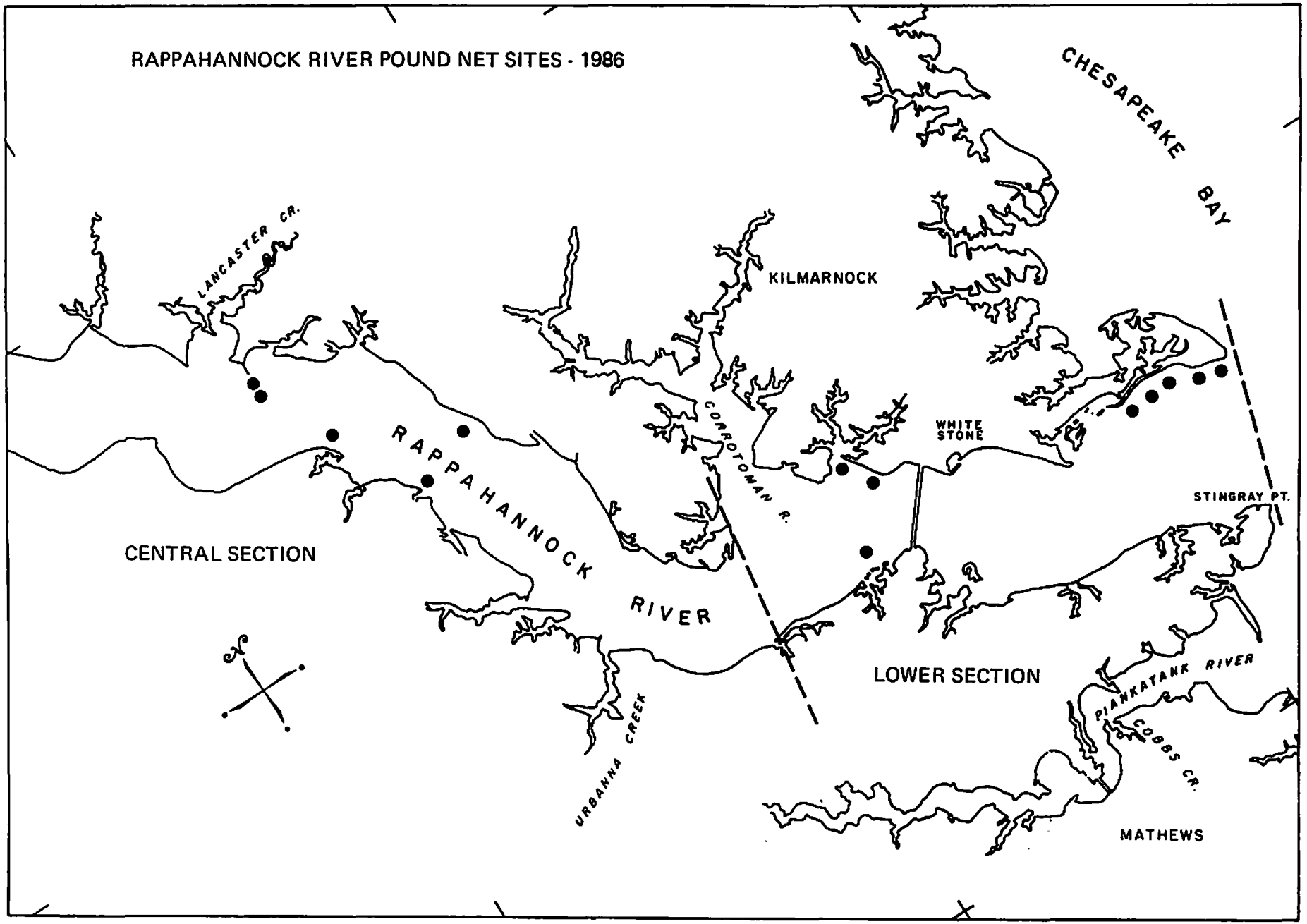
Appendix I. (Continued)


DEL
MD
MD
VA
085
050
019
059
043
075
093
377
017
015
Accoceek Pt.
Wares Wharf
041
088
084
072
029
011
021
027
049
177
Whiting Cr.
111
211
067
069
061
053
511
031
Clay Bank
395
023
087
Bigler Mill
013
055
079
295
611
Jamestown Island
195
411
337
Coleman Bridge
073
Cobham Wharf
089
Blunt Pt.
003
237
711
Days Pt.
811
065
137
057
025
045
001
VMRC WATER AREA CODES
VIMS POUND NET SURVEY AREAS WITHIN VMRC AREAS

