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SOUTHERN CALIFORNIA COMMERCIAL PASSENGER FISHING  
VESSEL SAMPLING STUDY  
QUARTERLY REPORT NO. 14

October 1 - December 31, 1978

by

Stephen J. Crooke

MARINE RESOURCES

Administrative Report No. 79-17

December 1979

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ABSTRACT

Between October 1 and December 31, 1978, Departmental personnel sampled catches during 132 trips aboard commercial passenger fishing vessels (partyboats) operating in southern California. A total of 25,571 fishes belonging to 87 species were identified and measured. In addition, six long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 1,225 fishes comprising 20 species was identified and measured at dockside from these vessels.

The 10 most commonly taken species during the quarter accounted for 76.3% of the southern California catch. The most frequently sampled species were bocaccio, *Sebastes paucispinis* (24.7%); Pacific mackerel, *Scomber japonicus* (15.8%); chilipepper, *Sebastes goodei* (8.7%); kelp bass, *Paralabrax clathratus* (7.4%); Pacific bonito, *Sarda chiliensis* (5.7%); olive rockfish, *Sebastes serranoides* (4.1%); blue rockfish, *S. mystinus* (4.0%); squarespot rockfish, *S. hopkinsi* (2.1%); green-spotted rockfish, *S. chlorostictus* (2.1%); and vermilion rockfish, *S. miniatus* (1.9%). Samples gathered from long-range trips showed the top five species accounted for 90.4% of the fishes sampled. The most frequently sampled species were yellowtail, *Seriola lalandi* (28.8%); yellowfin tuna, *Thunnus albacares* (20.7%); wahoo, *Acanthocybium solanderi* (16.2%); snowy grouper, *Epinephelus niveatus* (12.4%); and dolphinfish, *Coryphaena hippurus* (12.3%).

December marked the final month in which partyboats were sampled off southern California.

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Marine Resources Administrative Report No. 79-17, December 1979. This study is being performed as part of Dingell-Johnson Project California F-35-P, "Southern California Marine Sportfish Research" supported by Federal aid to Fish Restoration Funds. Field work was conducted in cooperation with the Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under a contract entitled Collection and Compilation of Southern California Partyboat Fishery Statistics, Project 868.

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SOUTHERN CALIFORNIA COMMERCIAL PASSENGER  
FISHING VESSEL SAMPLING STUDY

QUARTERLY REPORT NO. 14

INTRODUCTION

Between October 1 and December 31, 1978, Departmental personnel sampled catches during 132 trips aboard commercial passenger fishing vessels (partyboats) operating in southern California. A total of 25,571 fishes belonging to 87 species were identified and measured.<sup>3/</sup> In addition, six long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 1,225 fishes comprising 20 species was identified and measured at dockside from these vessels.

The 10 most commonly taken species during the quarter accounted for 76.3% of the southern California catch (Table 1). The most frequently sampled species were bocaccio, *Sebastes paucispinis* (24.7%); Pacific mackerel, *Scomber japonicus* (15.8%); chilipepper, *Sebastes goodei* (8.7%); kelp bass, *Paralabrax clathratus* (7.4%); Pacific bonito, *Sarda chilensis* (5.7%); olive rockfish, *Sebastes serranoides* (4.1%); blue rockfish, *S. mystinus* (4.0%); squarespot rockfish, *S. hopkinsi* (2.1%); greenspotted rockfish, *S. chlorostictus* (2.1%); and vermilion rockfish, *S. miniatus* (1.9%). Samples gathered from long-range trips showed the top five species accounted for 90.4% of the fishes sampled (Table 2). The most frequently sampled species were yellowtail, *Seriola lalandi* (28.8%); yellowfin tuna, *Thunnus albacares* (20.7%); wahoo, *Acanthocybium solanderi* (16.2%); snowy grouper, *Epinephelus niveatus* (12.4%); and dolphinfish, *Coryphaena hippurus* (12.3%).

<sup>3/</sup>

For definition of length measurements see Maxwell and Schultze, Administrative Report 76-3.

## OPERATIONS

December marked the final month which partyboats were sampled in southern California. Manpower limitations brought about by Governor Brown's June hiring freeze prevented us from hiring new personnel when previous appointments expired. Permanent personnel were used to "salvage" the last quarter since no temporary help was available after October 1, 1978. Long-range sampling was not affected since it could be easily handled by permanent personnel.

## ROCKFISHES

During the quarter 14,834 rockfish representing 38 species were identified and measured (Table 3). The group accounted for 58.0% of the fish sampled. Last quarter rockfishes (*Sebastes* spp.) accounted for 26.0% of the take while during the same quarter in 1977 they accounted for 55.8%. The 2.2% difference between years reflects the consistent contribution rockfishes make to the fishery during the fall months. Rockfishes increased in importance by 114.6% when compared with the previous quarter. This can be attributed to the seasonal switch from "surface" to "rockcod" fishing. The top 10 species accounted for 88.7% of the rockfish catch, down 0.9% from the previous quarter (89.6%) and up 3.7% from the same quarter in 1977 (85.0%).

Bocaccio was the most abundant rockfish accounting for 42.5% of the fish measured. This is a dramatic increase over the same quarter in 1977 when they represented only 18.0%. Likewise, it is also a significant increase over last quarter when they accounted for 25.2% of the rockfish caught. Bocaccio (Figures 1-3) taken this quarter averaged 37.4 cm in length while those taken during the fall of 1977 averaged 46.2 cm. The decrease in average size is attributable to the strong 1976 year class

represented by a mode at 25-35 cm. Fish taken the previous quarter were 1.9 cm shorter ( $\bar{x}$  length = 35.6 cm) than those measured this term.

Chilipepper landed this quarter averaged 36.6 cm in length (Figures 4-6) while those taken a year ago averaged 37.3 cm. Fish taken the previous quarter were smaller, averaging 33.6 cm in length. The average length for olive rockfish (Figures 7-9) was 29.1 cm, a decline of 1.4 cm from the previous quarter when they averaged 30.5 cm. Olive rockfish taken during the same quarter in 1977 were 0.7 cm shorter, averaging 28.4 cm in length. Data on blue rockfish (Figures 10-12) shows they were 3.1 cm longer ( $\bar{x}$  length = 27.9 cm) than those taken during the same quarter last year ( $\bar{x}$  length = 24.8 cm). However, there was a 0.4 cm decline in average size from the previous quarter when they averaged 28.3 cm in length. Squarespot rockfish taken this quarter averaged 22.6 cm in length (Figures 13-15) while greenspotted rockfish averaged 30.5 cm in length (Figures 16-18). No data are available from previous quarters for either species. Vermilion rockfish landed this quarter averaged 41.3 cm in length (Figures 19-21). No data are available on this species from previous quarters.

#### SURFACE GAMEFISHES

Three surface gamefishes were among the top 10 fishes measured this quarter. They accounted for 28.8 of the total catch while during the same quarter in 1977 they accounted for 26.0%. Increased catches of bonito (up 249%) are responsible for the 2.8% gain although it might have been larger if kelp bass catches had not dropped 33.0%.

Pacific mackerel landings continued to reflect the dominance of the 1976 year class (Figures 22-24) which is represented by a mode at 30-31 cm. The 1974 year class, which has dominated the fishery in the past, is now

noticeable as only a slight mode at 40-41 cm during October. There was a 3.2 cm decline in the average size of kelp bass (Figures 25-27) when comparing those taken this quarter ( $\bar{x}$  length = 27.5 cm) with the previous one ( $\bar{x}$  length = 30.7 cm). Likewise, there was a 5.5 cm decline in average length when looking at the same quarter last year ( $\bar{x}$  length = 33.0 cm). The decline in average length could possibly be attributed to increased catches of "shorts" or the number of legal fish available may have actually declined. Pacific bonito catches were dominated by the 1978 year class as evidenced by a mode at 42-45 cm (Figures 28-30). This is a continuation of a trend established during August. Barracuda, *Sphyræna argentea*, catches (Figures 31-33) were dominated by the 1976 year class (59-61 cm mode) during October and the 1975 year class (65-67 cm mode) during November. The average size of fish ( $\bar{x}$  length = 62.9 cm) declined 2.8 cm from the previous quarter ( $\bar{x}$  length = 65.7 cm) and 2.2 cm from the same quarter last year ( $\bar{x}$  length = 65.1 cm).

#### BAJA CALIFORNIA FISHERY

Yellowtail showed a marked decline in size ( $\bar{x}$  length = 76.2 cm) from the previous quarter when they averaged 81.7 cm in length (Figures 34-35). There was also a 0.7 cm decline from the same quarter in 1977 when the fish averaged 77.5 cm. The 1976 and 1974 year classes appear to be well represented as evidenced by modes at 60-61 cm and 75-77 cm. Unfortunately, the 1975 year class is absent as evidenced by the lack of a mode at 65-67 cm. Yellowfin tuna (Figures 36-38) sampled this quarter ( $\bar{x}$  length = 85.4 cm) averaged 20.3 cm longer than those taken the same quarter last year ( $\bar{x}$  length = 65.1 cm). They were 0.2 cm smaller than those taken last quarter ( $\bar{x}$  length = 85.6 cm). However, the highest average monthly mean length ever recorded ( $\bar{x}$  length = 104.2 cm) in the program was noted in December - the

results of excellent fishing on large individuals at the Revilla Gigedo Islands. Data on wahoo (Figures 39-41) shows the fish averaged 138.3 cm in length, 7.9 cm longer than for the same quarter last year ( $\bar{x}$  length = 130.4). Fish taken the previous quarter ( $\bar{x}$  length = 137.5 cm) were 0.8 cm shorter than those landed this quarter. Snowy grouper measured this period averaged 71.6 cm in length (Figures 42-44). No data are available from previous quarters for this species. Dolphinfish (Figures 45-47) taken this quarter averaged 85.9 cm, up 12.2 cm from the same period last year ( $\bar{x}$  length = 73.7 cm). No data are available from the previous quarter for comparison.

#### EFFORT AND CATCH-PER-UNIT-EFFORT

There was a steady decline in the number of anglers by month during the quarter (Table 4); a fact which was to be expected as winter approached. During December, the average number of passengers reached an all time low (Table 5) when the vessels sampled averaged only 19 anglers. Poor weather during this period was probably responsible for the low turnout. Angler success was high (3.29 fish/hr) during December so it is apparent that poor fishing was not the fault.

Catch-per-unit-effort increased substantially during the quarter with December representing an all time high. From October to December there was an 80% increase in the catch rate. Improved "rock" fishing was responsible for the increase although continued elevated catches of Pacific mackerel helped to keep the CPUE high.

#### REFERENCES

- Crooke, Stephen J. 1978. Southern California partyboat sampling study, quarterly report no. 10. Calif. Dept. Fish and Game, Mar. Res. Admin. Rept., 78-11:1-65.

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sampling study, quarterly report no. 13. Calif. Dept. Fish and Game,  
Mar. Res. Admin. Rept., 79-15:1-57.



TABLE 1. Number of Fishes Measured from Southern California Commercial Passenger Fishing Vessels, October Through December 1978.

| Common name            | Scientific name                    | Number measured | Common name              | Scientific name               | Number measured |
|------------------------|------------------------------------|-----------------|--------------------------|-------------------------------|-----------------|
| Sargo                  | <i>Anisotremus davidsonii</i>      | 2               | Rockfish, greenspotted   | <i>Sebastes chlorostictus</i> | 533             |
| Sablefish              | <i>Anoplopoma fimbria</i>          | 53              | Rockfish, black & yellow | <i>S. chrysogelas</i>         | 5               |
| Jacksmelt              | <i>Atherinopsis californiensis</i> | 20              | Rockfish, starry         | <i>S. constellatus</i>        | 301             |
| Seabass, white         | <i>Atractoscion nobilis</i>        | 14              | Rockfish, calico         | <i>S. dallii</i>              | 98              |
| Whitefish, ocean       | <i>Caulolatilus princeps</i>       | 311             | Rockfish, greenstriped   | <i>S. elongatus</i>           | 150             |
| Croaker, black         | <i>Cheilotrema saturnum</i>        | 7               | Rockfish, swordspine     | <i>S. ensifer</i>             | 22              |
| Blacksmith             | <i>Chromis punctipinnis</i>        | 13              | Rockfish, widow          | <i>S. entomelas</i>           | 63              |
| Sanddab, Pacific       | <i>Citharichthys sordidus</i>      | 87              | Rockfish, pink           | <i>S. eos</i>                 | 46              |
| Flyingfish, California | <i>Cypselurus californicus</i>     | 1               | Rockfish, yellowtail     | <i>S. flavidus</i>            | 26              |
| Surfperch, striped     | <i>Embiotoca lateralis</i>         | 1               | Rockfish, bronzespotted  | <i>S. gilli</i>               | 15              |
| Sole, petrale          | <i>Eopsetta jordani</i>            | 12              | Chillipepper             | <i>S. goodei</i>              | 2,216           |
| Hagfish, Pacific       | <i>Eptatretus stoutii</i>          | 1               | Rockfish, rosethorn      | <i>S. helvomaculatus</i>      | 4               |
| Skipjack               | <i>Euthymus pelamis</i>            | 62              | Rockfish, squarespot     | <i>S. hopkinsi</i>            | 535             |
| Croaker, white         | <i>Genyonemus lineatus</i>         | 246             | Rockfish, shortbelly     | <i>S. jordani</i>             | 1               |
| Kelpfish, giant        | <i>Heterostichus rostratus</i>     | 32              | Cowcod                   | <i>S. levis</i>               | 82              |
| Sole, bightmouth       | <i>Hippoglossina stomata</i>       | 3               | Rockfish, Mexican        | <i>S. macdonaldi</i>          | 21              |
| Ratfish                | <i>Hydrolagus colliei</i>          | 5               | Rockfish, vermilion      | <i>S. mystinus</i>            | 476             |
| Surfperch, silver      | <i>Hypporosopon ellipticum</i>     | 1               | Rockfish, blue           | <i>S. ovals</i>               | 1,033           |
| Sole, rock             | <i>Lepidopsetta bilineata</i>      | 1               | Rockfish, speckled       | <i>S. paucispinis</i>         | 344             |
| Halfmoon               | <i>Medialuna californiensis</i>    | 218             | Bocaccio                 | <i>S. pinniger</i>            | 6,305           |
| Hake, Pacific          | <i>Merluccius productus</i>        | 11              | Rockfish, canary         | <i>S. rastrelliger</i>        | 42              |
| Smoothhound, grey      | <i>Mustelus californicus</i>       | 11              | Rockfish, grass          | <i>S. rosaceus</i>            | 36              |
| Lingcod                | <i>Ophiodon elongatus</i>          | 103             | Rockfish, rosy           | <i>S. rosenblatti</i>         | 195             |
| Senorita               | <i>Oxyjulis californica</i>        | 14              | Rockfish, greenblotched  | <i>S. ruberrimus</i>          | 98              |
| Bass, kelp             | <i>Paralabrax clathratus</i>       | 1,884           | Rockfish, yelloweye      | <i>S. rubrivinctus</i>        | 1               |
| Bass, spotted sand     | <i>P. maculatofasciatus</i>        | 19              | Rockfish, flag           | <i>S. rufus</i>               | 242             |
| Bass, barred sand      | <i>P. nebulifer</i>                | 414             | Rockfish, bank           | <i>S. semicinctus</i>         | 97              |
| Bass, California       | <i>Paralichthys californicus</i>   | 230             | Rockfish, halfbanded     | <i>S. serranoides</i>         | 10              |
| Halibut, California    | <i>Parophrys vetulus</i>           | 1               | Rockfish, olive          | <i>S. serriceps</i>           | 1,036           |
| Sole, English          | <i>Phanerodon atripes</i>          | 1               | Treefish                 | <i>S. umbrosus</i>            | 57              |
| Surfperch, sharpnose   | <i>P. furcatus</i>                 | 2               | Rockfish, honeycomb      | <i>Semicossyphus pulcher</i>  | 151             |
| Surfperch, white       | <i>Forichthys notatus</i>          | 1               | Sheephead, California    | <i>Seriola lalandi</i>        | 129             |
| Midshipman, plainfin   | <i>Rhinobatos productus</i>        | 3               | Yellowtail               | <i>Seriphus politus</i>       | 17              |
| Guitarfish, shovelnose | <i>Sarda chiliensis</i>            | 1,451           | Queenfish                | <i>Sphyrna argentea</i>       | 105             |
| Bonito, Pacific        | <i>Sardinops sagax caeruleus</i>   | 2               | Barracuda, California    | <i>Squalus acanthias</i>      | 245             |
| Sardine, Pacific       | <i>Scorpaen japonicus</i>          | 4,034           | Dogfish, spiny           | <i>Stereolepis gigas</i>      | 20              |
| Mackerel, Pacific      | <i>Scorpaena guttata</i>           | 239             | Sea bass, giant          | <i>Synodus lucioceps</i>      | 5               |
| Sculpin                | <i>Scorpaenichthys marmoratus</i>  | 14              | Lizardfish, California   | <i>Thunnus alalunga</i>       | 126             |
| Cabazon                | <i>Sebastes atrovirens</i>         | 48              | Albacore                 | <i>T. albacares</i>           | 32              |
| Rockfish, kelp         | <i>S. articulatus</i>              | 38              | Tuna, yellowfin          | <i>Trachurus symmetricus</i>  | 152             |
| Rockfish, brown        | <i>S. babcocki</i>                 | 2               | Mackerel, jack           | <i>Umbrina roncadore</i>      | 336             |
| Rockfish, redbanded    | <i>S. brevispinis</i>              | 2               | Croaker, yellowfin       |                               | 17              |
| Rockfish, silvergrey   | <i>S. carinatus</i>                | 2               | TOTAL                    |                               | 25,571          |
| Rockfish, gopher       | <i>S. caurinus</i>                 | 118             |                          |                               |                 |
| Rockfish, copper       |                                    | 385             |                          |                               |                 |

