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## **A Mark-recapture Study of Striped Bass in the James River, Virginia : Annual Report 1988**

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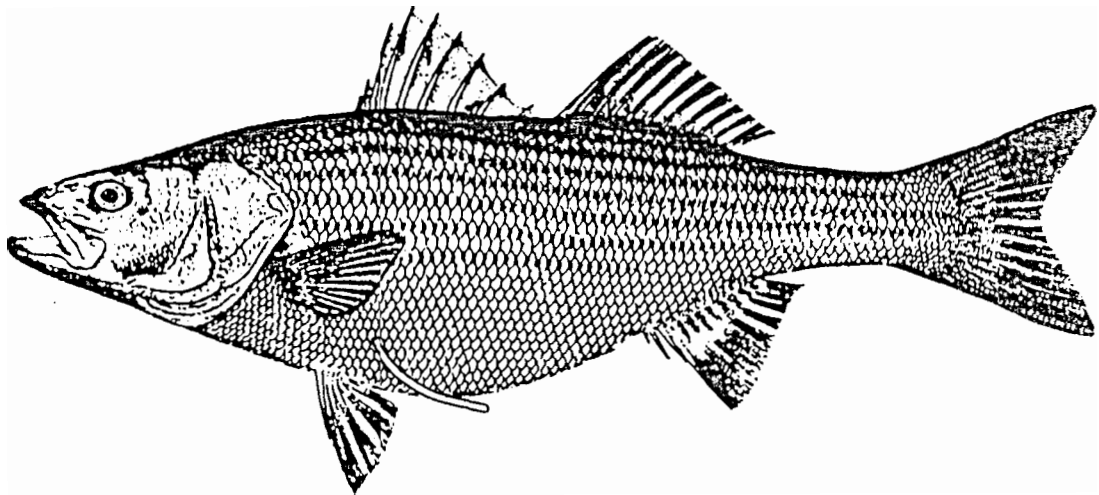
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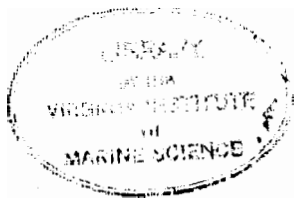
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# A MARK-RECAPTURE STUDY OF STRIPED BASS IN THE JAMES RIVER, VIRGINIA



ANNUAL REPORT 1988



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

Annual Report, 1988

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the James River, Virginia

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Principal Investigator: Joseph G. Loesch

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## EXECUTIVE SUMMARY

1. In the Spring 1988, 2,145 striped bass were tagged in the James River.
2. The mean size of striped bass tagged in 1988 (351.6 mm) was 117.9 mm smaller than mean size in 1987. The difference may be due to different locations and times of tagging.
3. The dominant age group in 1987 was the 1982 year class but in 1988 the dominant age group was the 1984 year class. This difference may also be accounted for by different locations and times of tagging.
4. The exodus of the mature fish out of the river after spawning and the absence of a commercial fishery resulted in only 34 tag returns from the Spring 1988 tagging. This proportion (0.016) of returns is small relative to the proportion of returns in previous tagging programs in the Chesapeake Bay when escapement was low due to high fishing pressures. There have been six returns from waters outside of Virginia when both 1987 and 1988 James River tagging releases are combined. Days-at-large range from zero (0) to 694, with 54% of the returns occurring within 60 days after release.



## INTRODUCTION

Loesch et al. (1988) presented an overview of the economic and social importance of the striped bass (Morone saxatilis) in the commercial and recreational fisheries in the Atlantic coastal states.