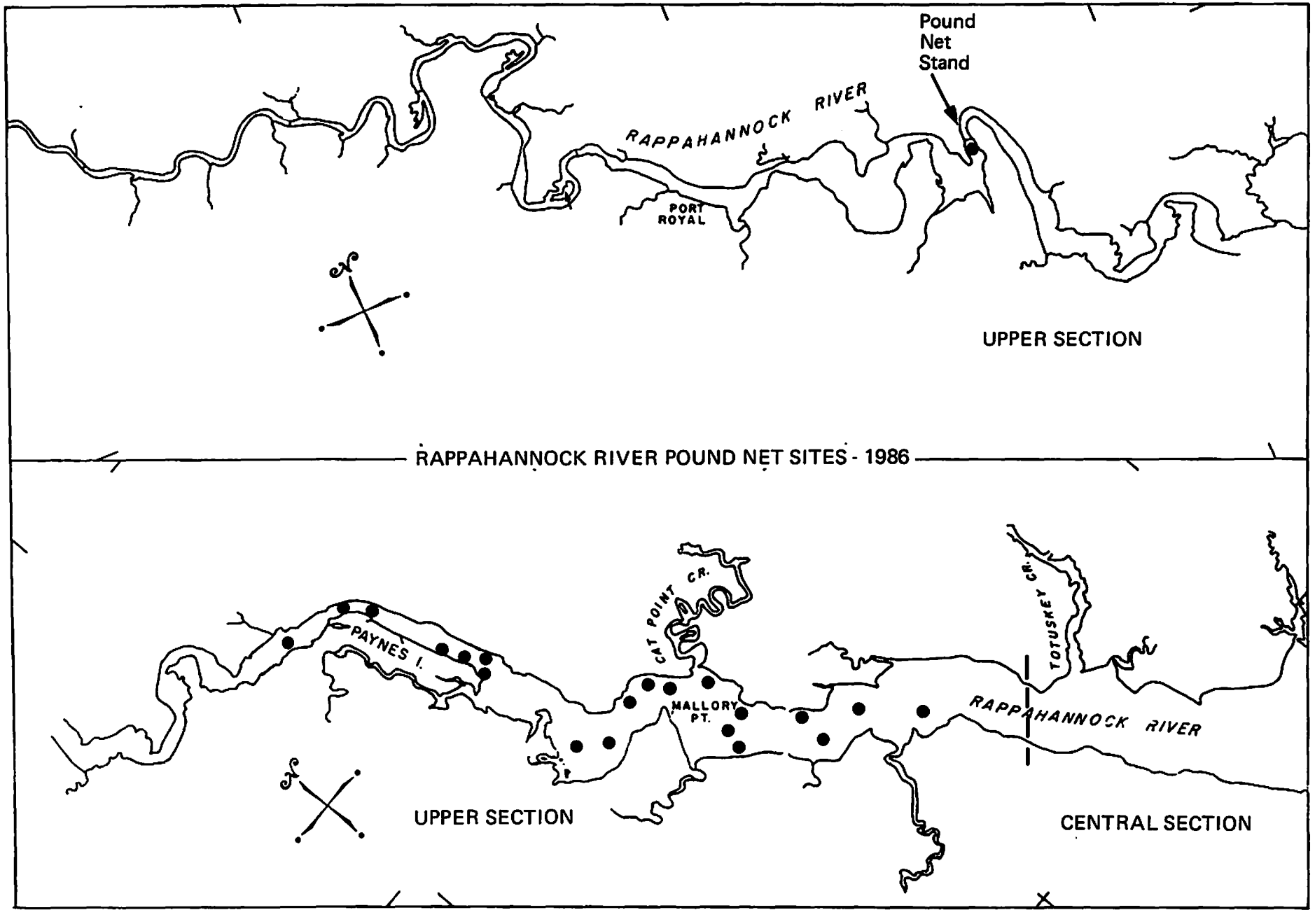
Appendix II. Active pound net sites in Virginia waters during 1986.


Potomac River Pound Net Sites not Shown
GREAT WICOMICO RIV.
TANGIER SOUND
JAMES RIVER

Appendix II. (Continued)


RAPPAHANNOCK RIVER POUND NET SITES - 1986
CHESAPEAKE BAY
LANCASTER CR.
KILMARNOCK
CORROTOMAN R.
WHITE STONE
STINGRAY PT.
RAPPAHANNOCK RIVER
CENTRAL SECTION
LOWER SECTION
PIANKATANK RIVER
COBBS CR.
URBANNA CREEK
MATHEWS

Appendix II. (Continued)


Pound
Net
Stand
RAPPAHANNOCK RIVER
PORT
ROYAL
UPPER SECTION
RAPPAHANNOCK RIVER POUND NET SITES - 1986
PAYNES I.
CAT POINT CR.
MALLORY
PT.
TOTUSKEY CR.
RAPPAHANNOCK RIVER
UPPER SECTION
CENTRAL SECTION