TABLE 2. Number of Fishes Measured from Long-Range Commercial Passenger Fishing Vessels, October Through December 1978.

| Common name         | Scientific name                | Number measured |
|---------------------|--------------------------------|-----------------|
| Wahoo               | <i>Acanthocybium solanderi</i> | 199             |
| Sea bass, white     | <i>Atractoscion nobilis</i>    | 4               |
| Jack, socorro       | <i>Carangoides jordani</i>     | 1               |
| Jack, black         | <i>Caranx lugubris</i>         | 6               |
| Hawkfish            | <i>Cirrhitte rivulatus</i>     | 3               |
| Dolphinfish, common | <i>Coryphaena hippurus</i>     | 151             |
| Runner, rainbow     | <i>Elagatis bipinnulata</i>    | 5               |
| Cabrilla, spotted   | <i>Epinephelus analogus</i>    | 13              |
| Grouper, snowy      | <i>E. niveatus</i>             | 152             |
| Cabrilla, flag      | <i>E. labriformis</i>          | 4               |
| Tuna, skipjack      | <i>Euthynnus pelamis</i>       | 15              |
| Dorade              | <i>Gnathanodon speciosus</i>   | 1               |
| Snapper             | <i>Lutjanus peru</i>           | 6               |
| Grouper, gulf       | <i>Mycteroperca jordani</i>    | 1               |
| Sierra              | <i>Scomberomorus sierra</i>    | 3               |
| Amberjack, Pacific  | <i>Seriola colburni</i>        | 10              |
| Yellowtail          | <i>S. lalandi</i>              | 353             |
| Sea bass, giant     | <i>Stereolepis gigas</i>       | 44              |
| Marlin, striped     | <i>Tetrapturus audax</i>       | 1               |
| Tuna, yellowfin     | <i>Thunnus albacares</i>       | 253             |
|                     | TOTAL                          | <u>1,225</u>    |

TABLE 3. Species Composition of the Rockfish (*Sebastes* spp.) Catch from Partyboat Samples, October through December 1978.

| Common name    | Scientific name             | Frequency of occurrence (%) |
|----------------|-----------------------------|-----------------------------|
| Bocaccio       | <i>Sebastes paucispinis</i> | 42.5                        |
| Chilipepper    | <i>S. goodei</i>            | 14.9                        |
| Olive          | <i>S. serranoides</i>       | 7.0                         |
| Blue           | <i>S. mystinus</i>          | 7.0                         |
| Squarespot     | <i>S. hopkinsi</i>          | 3.6                         |
| Greenspotted   | <i>S. chlorostictus</i>     | 3.6                         |
| Vermillion     | <i>S. miniatus</i>          | 3.2                         |
| Copper         | <i>S. caurinus</i>          | 2.6                         |
| Speckled       | <i>S. ovalis</i>            | 2.3                         |
| Starry         | <i>S. constellatus</i>      | 2.0                         |
| Flag           | <i>S. rubrivinctus</i>      | 1.6                         |
| Rosy           | <i>S. rosaceus</i>          | 1.3                         |
| Honeycomb      | <i>S. umbrosus</i>          | 1.0                         |
| Greenstriped   | <i>S. elongatus</i>         | 1.0                         |
| Gopher         | <i>S. carnatus</i>          | 0.8                         |
| Calico         | <i>S. dallii</i>            | 0.7                         |
| Greenblotched  | <i>S. rosenblatti</i>       | 0.7                         |
| Bank           | <i>S. rufus</i>             | 0.7                         |
| Cowcod         | <i>S. levis</i>             | 0.6                         |
| Widow          | <i>S. entomelas</i>         | 0.4                         |
| Treefish       | <i>S. serriceps</i>         | 0.4                         |
| Kelp           | <i>S. atrovirens</i>        | 0.3                         |
| Pink           | <i>S. eos</i>               | 0.3                         |
| Canary         | <i>S. pinniger</i>          | 0.3                         |
| Brown          | <i>S. auriculatus</i>       | 0.3                         |
| Grass          | <i>S. rastrelliger</i>      | 0.2                         |
| Yellowtail     | <i>S. flavidus</i>          | 0.2                         |
| Swordspine     | <i>S. ensifer</i>           | 0.1                         |
| Mexican        | <i>S. macdonaldi</i>        | 0.1                         |
| Bronzespotted  | <i>S. gilli</i>             | 0.1                         |
| Halfbanded     | <i>S. semicinctus</i>       | 0.1                         |
| Black & Yellow | <i>S. chrysomelas</i>       | <0.1                        |
| Rosethorn      | <i>S. helvomaculatus</i>    | <0.1                        |
| Redbanded      | <i>S. babcocki</i>          | <0.1                        |
| Silvergrey     | <i>S. brevispinis</i>       | <0.1                        |
| Shortbelly     | <i>S. jordani</i>           | <0.1                        |
| Yelloweye      | <i>S. ruberrimus</i>        | <0.1                        |

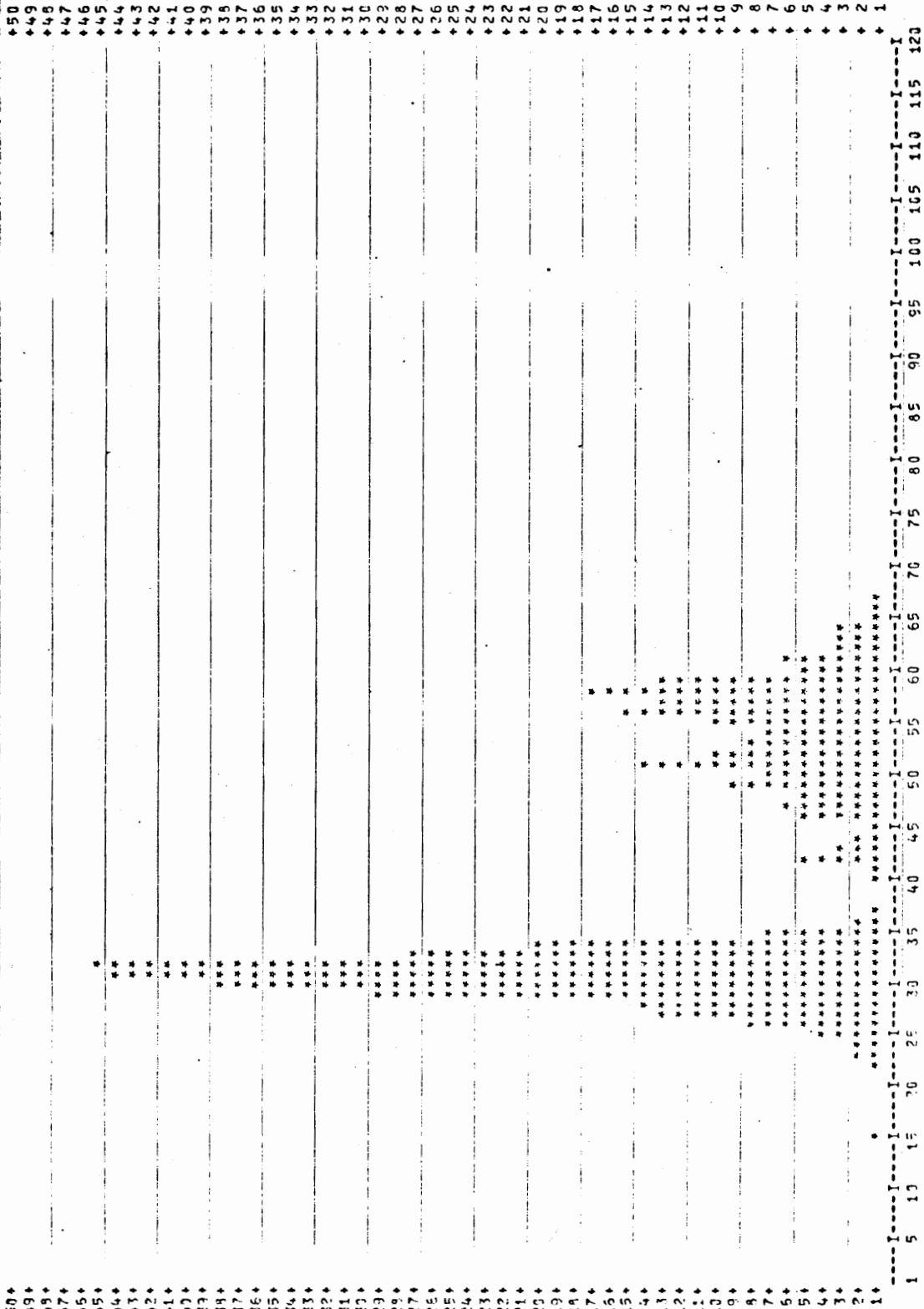
TABLE 4. Effort and Catch Per-Unit-Effort Values Determined from Commercial Passenger Fishing Vessel Samples for Each Port Complex and Month, January through December 1978.

| Port complex | No. trips/month                    |       |       |       |       |       |       |       |       |       |       |       |
|--------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|              | Jan                                | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |
| 1            | 8                                  | 10    | 12    | 4     | 4     | 14    | 21    | 24    | 16    | 8     | 7     | 4     |
| 2            | 5                                  | 5     | 6     | 2     | 6     | 10    | 9     | 8     | 8     | 6     | 7     | 7     |
| 3            | 2                                  | 6     | 6     | 3     | 4     | 8     | 7     | 3     | 3     | 2     | 4     | 2     |
| 4            | 6                                  | 10    | 6     | 9     | 9     | 9     | 13    | 7     | 6     | 10    | 7     | 6     |
| 5            | 9                                  | 9     | 8     | 10    | 9     | 15    | 7     | 12    | 8     | 12    | 12    | 13    |
| 6            | 11                                 | 10    | 12    | 11    | 9     | 12    | 11    | 13    | 9     | 6     | 9     | 10    |
|              | 41                                 | 50    | 50    | 39    | 41    | 68    | 68    | 67    | 50    | 44    | 46    | 42    |
| TOTAL        |                                    |       |       |       |       |       |       |       |       |       |       |       |
|              | Avg. no. anglers/trip              |       |       |       |       |       |       |       |       |       |       |       |
| 1            | 22.87                              | 20.50 | 22.25 | 16.50 | 32.75 | 26.79 | 32.90 | 40.12 | 31.19 | 30.25 | 16.86 | 22.75 |
| 2            | 16.60                              | 28.40 | 24.67 | 28.00 | 32.17 | 28.80 | 34.40 | 35.87 | 31.50 | 14.50 | 17.43 | 18.86 |
| 3            | 23.00                              | 20.50 | 28.83 | 13.33 | 25.00 | 34.25 | 32.29 | 37.00 | 25.33 | 12.50 | 24.00 | 17.00 |
| 4            | 24.83                              | 28.90 | 30.67 | 33.44 | 44.67 | 37.11 | 35.08 | 40.71 | 38.00 | 25.40 | 24.86 | 21.17 |
| 5            | 25.78                              | 30.44 | 30.50 | 22.70 | 29.22 | 22.60 | 33.14 | 34.08 | 27.87 | 22.08 | 19.42 | 17.69 |
| 6            | 24.45                              | 22.30 | 20.33 | 27.82 | 33.33 | 28.25 | 27.18 | 31.23 | 24.78 | 25.83 | 23.89 | 23.00 |
|              | 23.00                              | 25.00 | 25.00 | 25.00 | 33.00 | 29.00 | 32.00 | 36.00 | 30.00 | 23.00 | 20.00 | 19.00 |
| Average      |                                    |       |       |       |       |       |       |       |       |       |       |       |
|              | No. fish caught/angler hour fished |       |       |       |       |       |       |       |       |       |       |       |
| 1            | 1.74                               | 2.00  | 1.69  | 1.68  | 3.28  | 1.74  | 0.94  | 0.79  | 0.92  | 1.39  | 2.62  | 3.05  |
| 2            | 2.74                               | 2.53  | 0.79  | 2.64  | 1.48  | 1.44  | 1.99  | 2.79  | 2.98  | 4.82  | 4.11  | 2.52  |
| 3            | 1.26                               | 1.43  | 0.83  | 1.31  | 1.78  | 1.95  | 1.61  | 1.54  | 1.42  | 5.13  | 2.00  | 1.70  |
| 4            | 2.56                               | 2.68  | 2.23  | 1.70  | 1.18  | 1.64  | 1.62  | 1.87  | 2.37  | 1.18  | 2.55  | 4.94  |
| 5            | 2.90                               | 2.64  | 1.66  | 1.25  | 1.88  | 2.10  | 1.49  | 1.51  | 1.75  | 2.35  | 2.74  | 2.86  |
| 6            | 1.78                               | 2.00  | 2.66  | 2.55  | 2.33  | 1.15  | 1.42  | 1.49  | 1.39  | 2.29  | 2.50  | 3.66  |
|              | 2.20                               | 2.25  | 1.76  | 1.85  | 1.79  | 1.63  | 1.41  | 1.38  | 1.61  | 1.82  | 2.72  | 3.29  |
| Average      |                                    |       |       |       |       |       |       |       |       |       |       |       |

TABLE 5. Effort and Catch per-Unit-Effort Values Determined from Commercial Passenger Fishing Vessel Samples for Each Port Complex and Month, January 1976 Through December 1977.