Due to the concern about the decline in striped bass stocks along the Atlantic coast since the mid-1970's, an interstate fisheries management plan was developed under the auspices of the Atlantic States Marine Fisheries Commission (ASMFC) as part of their Interstate Fisheries Management Program (ASMFC 1981). Federal legislation was enacted in 1984 (Public Law #98-613, The Atlantic Striped Bass Conservation Act) which enables Federal imposition of a moratorium for an indefinite period in those states that fail to comply with the coastwide plan. To be in compliance with the plan, coastal states have imposed restrictions on their commercial and recreational striped bass fisheries ranging from combinations of catch quotas, size limits, and time-limited moratoriums (e.g., Virginia) to year-round moratoriums (e.g., Maryland). In addition, the Striped Bass Management Board has urged the coastal states to monitor the stocks and to institute tagging programs. Mark-recapture studies of striped bass in Virginia have been initiated in the James and Rappahannock rivers; elsewhere, striped bass are being tagged in Rhode Island, New York, and Maryland waters. These studies should provide information about exploitation rates, migration patterns, and the proportions of Hudson River, Maryland and Virginia striped bass in northern waters. The Maryland and Virginia studies will also provide information on the degree of striped bass movement within Chesapeake Bay. The data collected will be an important constituent of the total information base needed to assess present management strategies.

The long-term objectives of the mark-recapture study in Virginia are:

- 1) evaluate the degree of striped bass exploitation within and outside the Chesapeake Bay region under present fishery restrictions;
- 2) assess the coastal migratory pattern of Virginia striped bass;
- 3) assess the degree of fidelity to the rivers of capture by mature, migrant fish in subsequent spawning seasons;
- and 4) contribute to the present age-growth and size-at-maturity database.

The objectives in the second segment of the study (AFC-19-2) were: 1) as available, tag and release approximately 2,500 striped bass in the James River in Spring 1988; 2) analyze tag return data in regard to exploitation and migration; and 3) prepare an annual report. This report will be made available to the Atlantic States Marine Fisheries Commission, the National Marine Fisheries Service, the U. S. Fish and Wildlife Service, and all other state and federal agencies directly or peripherally involved in striped bass management and research.

## METHODS

Striped bass were obtained from cooperating commercial fishermen in Spring 1988. Fish were captured with fyke nets between river km 74 to 85 on 8 April and with a haul seine at river km 48 from 22 February through 30 March (Fig. 1).

A Floy internal anchor tag 10 mm X 32 mm, with a 100 mm external tube was used with striped bass greater than or equal to 350 mm in fork length, and a Floy internal anchor tag 5 mm X 20 mm, with a 85 mm external tube for fish greater than or equal to 250 mm and less than 350 mm in fork length. The anchor tag was inserted into the body cavity through a small surgical incision made just posterior to the apex of the pectoral fin on the museum (left) side of the fish. Thus, the anchor was inserted into the peritoneal cavity posterior to the pericardial cavity and anterior to the spleen. The tags were treated by the Floy Company with an algaecide which reduces algae build-up, reduces drag, and increases retention (Hillman and Werme 1983).

A commercial haul seine (1,000 m) was employed on four occasions during evening hours and high slack tide at river km 48. Fishes other than striped bass were removed, and the striped bass were retained in a pocket measuring 13 m x 2.0 m x 6.5 m. Fish were retrieved from the pocket, and prior to implanting a tag, total length (TL), fork length (FL), and, if possible, sex were recorded. Scales were removed from the area just above the lateral line midway between the insertion of the first dorsal fin and the origin of the second. Salinity, water temperature and tidal stage were also recorded.

Scales were prepared for reading by utilizing the method described by Merriman (1941) except that an acetate sheet replaced the glass slide and acetone. All scales were aged using the microcomputer program (DISBCAL) of Frie (1982), as modified for a sonic digitizer-microcomputer complex (Loesch et al. 1985). Growth increments were measured from the focus to the posterior edge of each annulus. There was little difficulty in reading the scales when a clear focus was found. On fish that were older than age 6, the first and sometimes the second annuli were difficult to define.

Aging was not an objective of the study; scales were to be stored for "reading" at a later date. However, preliminary readings were accomplished for scales collected in 1987 and 1988. Striped bass scale annuli form between April and June in Virginia waters; therefore, year classes, other than 0 year class, are considered to be a year older on July 1 (Grant 1974). This aging scheme differs from that utilized in Maryland and North Carolina where age is incremented on 1 January. Thus, the same year class is designated a year older in Maryland and North Carolina (Harris and Burns 1982) six months before age designations are equalized for all three states.