|                                    |  | 1976           |       |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------|--|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                    |  | Port complex   | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |
| No. trips/month                    |  | 1              | 7     | 8     | 8     | 10    | 10    | 11    | 0     | 4     | 12    | 8     | 14    | 11    |
|                                    |  | 2              | 7     | 5     | 7     | 7     | 10    | 9     | 5     | 7     | 5     | 2     | 4     | 6     |
|                                    |  | 3              | 3     | 2     | 2     | 2     | 3     | 4     | 3     | 2     | 2     | 4     | 6     | 4     |
|                                    |  | 4              | 7     | 5     | 6     | 9     | 10    | 8     | 13    | 9     | 8     | 9     | 7     | 8     |
|                                    |  | 5              | 11    | 16    | 12    | 11    | 9     | 8     | 12    | 13    | 6     | 7     | 14    | 12    |
|                                    |  | 6              | 10    | 11    | 12    | 9     | 9     | 8     | 10    | 16    | 10    | 13    | 15    | 15    |
|                                    |  | <b>TOTAL</b>   |       | 45    | 47    | 47    | 48    | 51    | 48    | 43    | 51    | 43    | 43    | 60    |
| Avg. no. anglers/trip              |  | 1              | 29.71 | 19.25 | 28.63 | 20.50 | 48.10 | 44.55 | -     | 46.00 | 28.66 | 23.88 | 15.64 | 18.30 |
|                                    |  | 2              | 26.57 | 23.00 | 20.57 | 21.57 | 30.20 | 36.89 | 51.20 | 45.71 | 29.60 | 21.50 | 18.50 | 19.70 |
|                                    |  | 3              | 22.33 | 22.00 | 11.50 | 23.00 | 21.67 | 45.50 | 44.33 | 36.50 | 38.50 | 19.50 | 33.17 | 23.30 |
|                                    |  | 4              | 30.57 | 29.00 | 26.17 | 25.33 | 26.20 | 39.38 | 43.23 | 49.11 | 30.75 | 27.20 | 25.28 | 27.50 |
|                                    |  | 5              | 22.00 | 23.44 | 29.58 | 29.00 | 31.56 | 35.38 | 39.67 | 39.92 | 25.83 | 23.70 | 24.21 | 21.90 |
|                                    |  | 6              | 16.40 | 25.64 | 23.83 | 22.89 | 26.22 | 27.13 | 43.30 | 38.44 | 24.00 | 21.46 | 18.00 | 19.60 |
|                                    |  | <b>Average</b> |       | 24.91 | 23.32 | 23.38 | 24.06 | 31.96 | 37.90 | 43.26 | 42.22 | 28.14 | 23.30 | 21.30 |
| No. fish caught/angler hour fished |  | 1              | 1.20  | 1.36  | 1.20  | 0.95  | 1.28  | 2.07  | -     | 0.40  | 0.70  | 1.14  | 2.45  | 2.21  |
|                                    |  | 2              | 1.47  | 1.16  | 1.16  | 0.73  | 0.92  | 1.13  | 0.92  | 0.44  | 0.39  | 1.21  | 2.09  | 1.66  |
|                                    |  | 3              | 1.25  | 0.50  | 2.16  | 1.47  | 0.67  | 0.70  | 0.43  | 0.55  | 0.55  | 0.89  | 1.61  | 1.00  |
|                                    |  | 4              | 1.87  | 1.77  | 1.48  | 1.67  | 0.80  | 0.94  | 0.76  | 0.80  | 1.18  | 2.07  | 2.19  | 2.19  |
|                                    |  | 5              | 3.28  | 2.77  | 2.51  | 1.97  | 1.47  | 0.74  | 0.69  | 1.05  | 1.09  | 1.00  | 1.66  | 2.54  |
|                                    |  | 6              | 3.55  | 1.80  | 1.92  | 1.41  | 2.33  | 1.03  | 0.58  | 0.87  | 1.43  | 1.96  | 3.19  | 2.92  |
|                                    |  | <b>Average</b> |       | 2.15  | 1.69  | 1.74  | 1.42  | 1.23  | 1.13  | 0.70  | 0.77  | 0.96  | 1.62  | 2.24  |
|                                    |  | 1977           |       |       |       |       |       |       |       |       |       |       |       |       |
|                                    |  | Port complex   | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |
| No. trips/month                    |  | 1              | 1     | 3     | 7     | 10    | 8     | 10    | 12    | 9     | 8     | 9     | 8     | 5     |
|                                    |  | 2              | 6     | 2     | 2     | 2     | 3     | 5     | 9     | 11    | 12    | 7     | 7     | 6     |
|                                    |  | 3              | 4     | 3     | 2     | 2     | 3     | 5     | 5     | 5     | 4     | 5     | 4     | 3     |
|                                    |  | 4              | 7     | 4     | 4     | 7     | 12    | 10    | 11    | 13    | 11    | 12    | 13    | 10    |
|                                    |  | 5              | 10    | 5     | 8     | 7     | 8     | 6     | 9     | 12    | 16    | 13    | 16    | 9     |
|                                    |  | 6              | 14    | 11    | 7     | 10    | 7     | 10    | 10    | 11    | 16    | 14    | 13    | 12    |
|                                    |  | <b>TOTAL</b>   |       | 42    | 28    | 30    | 38    | 41    | 46    | 56    | 61    | 67    | 60    | 61    |
| Avg. no. anglers/trip              |  | 1              | 17.00 | 56.00 | 24.00 | 30.30 | 18.62 | 27.70 | 42.58 | 50.00 | 36.87 | 17.44 | 23.00 | 17.60 |
|                                    |  | 2              | 18.33 | 32.50 | 23.00 | 24.00 | 19.67 | 30.40 | 40.78 | 40.55 | 22.00 | 27.29 | 21.57 | 28.67 |
|                                    |  | 3              | 25.75 | 27.67 | 22.00 | 15.00 | 27.33 | 35.20 | 36.20 | 32.80 | 23.50 | 21.60 | 32.50 | 20.00 |
|                                    |  | 4              | 28.57 | 32.50 | 24.00 | 33.00 | 31.17 | 42.80 | 41.27 | 29.54 | 28.27 | 23.58 | 35.08 | 27.90 |
|                                    |  | 5              | 21.60 | 36.00 | 22.87 | 33.29 | 17.50 | 20.50 | 28.00 | 24.50 | 22.75 | 21.08 | 18.94 | 18.00 |
|                                    |  | 6              | 19.00 | 30.45 | 26.14 | 25.50 | 23.14 | 12.30 | 31.20 | 41.82 | 22.75 | 14.40 | 18.62 | 13.50 |
|                                    |  | <b>Average</b> |       | 21.00 | 34.00 | 22.00 | 28.00 | 23.00 | 32.00 | 37.00 | 36.00 | 26.00 | 20.00 | 24.00 |
| No. fish caught/angler hour fished |  | 1              | 1.85  | 1.35  | 0.89  | 0.98  | 1.29  | 0.98  | 1.10  | 0.98  | 1.30  | 1.61  | 2.41  | 2.82  |
|                                    |  | 2              | 1.11  | 0.48  | 1.77  | 0.22  | 0.96  | 2.18  | 0.87  | 1.02  | 1.13  | 0.89  | 1.48  | 1.45  |
|                                    |  | 3              | 1.03  | 0.66  | 1.86  | 0.60  | 1.00  | 1.20  | 0.62  | 1.29  | 1.06  | 2.07  | 1.98  | 1.33  |
|                                    |  | 4              | 2.95  | 2.30  | 1.19  | 1.55  | 1.70  | 1.60  | 1.11  | 1.50  | 1.58  | 2.22  | 1.48  | 2.77  |
|                                    |  | 5              | 2.40  | 0.88  | 2.30  | 1.07  | 0.47  | 1.00  | 0.96  | 1.74  | 1.70  | 2.24  | 1.82  | 1.78  |
|                                    |  | 6              | 4.04  | 1.54  | 1.11  | 1.64  | 1.05  | 0.59  | 1.29  | 1.40  | 2.36  | 2.50  | 2.34  | 2.05  |
|                                    |  | <b>Average</b> |       | 2.61  | 1.29  | 1.44  | 1.21  | 1.21  | 1.25  | 1.04  | 1.30  | 1.63  | 1.98  | 1.83  |

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 2



LENGTH HISTOGRAM FOR BOCCACCIO (SEBASTES PAUCISPINIS)  
DURING OCTOBER 1978.  
TOTAL NO. = 846 MEAN = 40.060 STANDARD DEVIATION = 12.143

FIGURE 1. Length frequencies of bocaccio for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 7

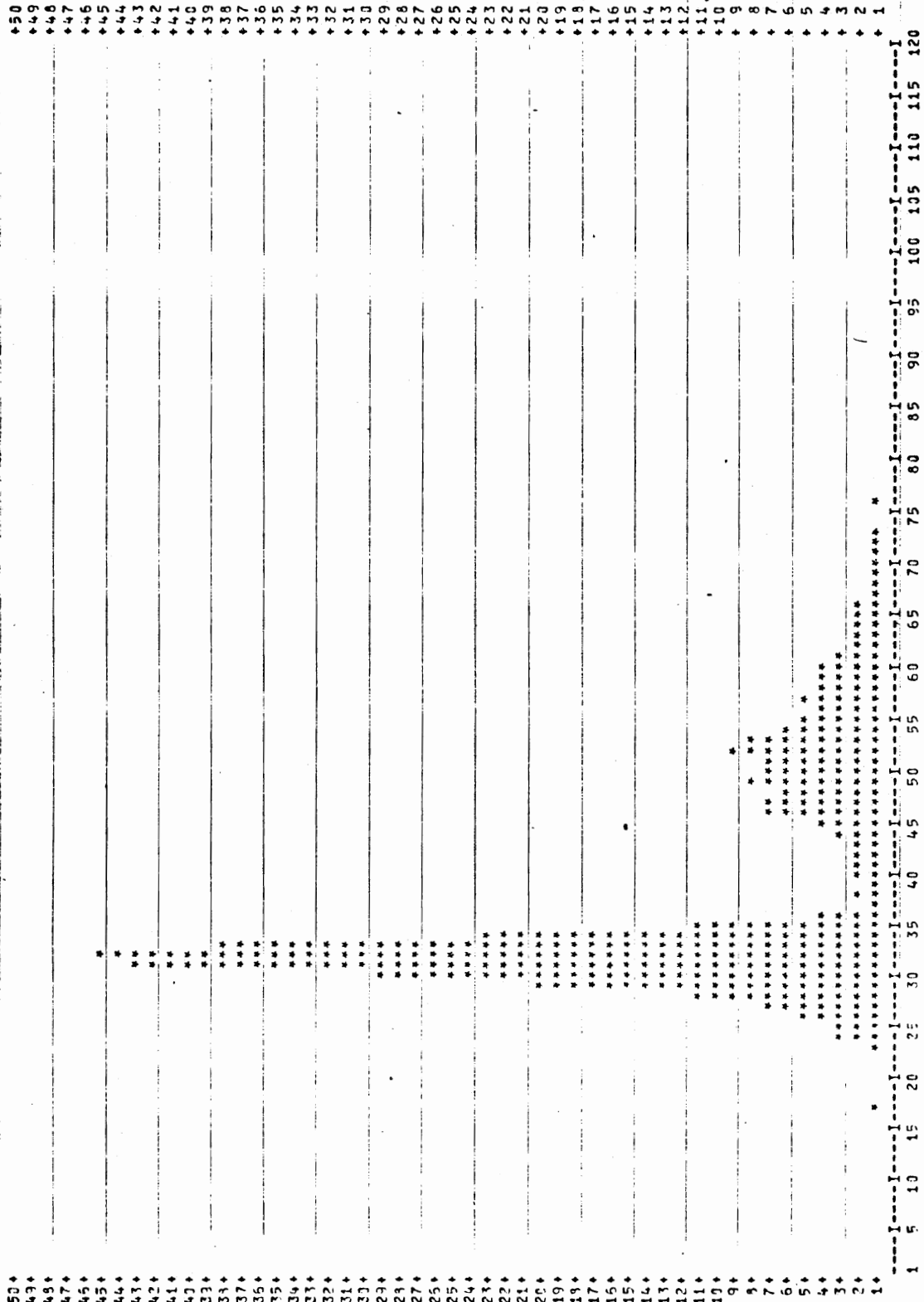
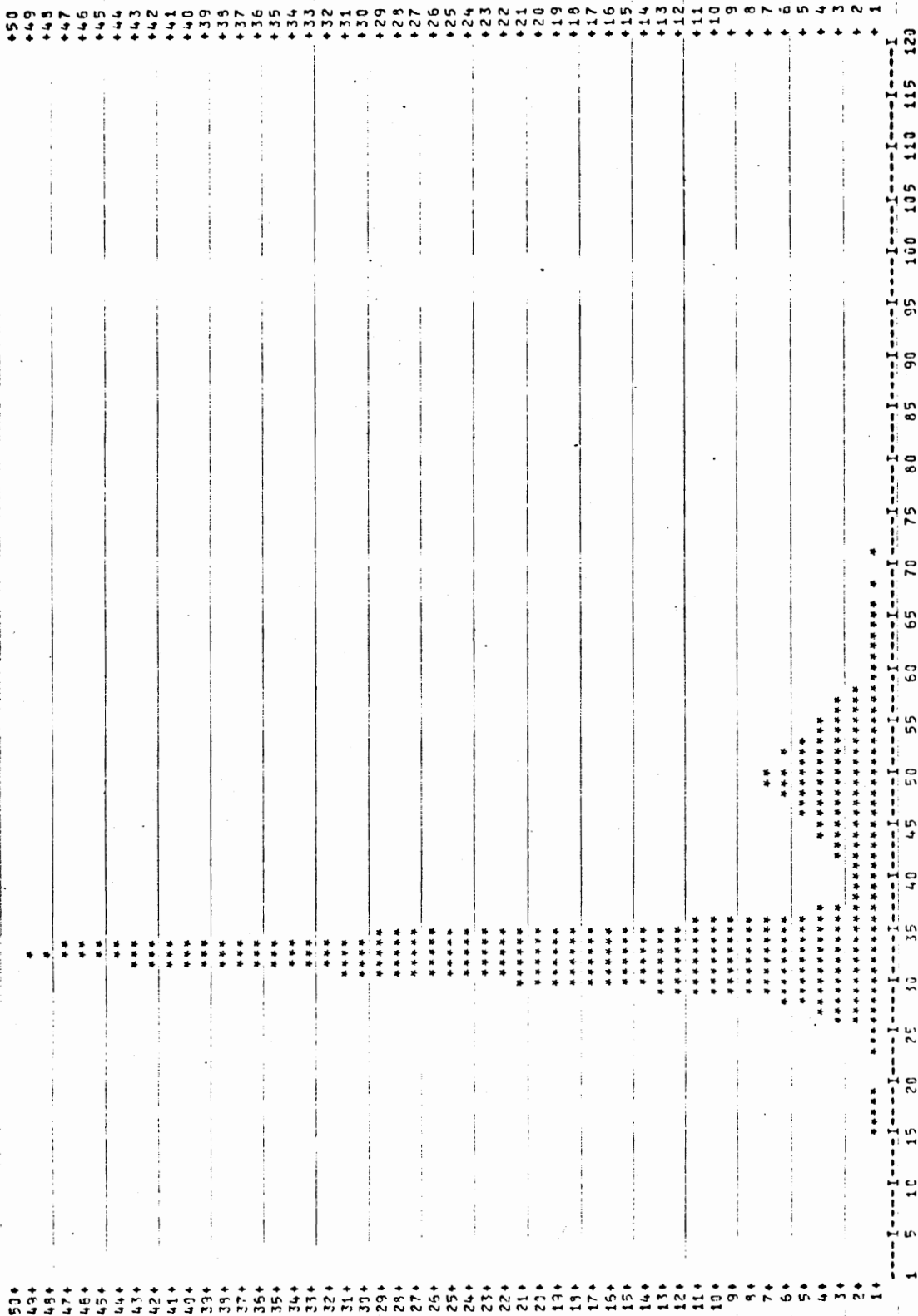


FIGURE 2. Length frequencies of bocaccio for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 9

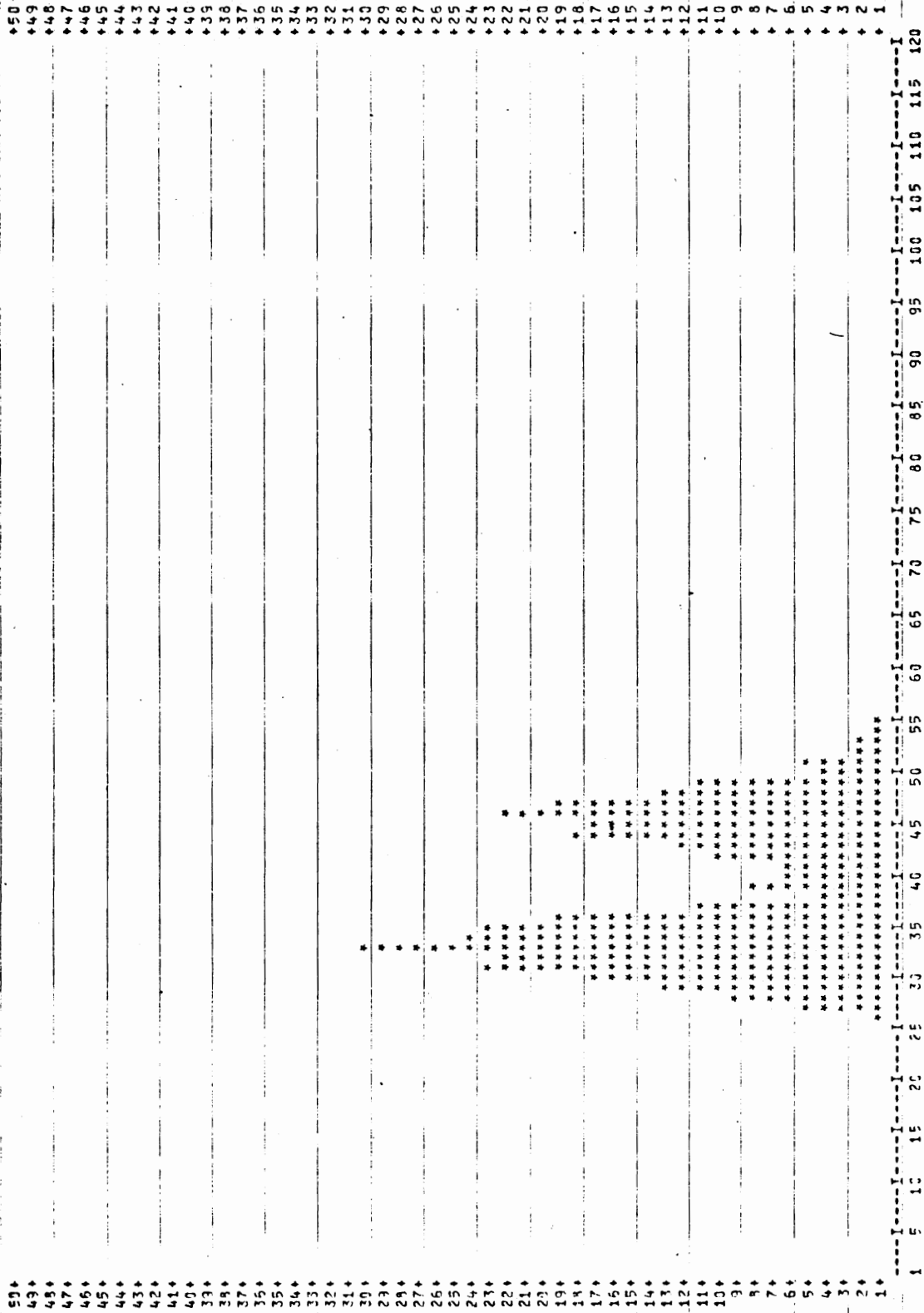


LENGTH HISTOGRAM FOR BOCACCIO (SEBASTES PAUCISPINIS)  
DURING DECEMBER 1978.  
TOTAL NO. = 3033 MEAN = 36.379 STANDARD DEVIATION = 11.006

FIGURE 3. Length frequencies of bocaccio for December 1978.  
Total No. Quarter 6,305 Mean Length Quarter 37.440 cm



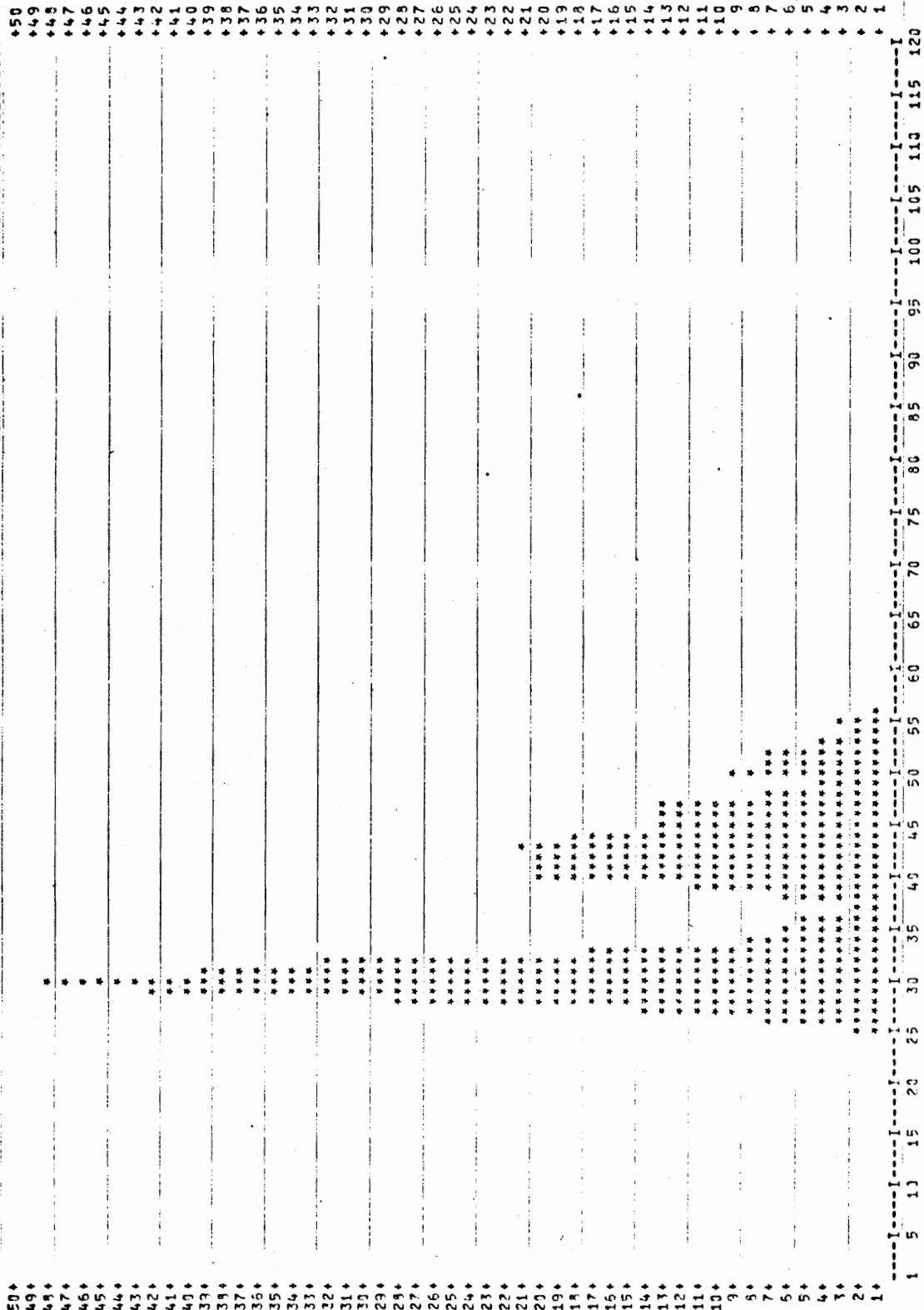
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 2



LENGTH HISTOGRAM FOR CHILPEPPER (SEBASTIS GOODEI)  
CUPING CATCHED 1979.  
TOTAL NO. = 699 MEAN = 38.276 STANDARD DEVIATION = 6.945

FIGURE 4. Length frequencies of chilipepper for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 2



LENGTH HISTOGRAM FOR CHILIFEPPER (SEBASTES GOGOEI)  
DURING NOVEMBER 1978.  
TOTAL NO. = 879 MEAN = 36.451 STANDARD DEVIATION = 7.691

FIGURE 5. Length frequencies of chilipepper for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 2

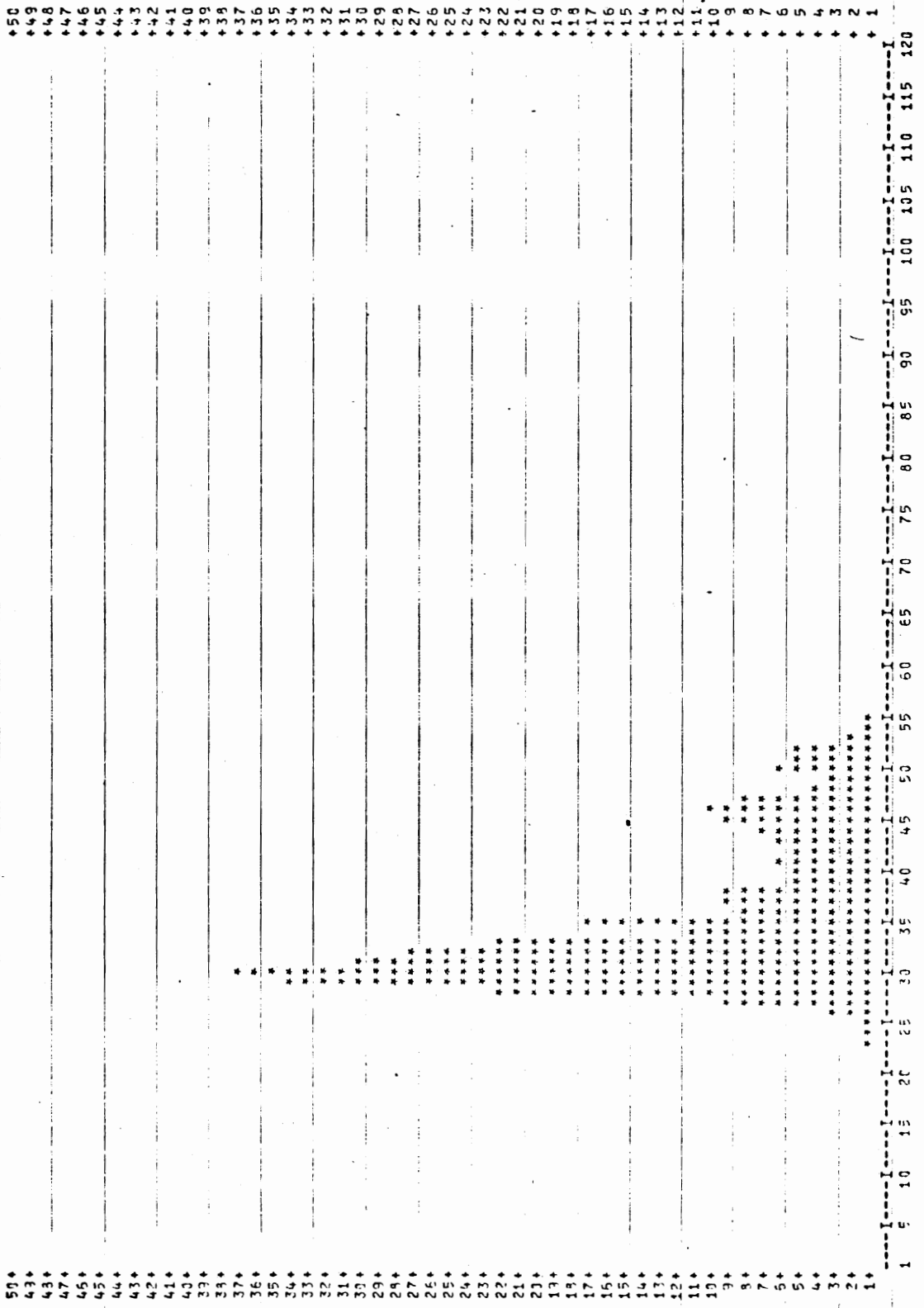
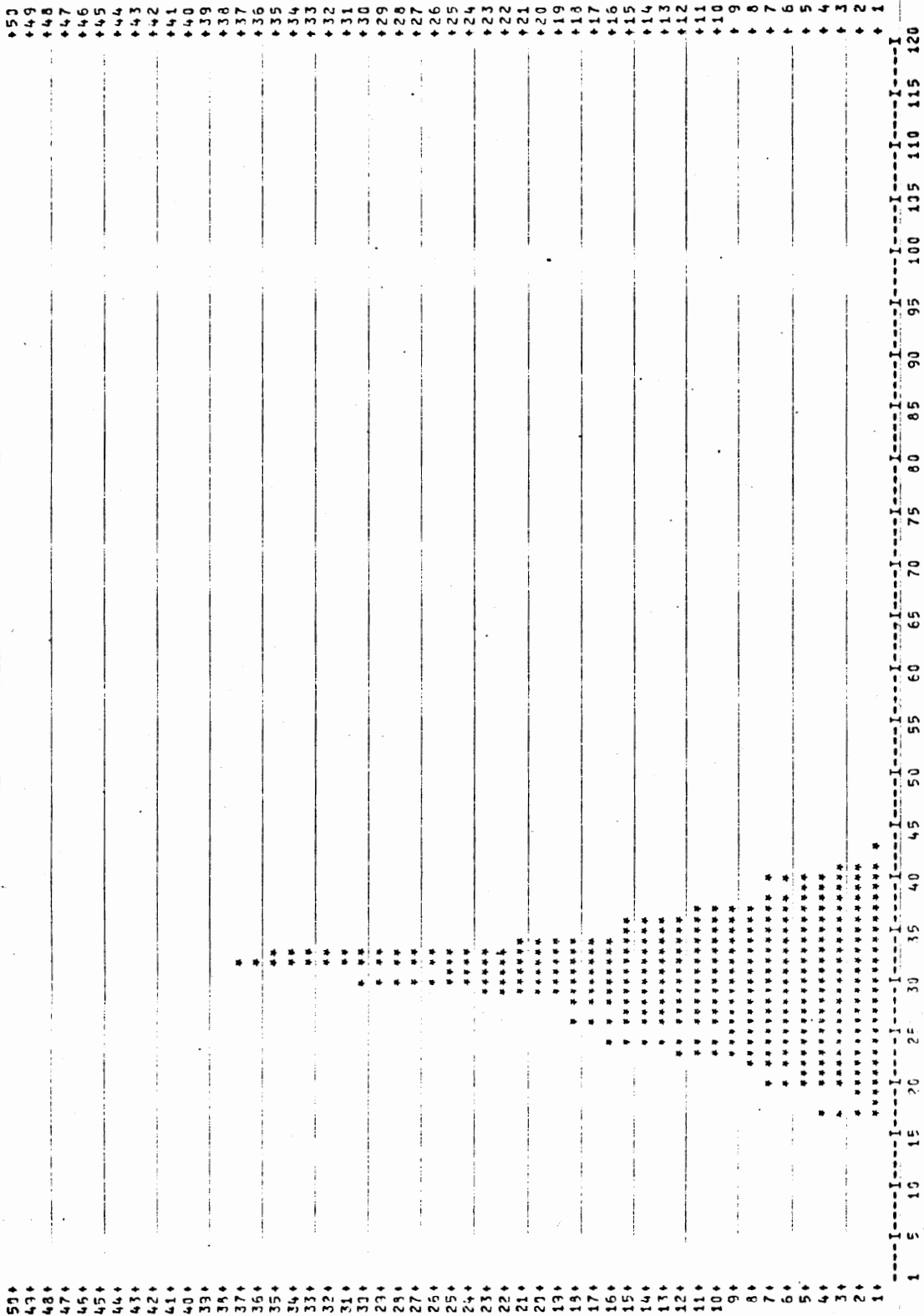


FIGURE 6. Length frequencies of chilipepper for December 1978.  
 Total No. Quarter 2,216 Mean Length Quarter 36.614 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR OLIVE ROCKFISH (SERASTES SERRANOIDES)  
DURING OCTOBER 1978.  
TOTAL NO. = 350 MEAN = 30.231 STANDARD DEVIATION = 5.051

FIGURE 7. Length frequencies of olive rockfish for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

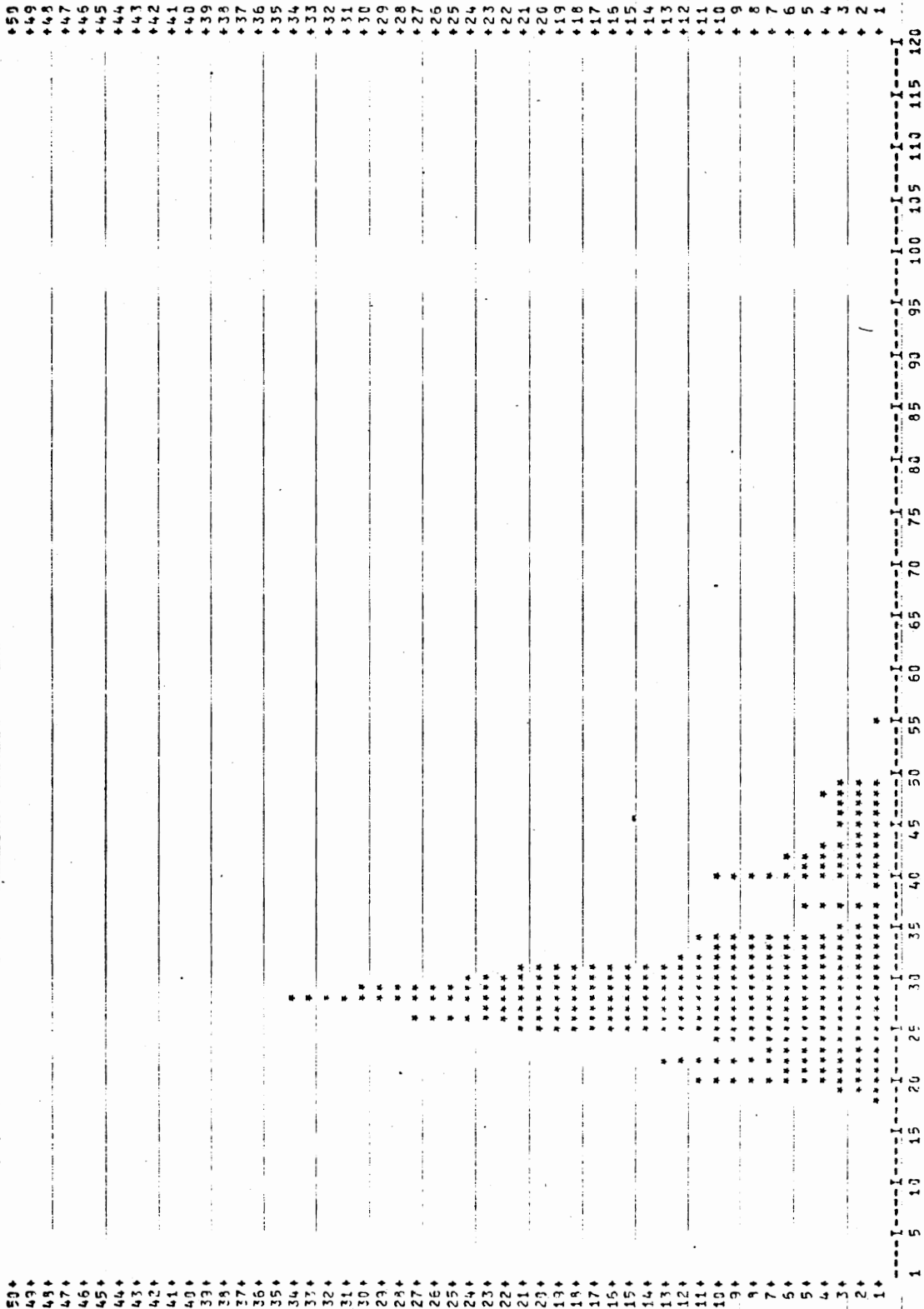
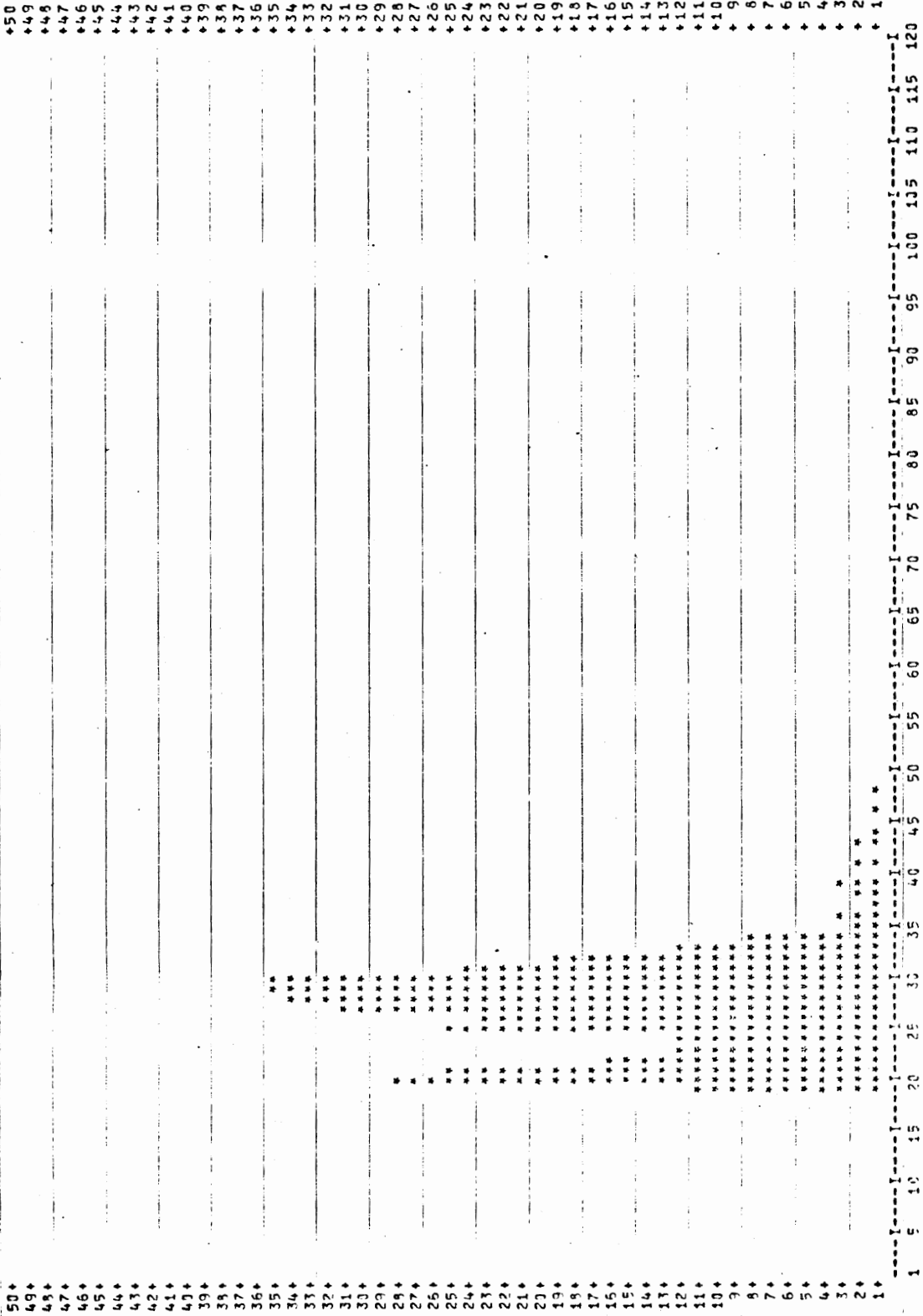