The U. S. Fish and Wildlife Service (FWS) supplied the anchor tags for our project and to the other coastal states tagging striped bass, and it is functioning as the repository for the tag-return data. The data will be sorted and subsequently returned to the appropriate states. The external tube of the tag is inscribed with instructions to return the tag to, or telephone, the Annapolis, Maryland, office of the FWS. The National Fish and Wildlife Foundation (Washington, D. C.) forwards a reward of \$5.00 or a fisherman's cap with a striped bass logo as an acknowledgment for the recapture information.

## RESULTS

In Spring 1988, 2,145 striped bass were tagged; of this total, 2,048 were captured in a haul seine and 97 in fyke nets. The grand total of striped bass tagged (1987 and 1988) was 4,131 as of 8 April 1988. The striped bass tagged in the James River in Spring 1988 ranged from 218 mm to 1,240 mm (FL) with a mean length of 351.6 mm (Fig. 2). Length frequency histograms by count indicate that 56% of the tagged fish were between 301 to 350 mm FL. The mean length of striped bass tagged in 1988 was 117.9 mm less than in 1987.

The 1982 year class composed 42% of the tagged specimens in 1987 while the 1984 yearclass composed 56% of the tagged specimens in 1988 (Figs. 3 and 4). The age frequency determinations are preliminary because the scales have been aged by only one reader.

Days at large for the tagged striped bass (1987 and 1988) ranged from zero (day of tagging) to 694 (Table 1 and Fig. 5). Recaptures from hook and line fishing were more than three times greater than recaptures from either fyke nets, pound nets or gill nets (Table 1). The exploitation rate for the 1988 tagging program was 0.015.

## DISCUSSION

The difference in striped bass mean lengths and modal ages in 1987 and 1988 appears to be related to the location and time of capture. In 1987, striped bass were obtained from fyke nets at river km 71 to 85, but in 1988 the majority of striped bass were obtained from a haul seine at river km 48. Due to prolonged flood conditions in the James River in the Spring 1987, the planned use of the commercial haul seine was not possible. Tagging of striped bass in 1987 did not commence until 22 April and ended on 28 May, while in 1988 tagging commenced on 22 February and ended on 8 April. Capture by a haul seine and retention in a large holding pen in 1988 placed less stress on the fish than did capture and retention in the smaller fyke nets in 1987. The lower water temperatures in 1988 (because of the the earlier tagging dates) also contributed to the robustness of captured striped bass.

The exodus of the mature fish from the James River after spawning and the absence of a commercial fishery resulted in only 34 tag returns from the Spring 1988 tagging. This proportion (0.016) of returns is small relative to the proportion of returns in previous tagging programs in the Chesapeake Bay when escapement was low due to high fishing pressures. There have been six returns from waters outside of Virginia when both 1987 and 1988 James River tagging releases are combined. Days-at-large range from zero (0) to 694, with 54% of the returns occurring within 60 days after release (Fig. 5). Very few fish were caught by commercial fishermen due the 610 mm (24 inch) minimum total length regulation and the scarcity of larger fish during the legal season (1 June-30 November). The James River was closed to the taking of striped bass and some other species due to Kepone contamination and although the river was re-opened on 1 July 1988, the minimum size limit (610 mm) discouraged commercial fishing. A full moratorium on striped bass fishing in Virginia will commence on 1 June 1989; thus we expect the escapement rate will remain high.