FIGURE 8. Length frequencies of olive rockfish for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

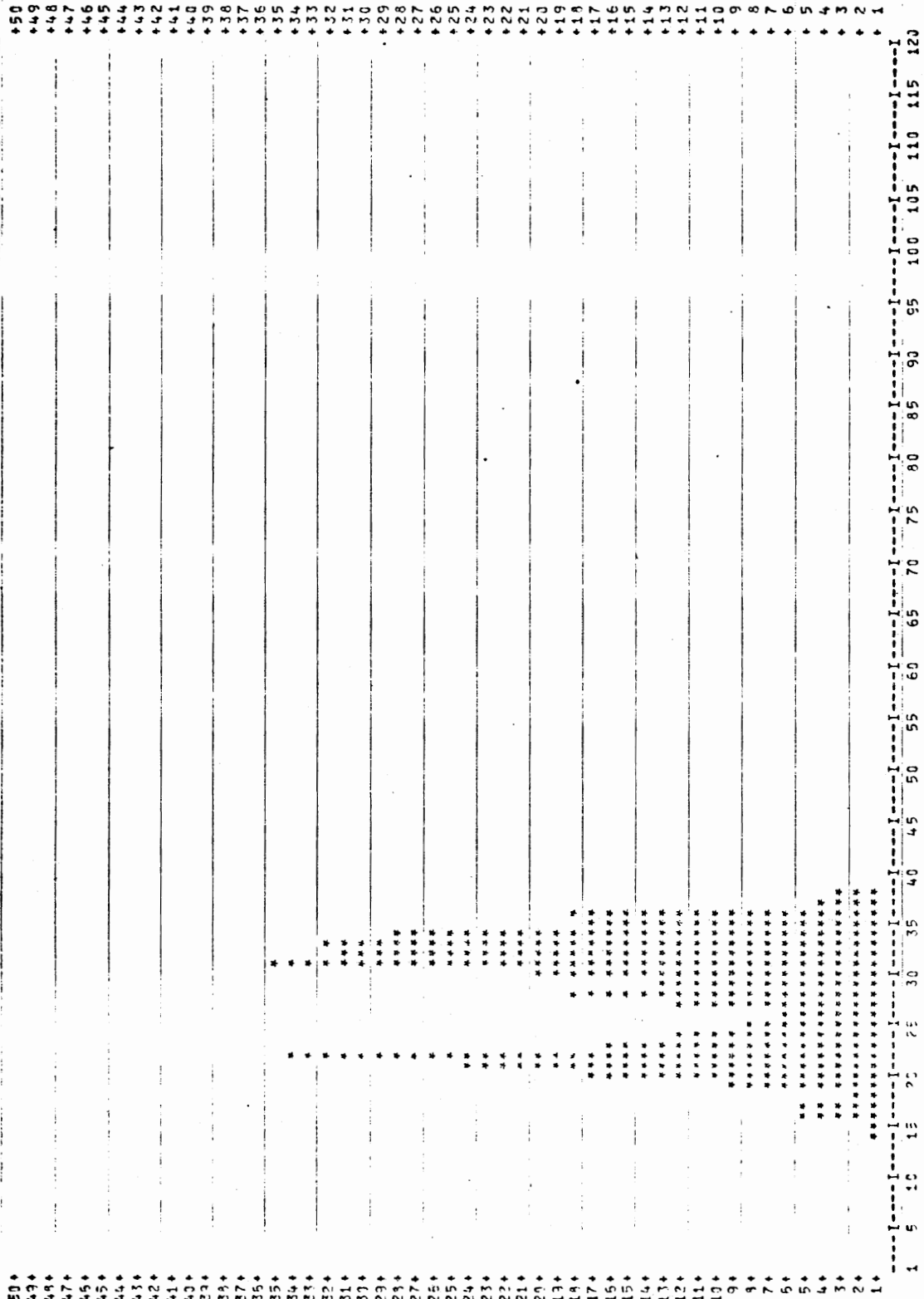


LENGTH HISTOGRAM FOR OLIVE ROCKFISH (SEBASTES SERRANOIDES)  
DURING DECEMBER 1978.

TOTAL NO. = 368 MEAN = 27.231 STANDARD DEVIATION = 4.970

FIGURE 9. Length frequencies of olive rockfish for December 1978.  
Total No. Quarter 1,036 Mean Length Quarter 29.082 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR BLUE ROCKFISH (SEBASTES MYSTINUS)  
DURING OCTOBER 1978.  
TOTAL NO. = 371 MEAN = 28.032 STANDARD DEVIATION = 5.717

FIGURE 10. Length frequencies of blue rockfish for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

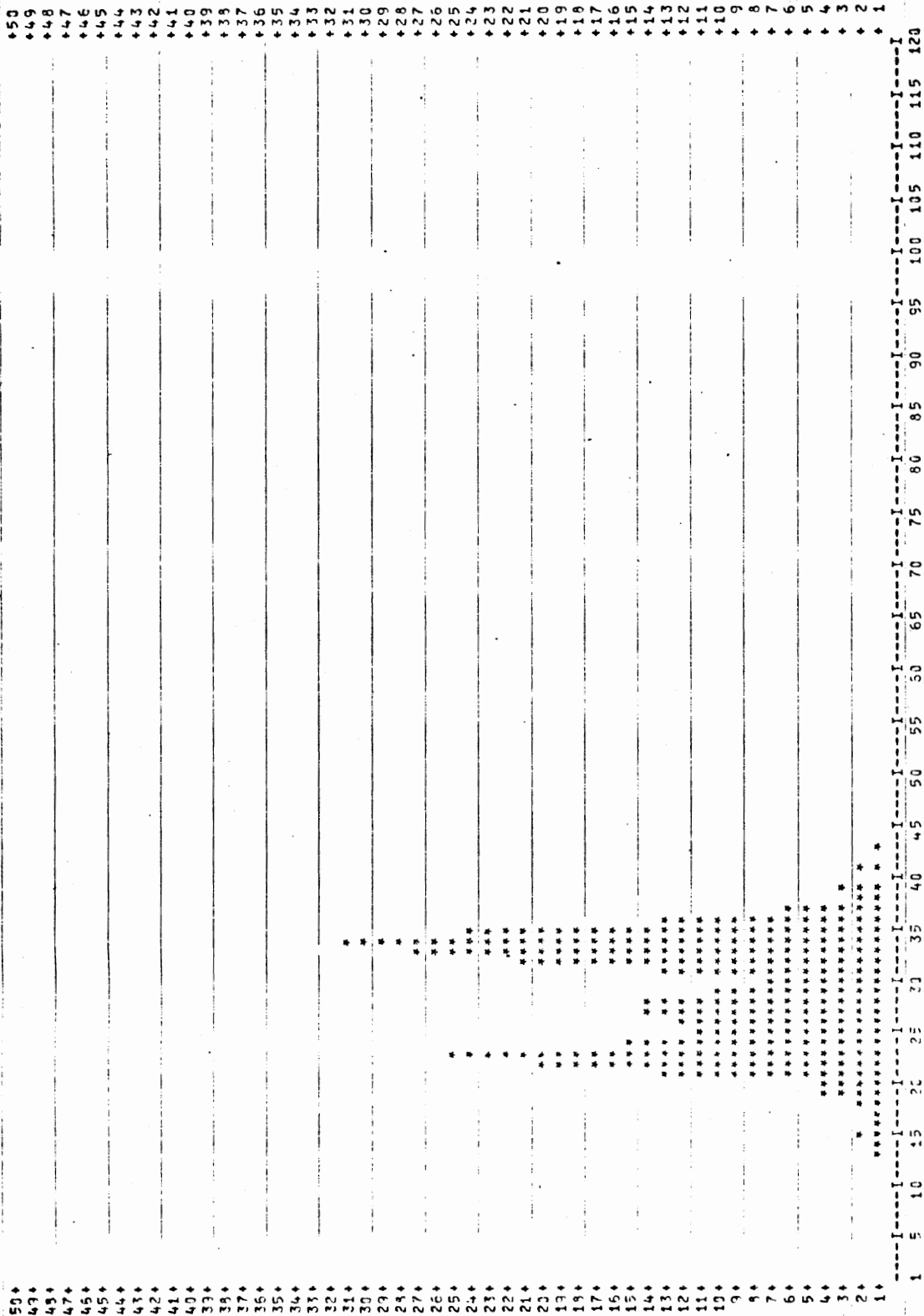
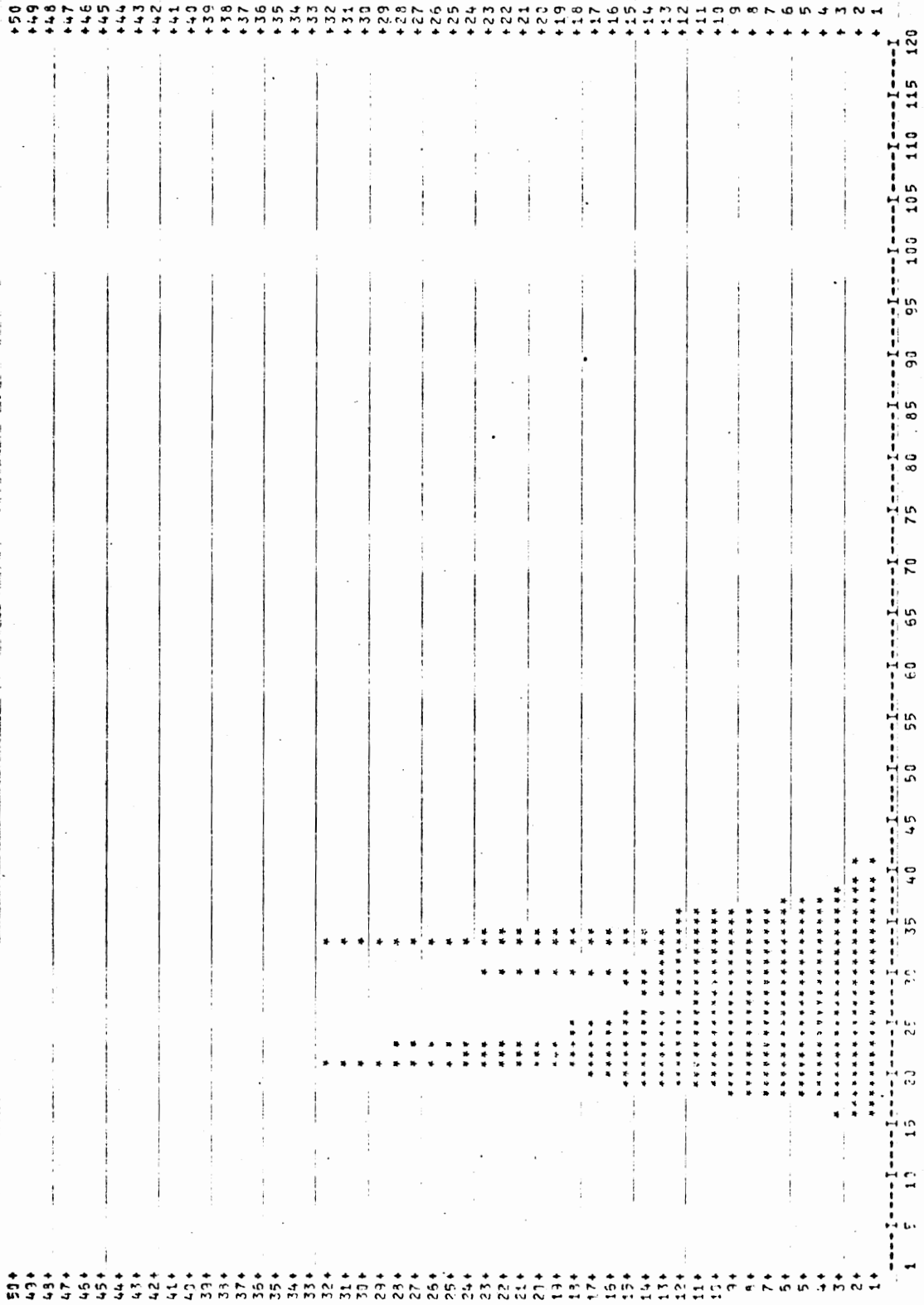


FIGURE 11. Length frequencies of blue rockfish for November 1978.



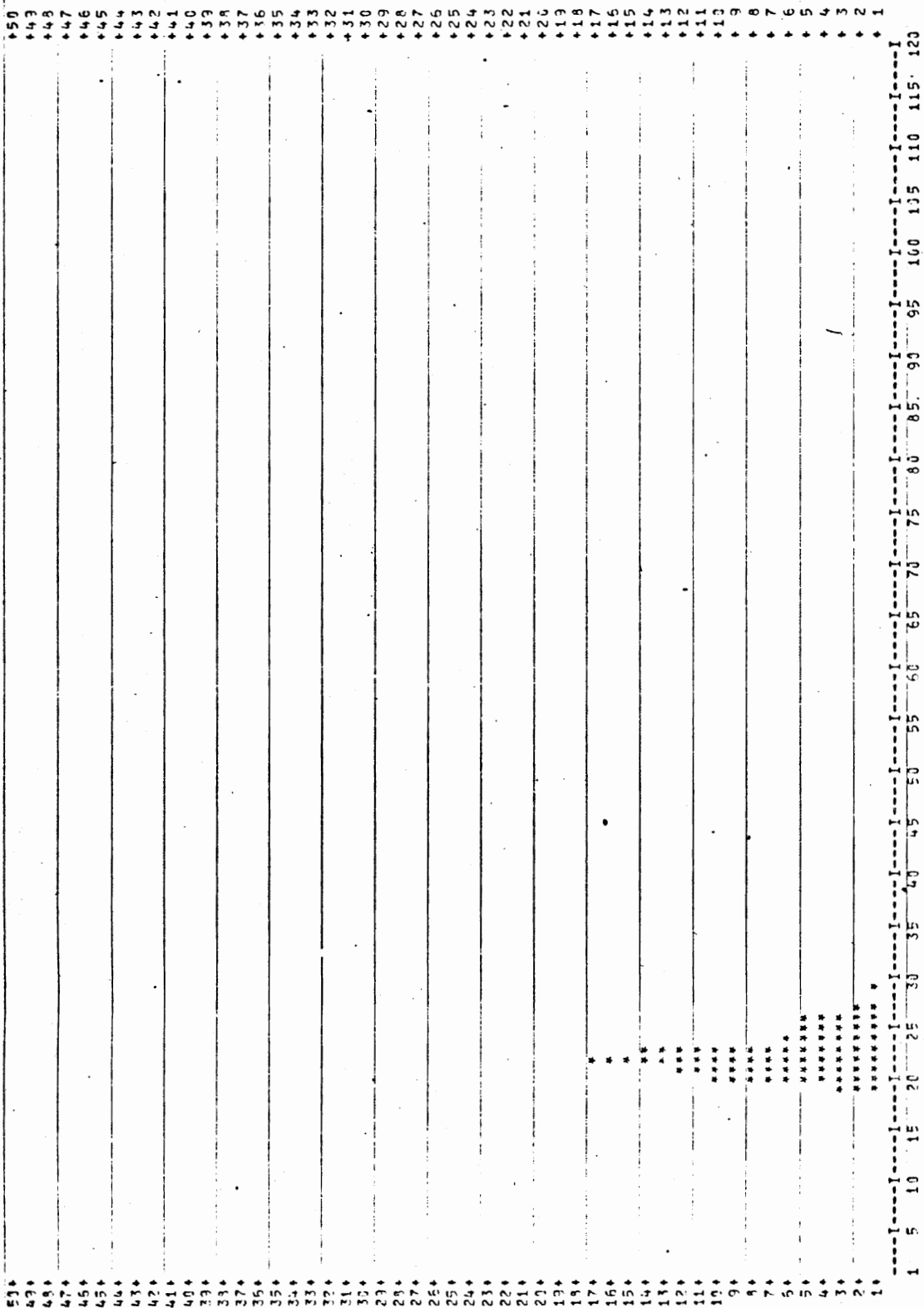
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR BLUE ROCKFISH (SEBASTES MYSTINUS)  
DURING DECEMBER 1978.  
TOTAL NO. = 362 MEAN = 27.083 STANDARD DEVIATION = 5.759

FIGURE 12. Length frequencies of blue rockfish for December 1978.  
Total No. Quarter 1,033 Mean Length Quarter 27.937 cm

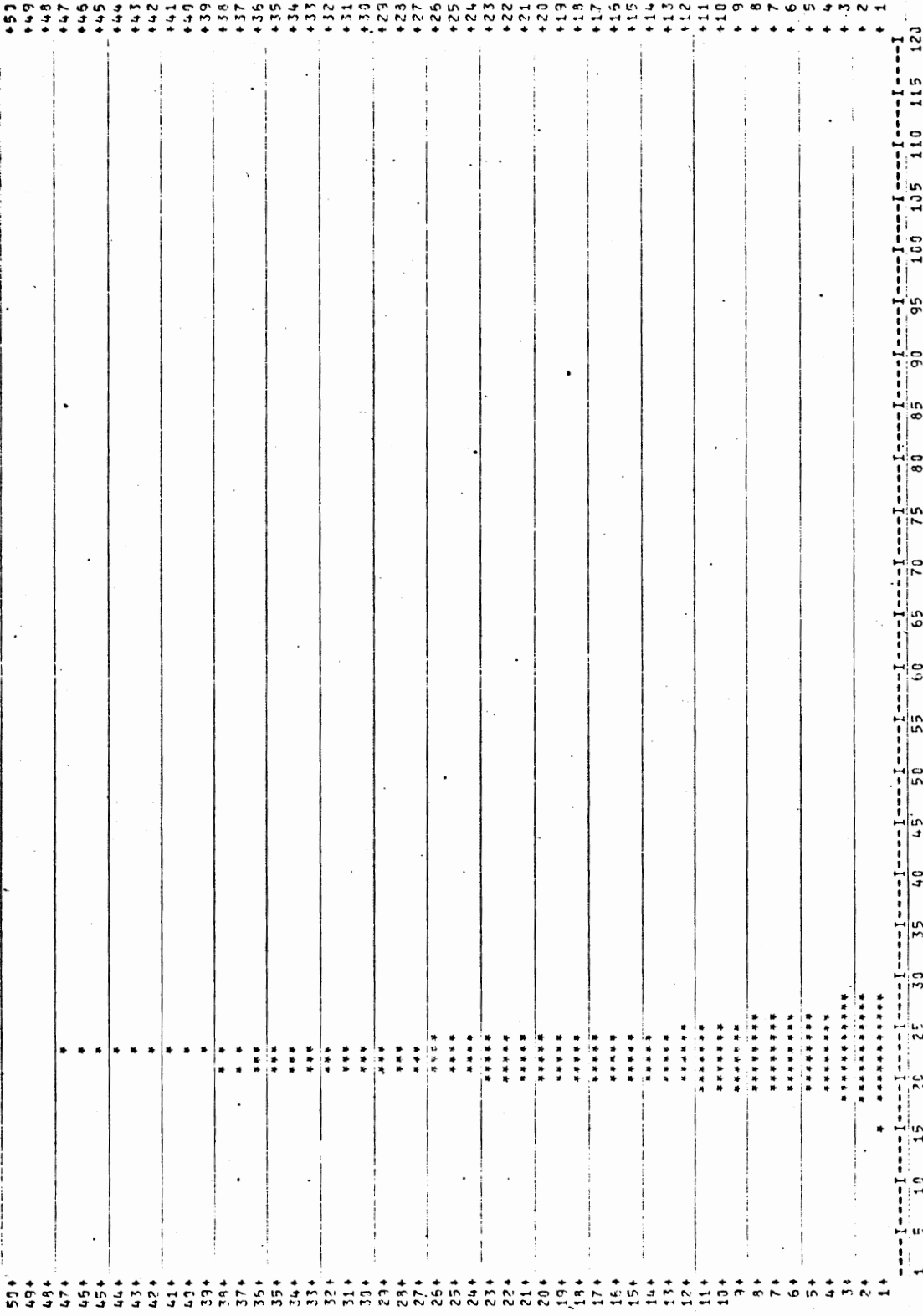
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR SQUARESPOT ROCKFISH (SEBASTES HOPKINSI)  
 1978.  
 DUPING COYNER  
 TOTAL NC. = 75 MEAN = 22.493 STANDARD DEVIATION = 2.074

FIGURE 13. Length frequencies of squarespot rockfish for October 1978.

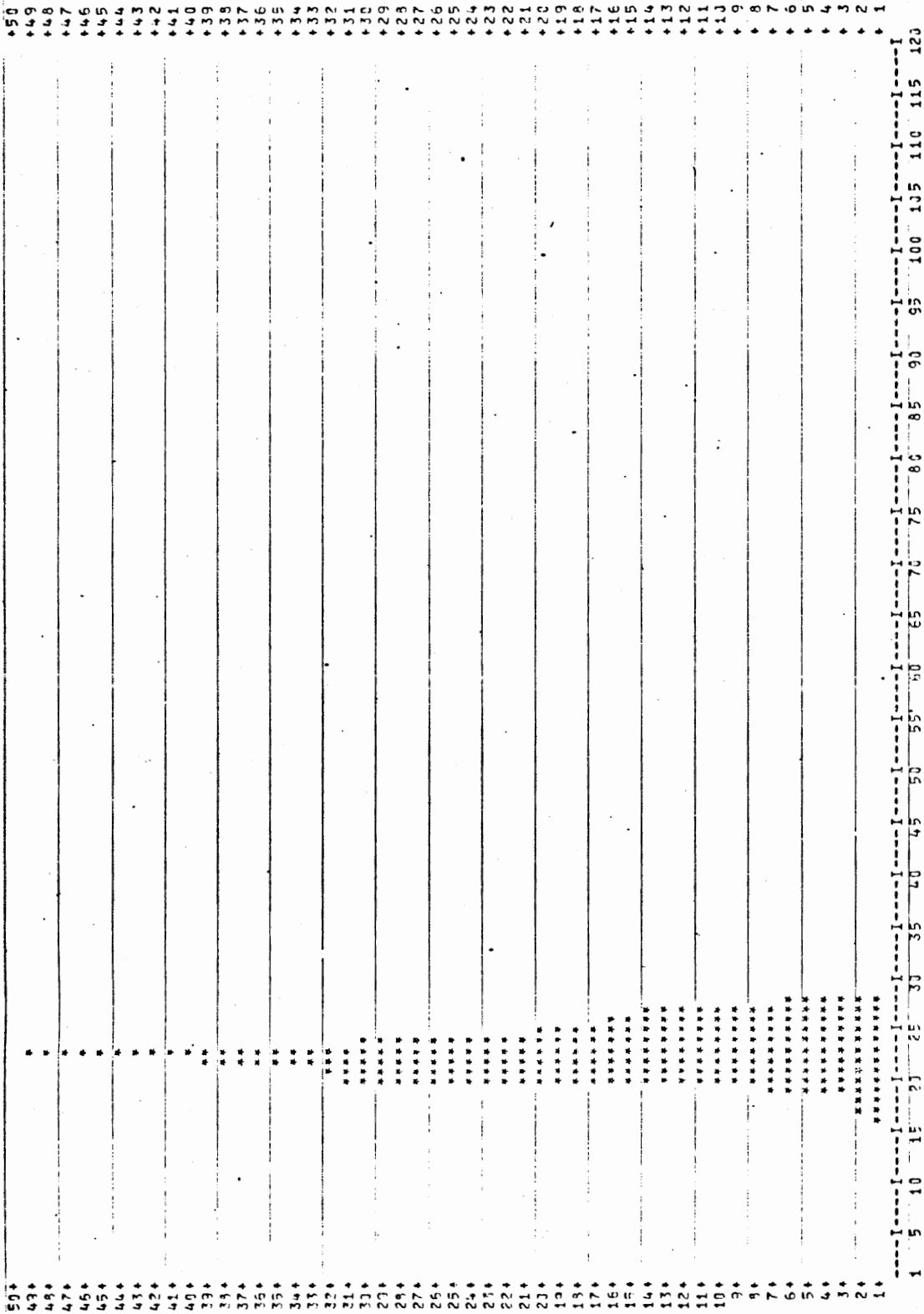
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR SQUARESPOT ROCKFISH (SEGASTES HOPKINSI)  
RUPING NOVEMBER 1978.  
TOTAL NO. = 211    MEAN = 22.303    STANDARD DEVIATION = 2.030

FIGURE 14. Length frequencies of squarespot rockfish for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

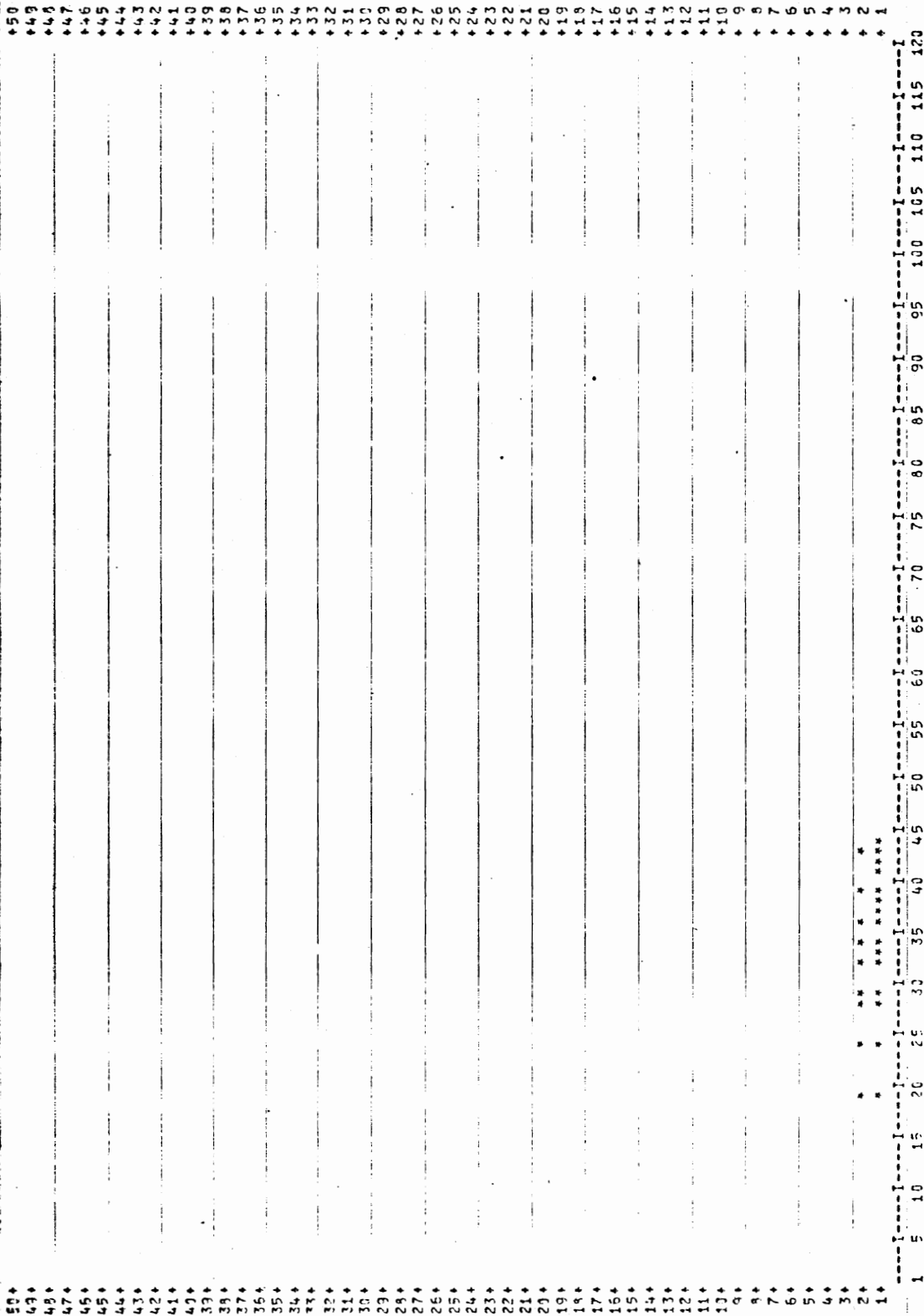


LENGTH HISTOGRAM FOR SQUARESPOT ROCKFISH (SEBASTES HOPKINSI)  
1979.

TOTAL NO. = 249 MEAN = 22.803 STANDARD DEVIATION = 2.326

FIGURE 15. Length frequencies of squarespot rockfish for December 1978.  
Total No. Quarter 535 Mean Length Quarter 22.563 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR GREENSPOTTED ROCKFISH (SEBASTES CHLOROSTICTUS)  
DURING OCTOBER 1978.  
TOTAL NO. = 24 MEAN = 33.458 STANDARD DEVIATION = 7.165

FIGURE 16. Length frequencies of green-spotted rockfish for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR GREENSPOTTED ROCKFISH (SEBASTES CHLOROSTICTUS)  
DURING NOVEMBER 1978.

TOTAL NO. = 186 MEAN = 51.570 STANDARD DEVIATION = 9.134

FIGURE 17. Length frequencies of greenspotted rockfish for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

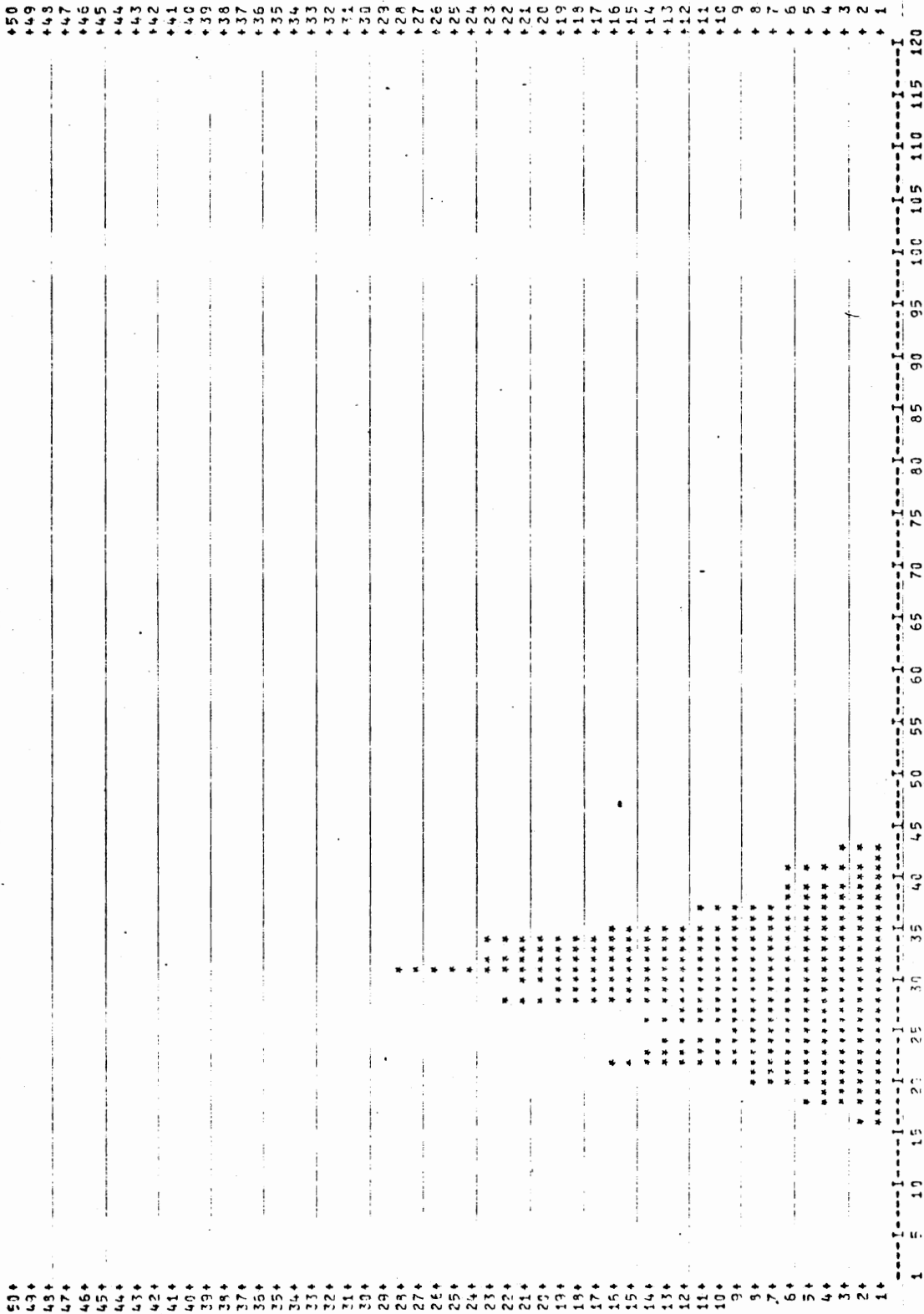


FIGURE 18. Length frequencies of greenspotted rockfish for December 1978.  
Total No. Quarter 533 Mean Length Quarter 30.475 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1