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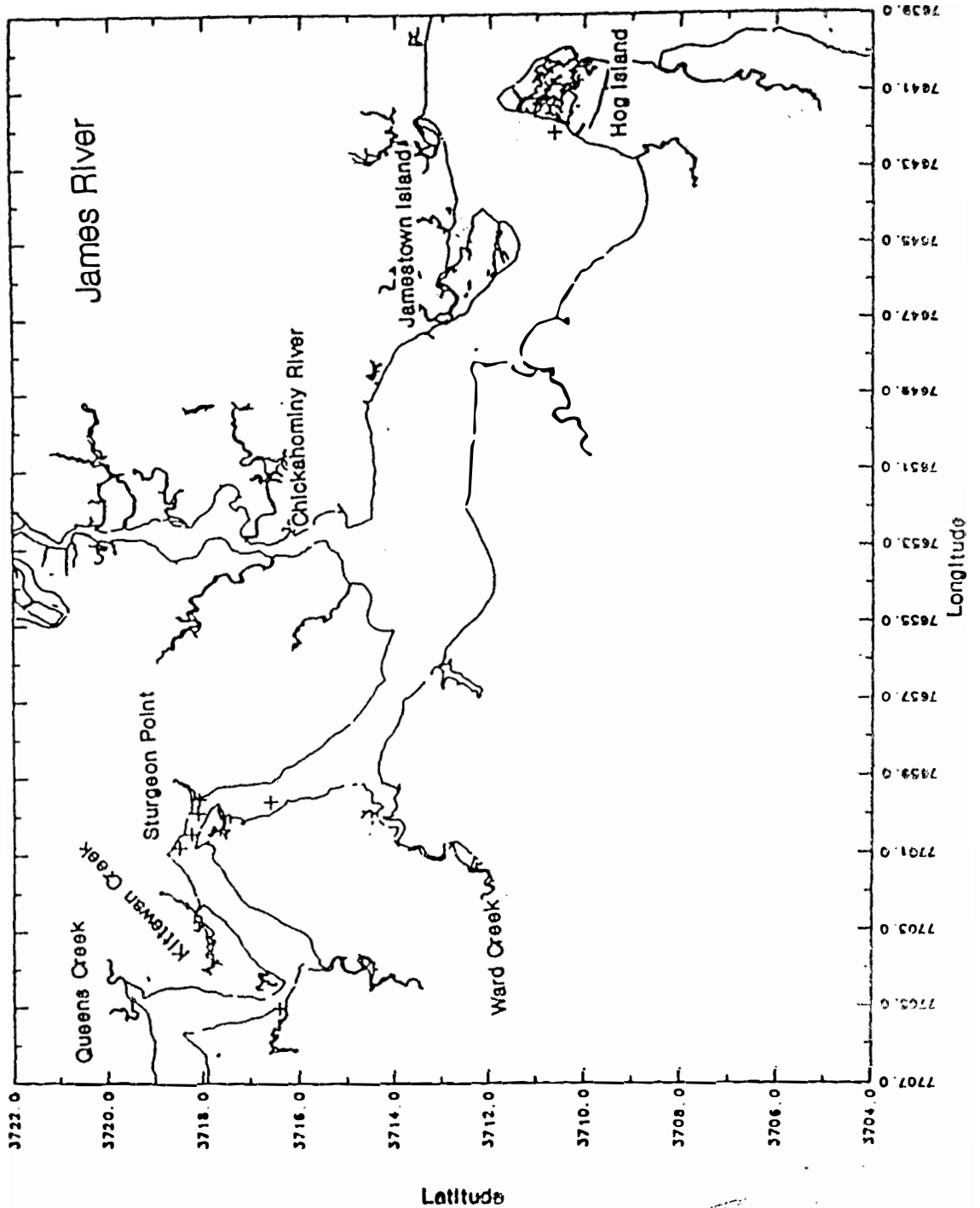
Table 1. Number of recaptures, by gear of striped bass tagged in the James River in Spring 1987 and Spring 1988.

| Gear            | Number of Recaptures |
|-----------------|----------------------|
| Hook & Line     | 78*                  |
| Anchor Gill Net | 16                   |
| Gill Net        | 10                   |
| Trap            | 18                   |
| Seine           | 1                    |
| Not Reported    | 57                   |
| Other           | 2**                  |
| <b>Total</b>    | <b>182</b>           |

\* One fish recaptured twice by the same gear.

\*\* Electroshocking, dynamite etc..

Fig. 1. Locations of Fyke Nets and Haul Seine, Used to Capture Striped Bass in the James River, Spring 1989



Latitude

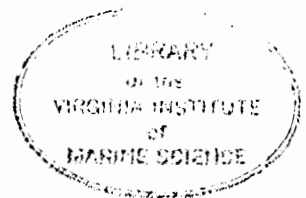


Figure 2. Size Frequency for Striped Bass Tagged in the James River, Spring 1988

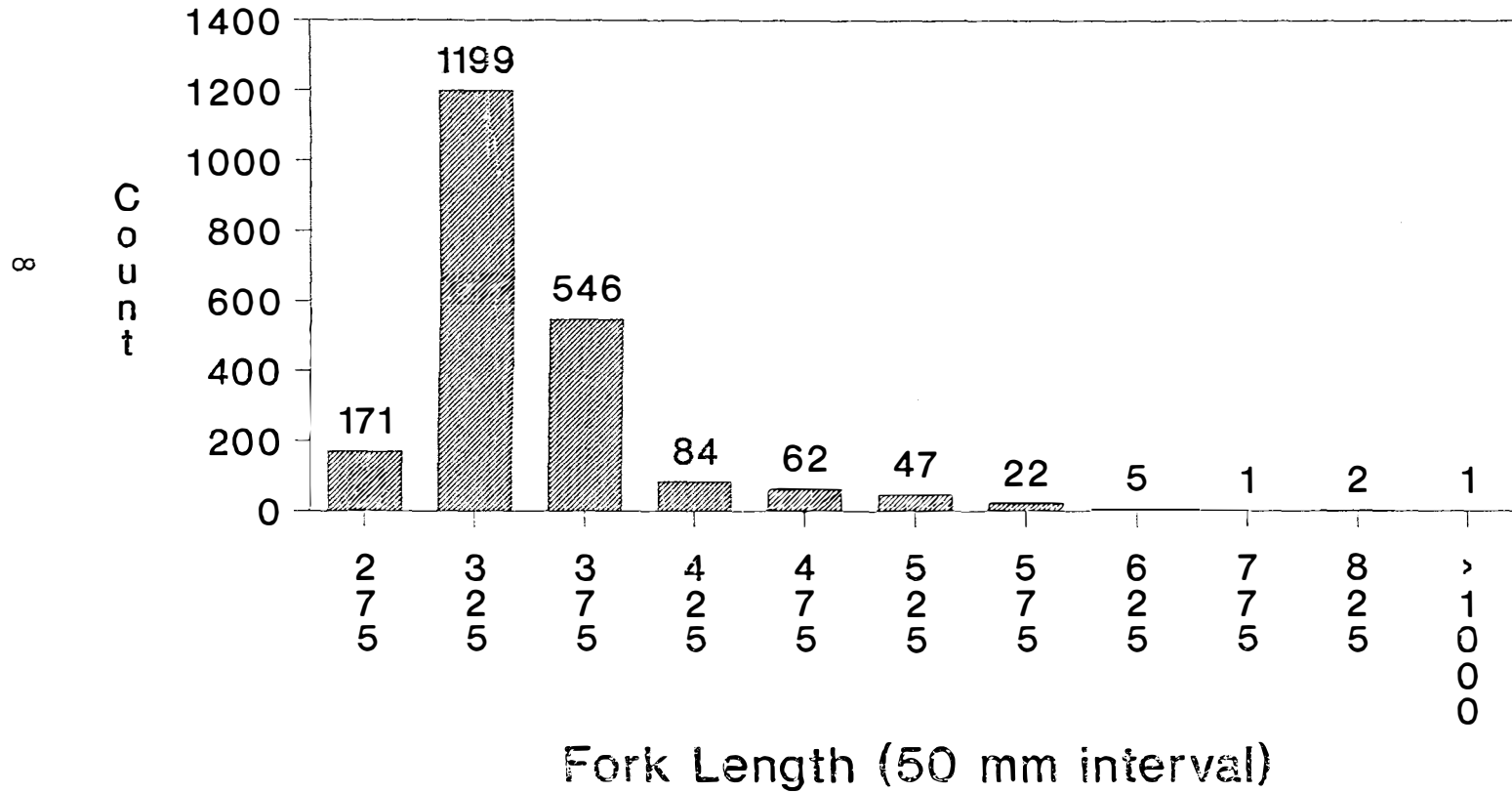
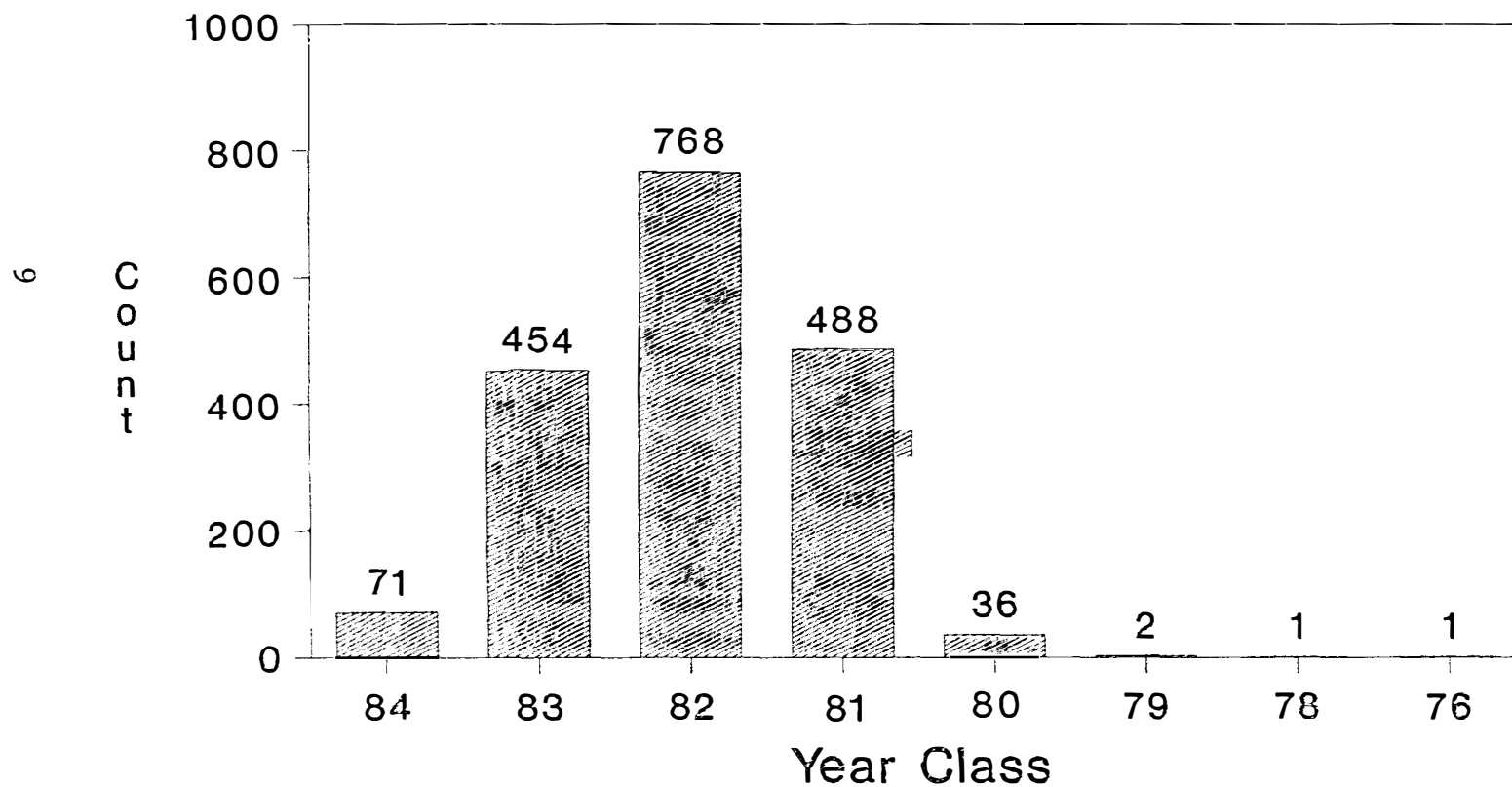