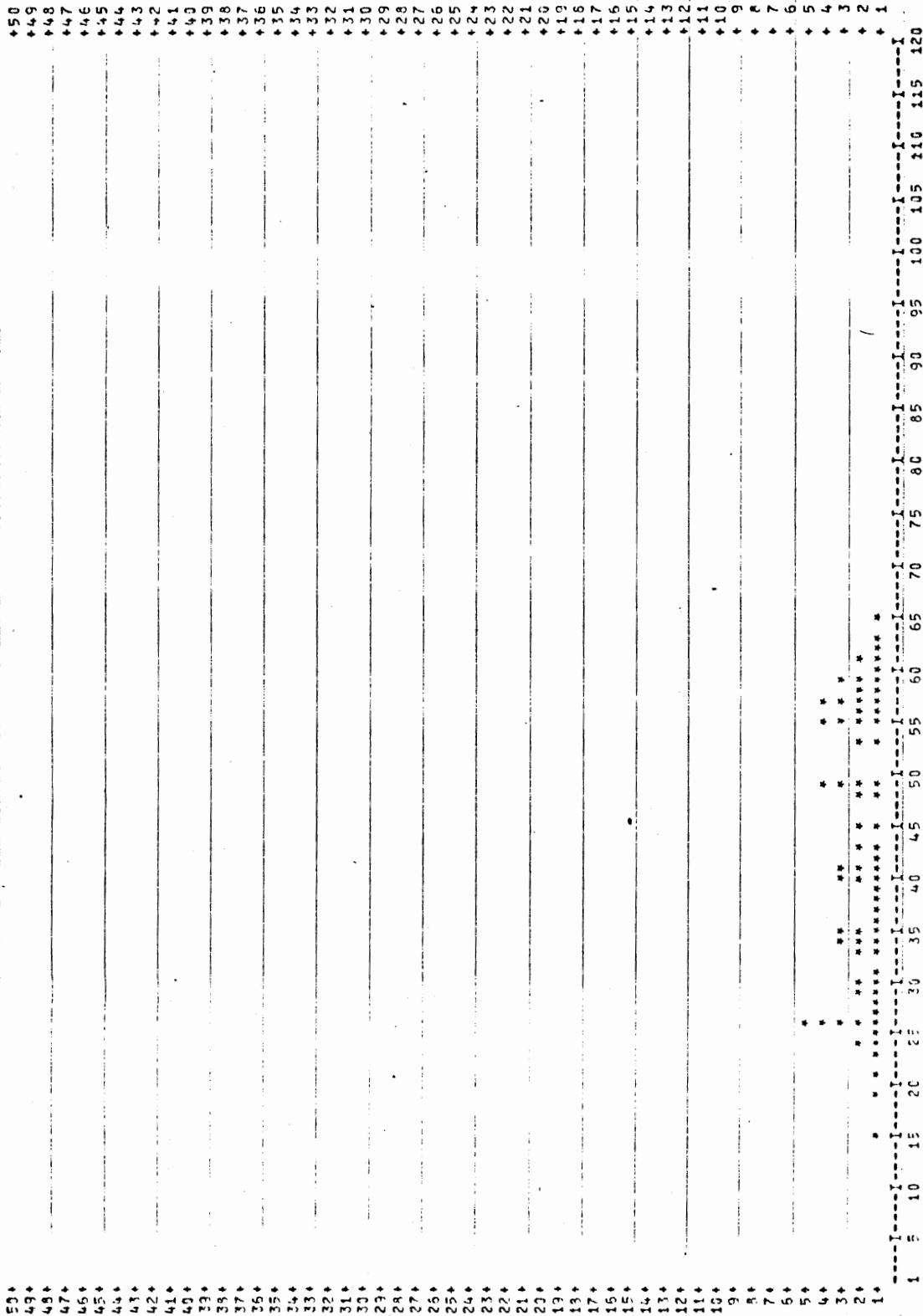
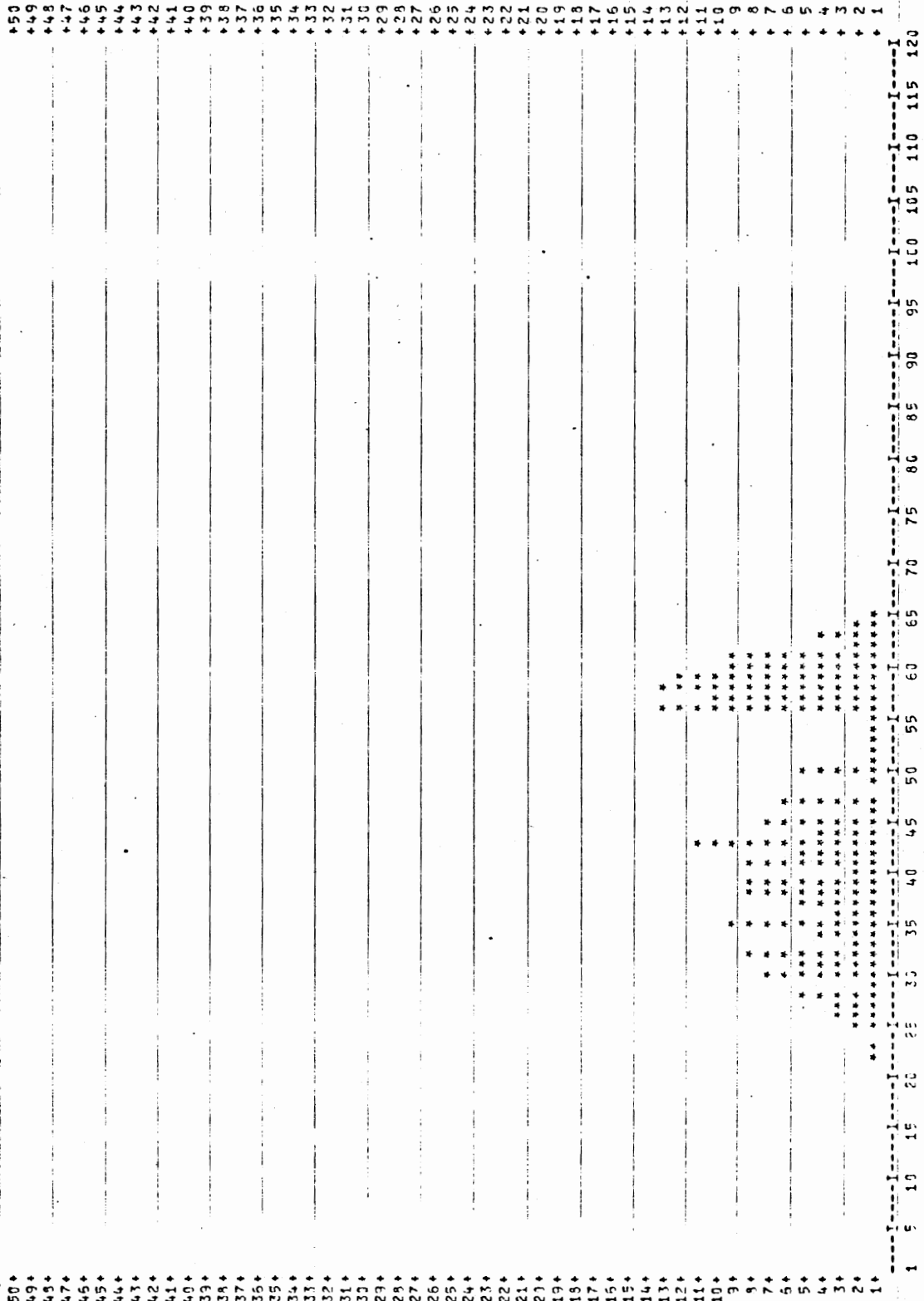


FIGURE 19. Length frequencies of vermilion rockfish for October 1978.



THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR VERMILION ROCKFISH (SEBASTES MINIATUS)  
 DURING NOVEMBER 1978.  
 TOTAL NO. = 205 MEAN = 45.668 STANDARD DEVIATION = 11.677

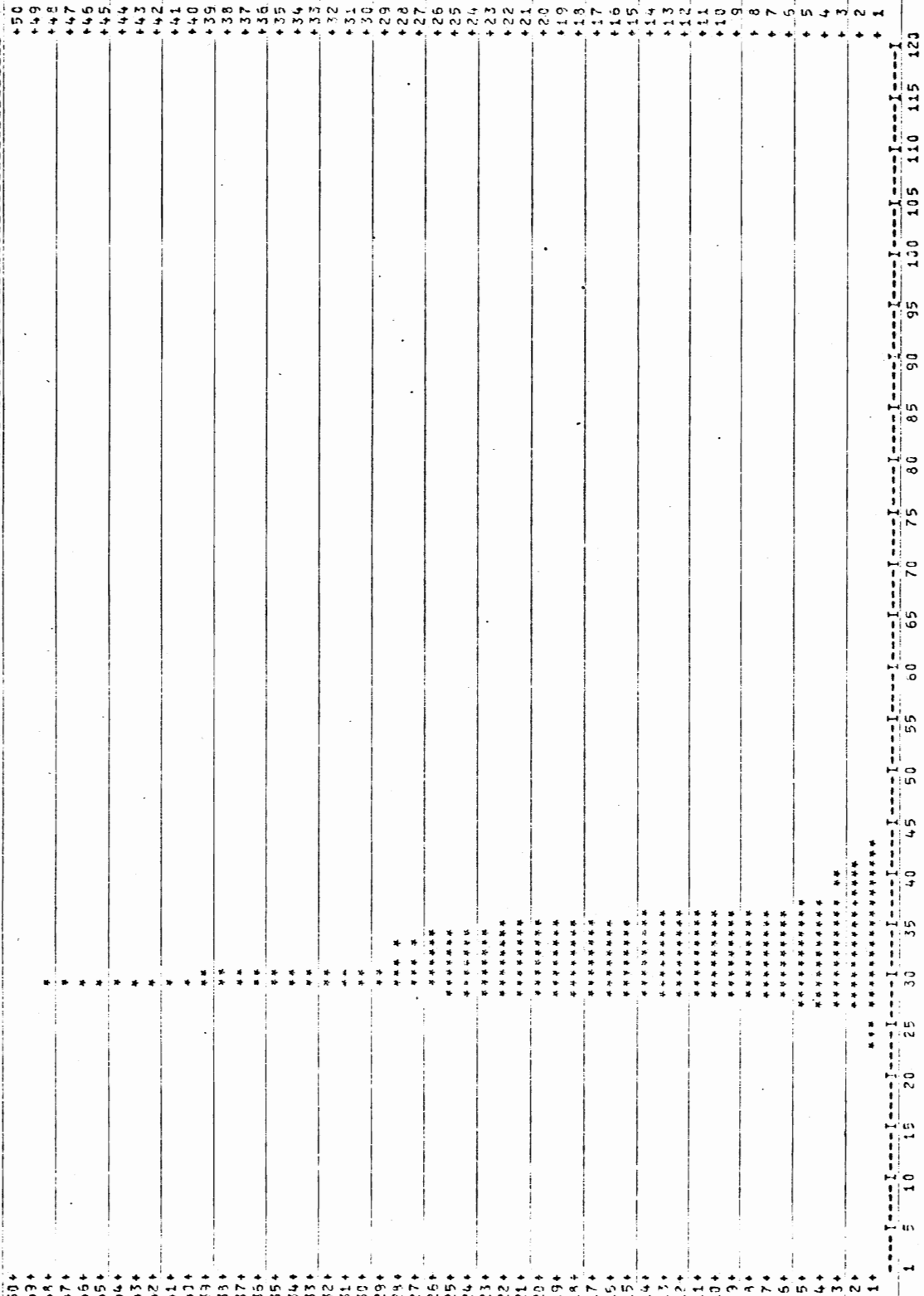
FIGURE 20. Length frequencies of vermilion rockfish for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



FIGURE 21. Length frequencies of vermilion rockfish for December 1978.  
 Total No. Quarter 476      Mean Length Quarter 41.318

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 8



LENGTH HISTOGRAM FOR PACIFIC MACKEREL (SCOMBER JAPONICUS)  
CURING OCTOBER 1978.  
TOTAL NO. = 2159 MEAN = 31.698 STANDARD DEVIATION = 2.939

FIGURE 22. Length frequencies of Pacific mackerel for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 7

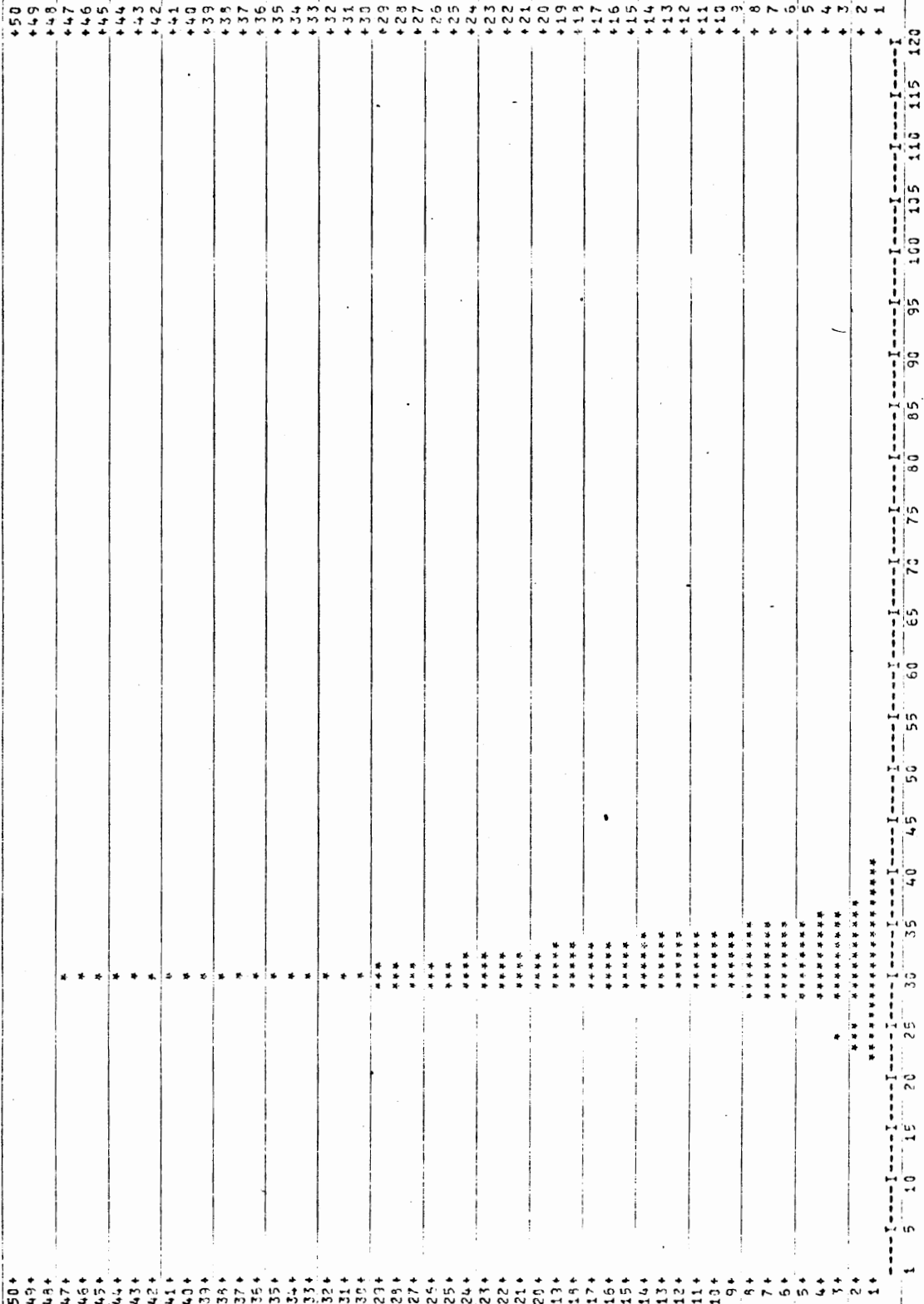
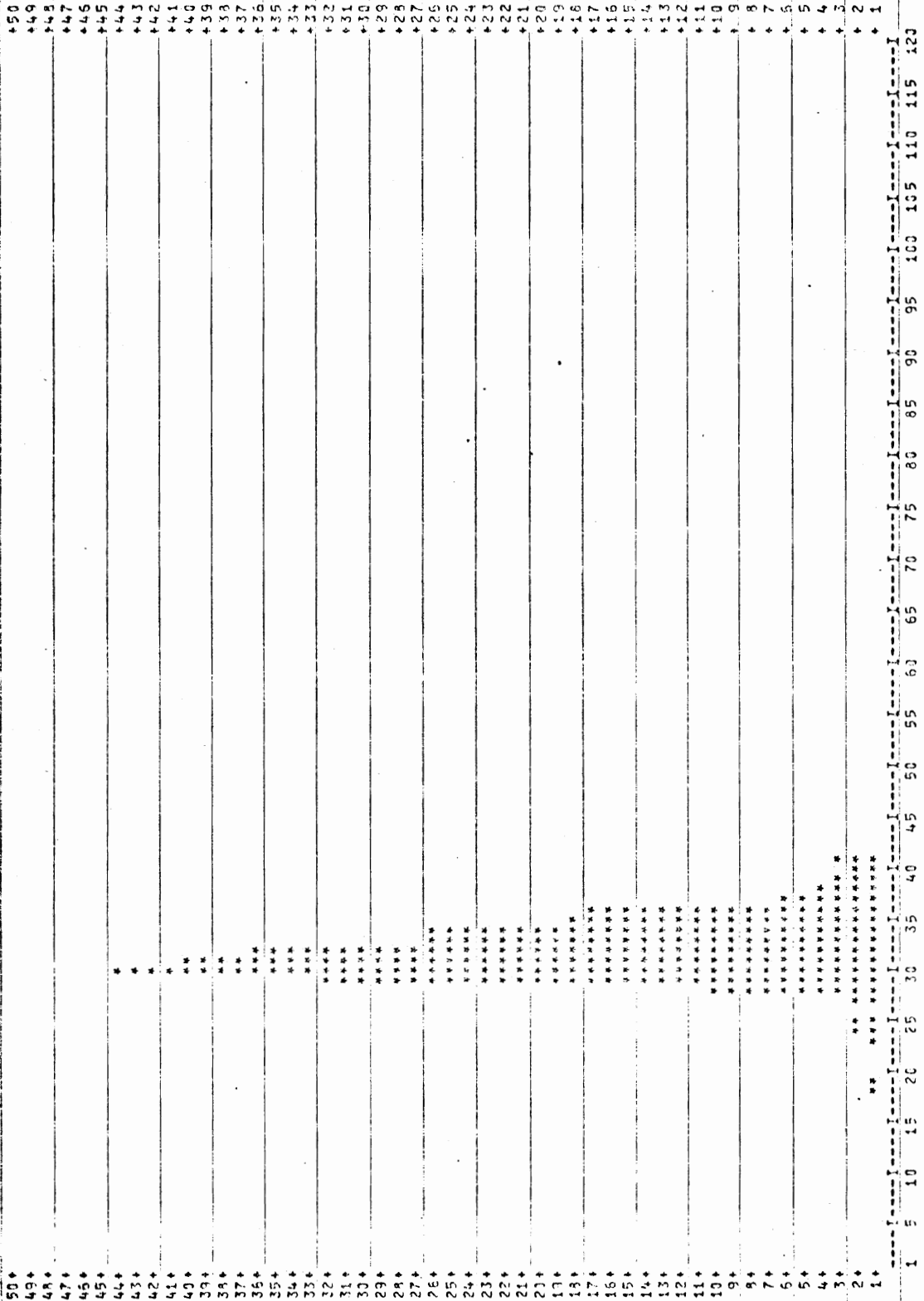


FIGURE 23. Length frequencies of Pacific mackerel for November 1978.