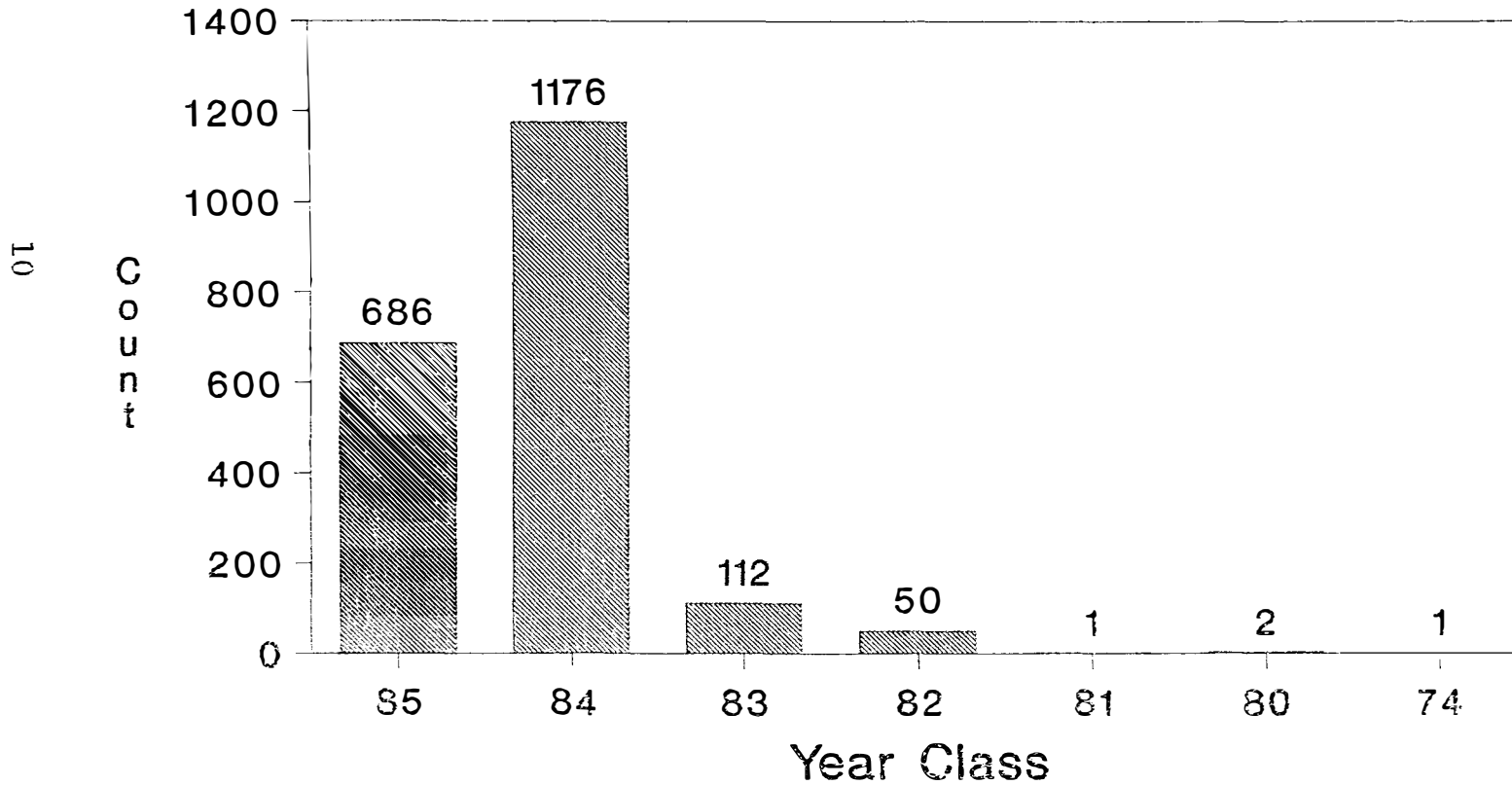


Figure 3. Age Frequency of Striped Bass Tagged in the James River, Spring 1987



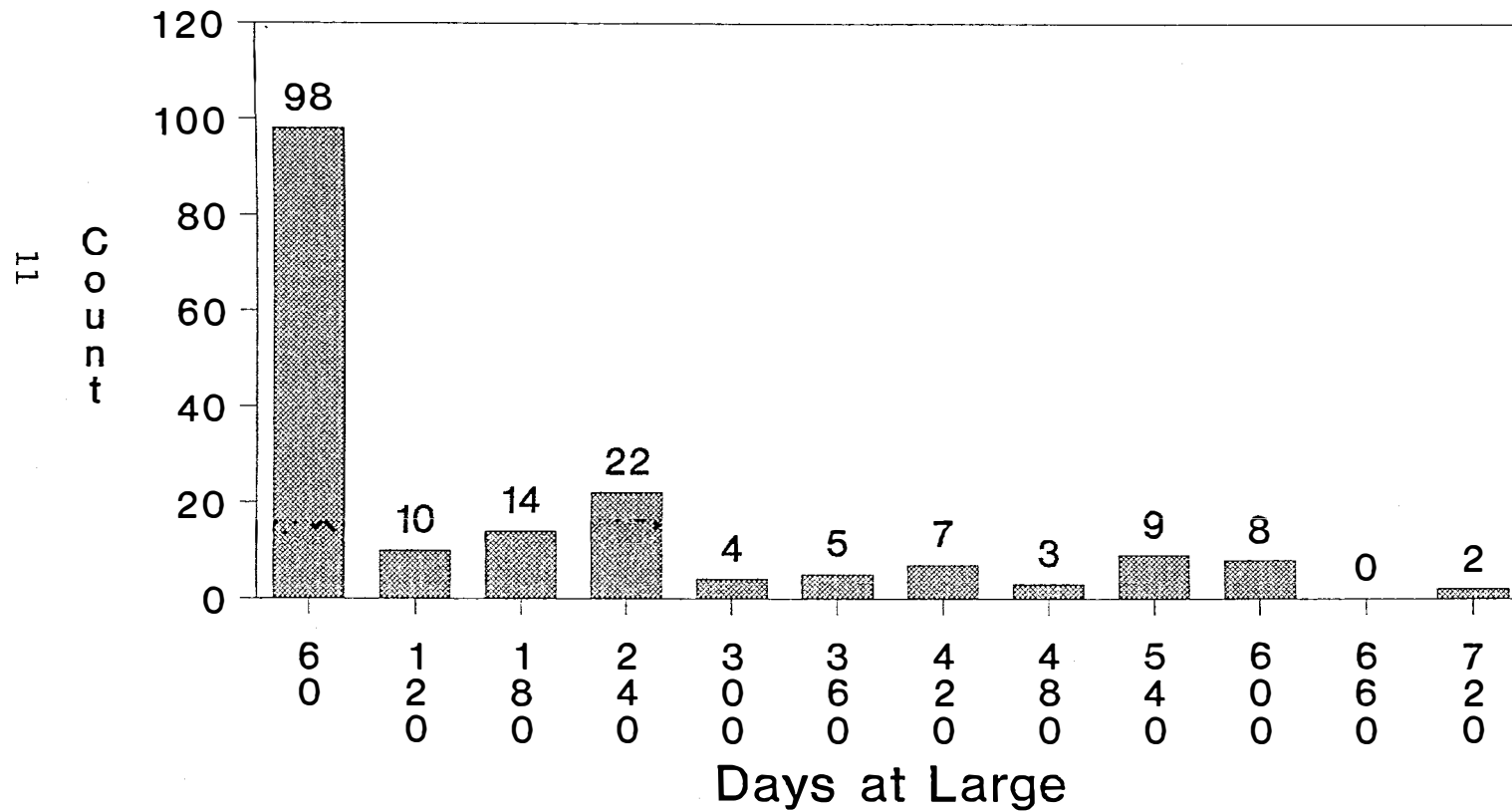
Preliminary

Figure 4. Age Frequency of Striped Bass Tagged in the James River, Spring 1988



Preliminary

Figure 5. Days at Large of Recaptured Striped Bass Tagged in the James River Spring 1987 and 1988



As of May 1, 1989