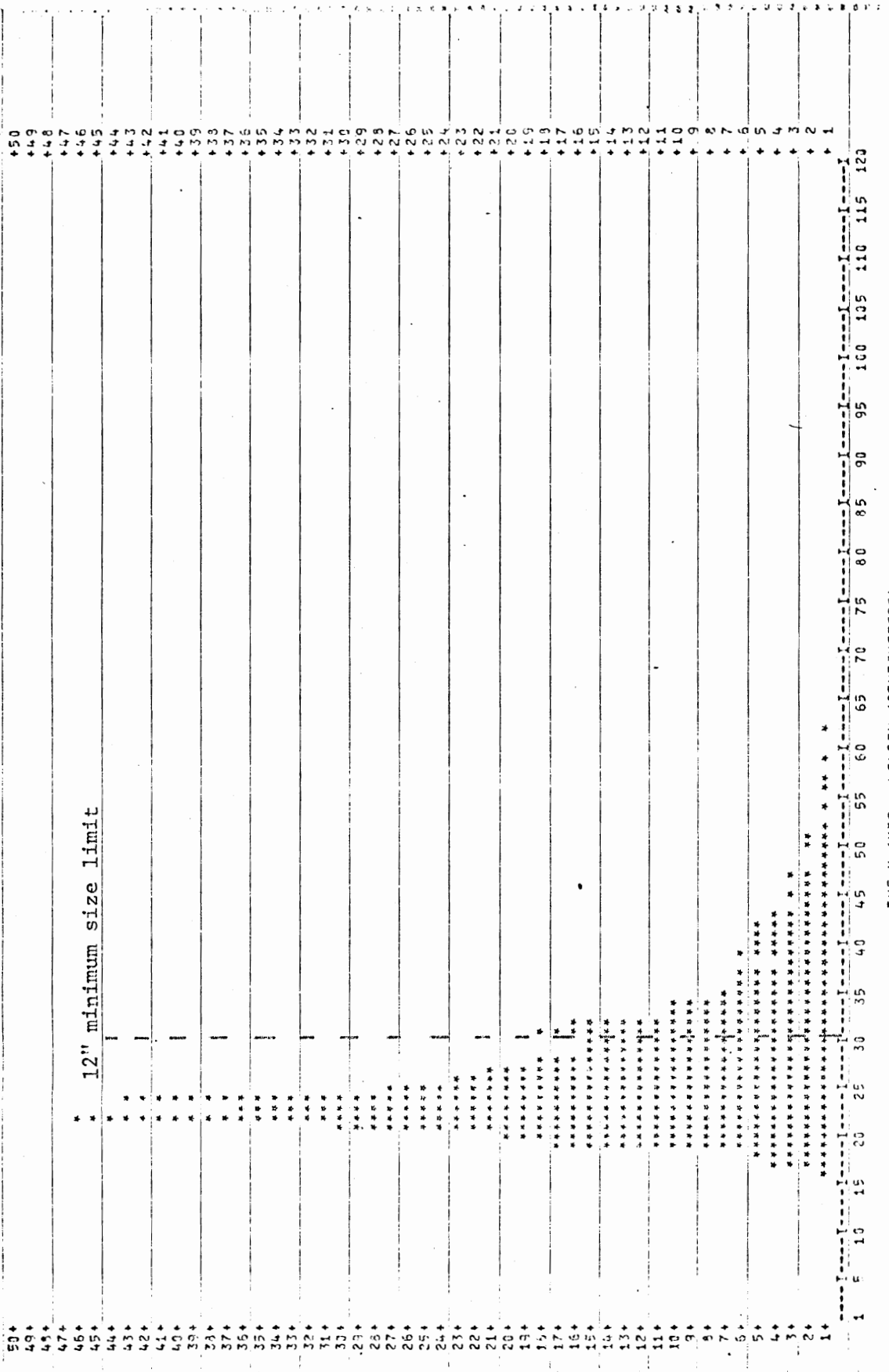
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 2



LENGTH HISTOGRAM FOR PACIFIC MACKEREL (SOCHBER JAPONICUS)  
 DURING DECEMBER 1978.  
 TOTAL NO. = 593 MEAN = 31.924 STANDARD DEVIATION = 3.077  
 THE X-AXIS = LENGTH (CENTIMETERS)

FIGURE 24. Length frequencies of Pacific mackerel for December 1978.  
 Total No. Quarter 4,034 Mean Length Quarter 31.499 cm

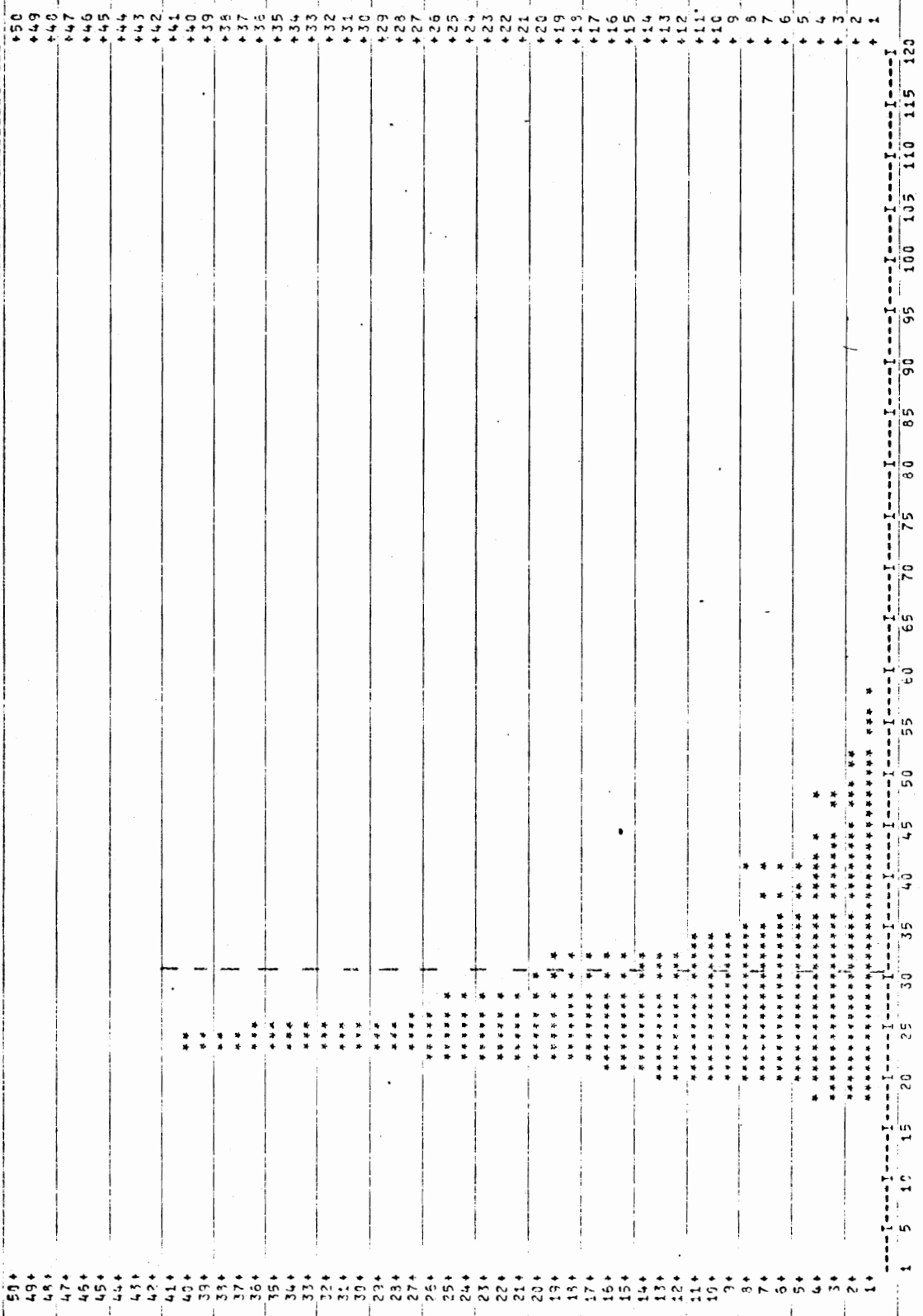
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 3



LENGTH HISTOGRAM FOR HELP BASS (PARALABRAX CLATHRATUS)  
 DURING OCTOBER 1978.  
 TOTAL NO. = 1220    MEAN = 27.238    STANDARD DEVIATION = 7.043

FIGURE 25. Length frequencies of help bass for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR KELP BASS (PARALABRAX CLATHRATUS)  
 DURING NOVEMBER 1978.  
 TOTAL NO. = 404    MEAN = 28.800    STANDARD DEVIATION = 7.552

FIGURE 26. Length frequencies of kelp bass for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1

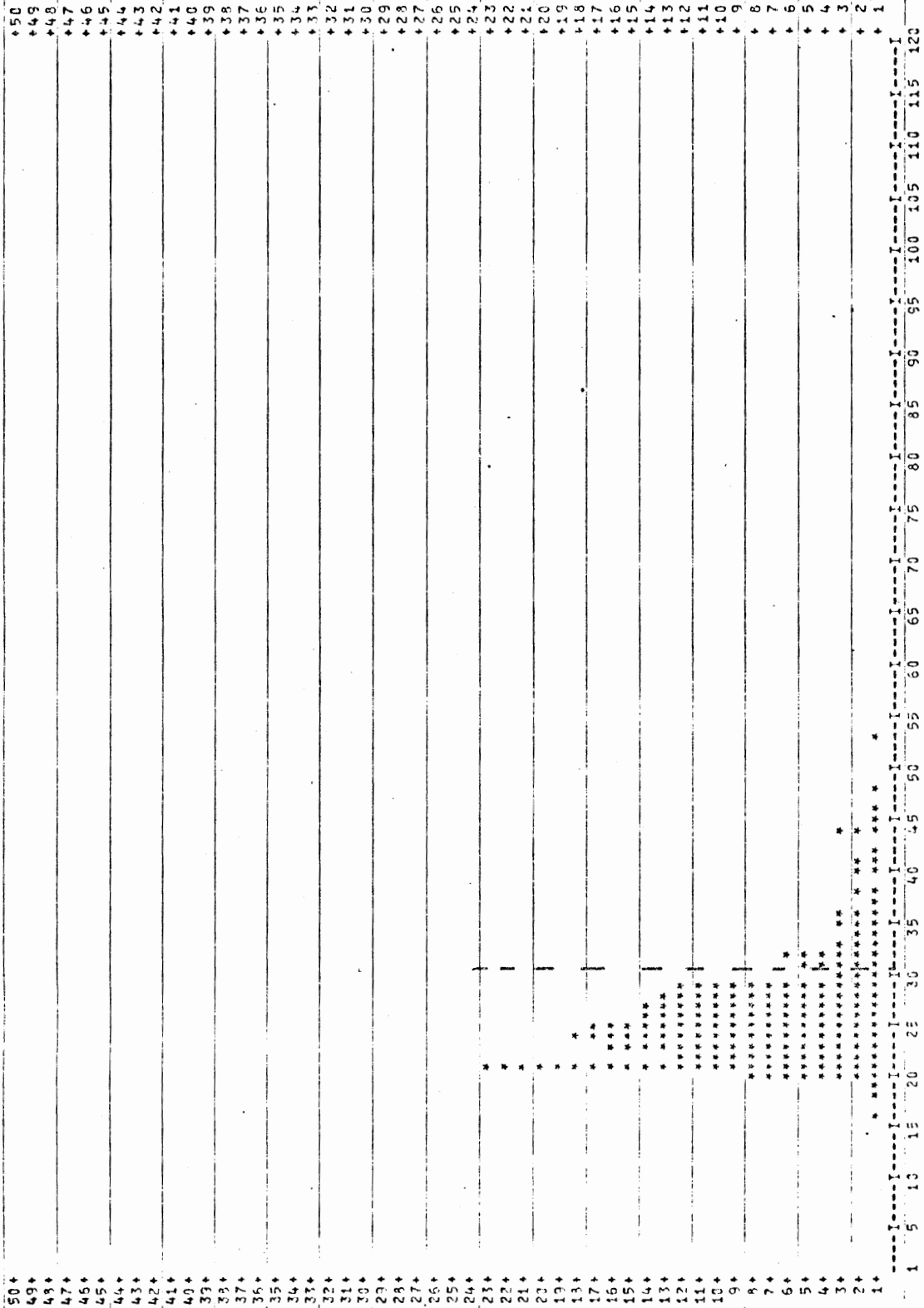


FIGURE 27. Length frequencies of kelp bass for December 1978.  
 Total No. Quarter 1884      Mean Length Quarter 27.511 cm



THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 3

| Length (cm) | Frequency |
|-------------|-----------|
| 1           | 1         |
| 5           | 1         |
| 10          | 1         |
| 15          | 1         |
| 20          | 1         |
| 25          | 1         |
| 30          | 1         |
| 35          | 1         |
| 40          | 1         |
| 45          | 1         |
| 50          | 1         |
| 55          | 1         |
| 60          | 1         |
| 65          | 1         |
| 70          | 1         |
| 75          | 1         |
| 80          | 1         |
| 85          | 1         |
| 90          | 1         |
| 95          | 1         |
| 100         | 1         |
| 105         | 1         |
| 110         | 1         |
| 115         | 1         |
| 120         | 1         |
| 125         | 1         |
| 130         | 1         |
| 135         | 1         |
| 140         | 1         |
| 145         | 1         |
| 150         | 1         |
| 155         | 1         |
| 160         | 1         |
| 165         | 1         |
| 170         | 1         |
| 175         | 1         |
| 180         | 1         |
| 185         | 1         |
| 190         | 1         |
| 195         | 1         |
| 200         | 1         |
| 205         | 1         |
| 210         | 1         |
| 215         | 1         |
| 220         | 1         |
| 225         | 1         |
| 230         | 1         |
| 235         | 1         |
| 240         | 1         |
| 245         | 1         |
| 250         | 1         |
| 255         | 1         |
| 260         | 1         |
| 265         | 1         |
| 270         | 1         |
| 275         | 1         |
| 280         | 1         |
| 285         | 1         |
| 290         | 1         |
| 295         | 1         |
| 300         | 1         |
| 305         | 1         |
| 310         | 1         |
| 315         | 1         |
| 320         | 1         |
| 325         | 1         |
| 330         | 1         |
| 335         | 1         |
| 340         | 1         |
| 345         | 1         |
| 350         | 1         |
| 355         | 1         |
| 360         | 1         |
| 365         | 1         |
| 370         | 1         |
| 375         | 1         |
| 380         | 1         |
| 385         | 1         |
| 390         | 1         |
| 395         | 1         |
| 400         | 1         |
| 405         | 1         |
| 410         | 1         |
| 415         | 1         |
| 420         | 1         |
| 425         | 1         |
| 430         | 1         |
| 435         | 1         |
| 440         | 1         |
| 445         | 1         |
| 450         | 1         |
| 455         | 1         |
| 460         | 1         |
| 465         | 1         |
| 470         | 1         |
| 475         | 1         |
| 480         | 1         |
| 485         | 1         |
| 490         | 1         |
| 495         | 1         |
| 500         | 1         |

LENGTH HISTOGRAM FOR PACIFIC BONITO (SARGA CHILIENSIS) DURING OCTOBER 1978.

TOTAL NO. = 596 MEAN = 41.253 STANDARD DEVIATION = 2.503

FIGURE 28. Length frequencies of Pacific bonito for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 4

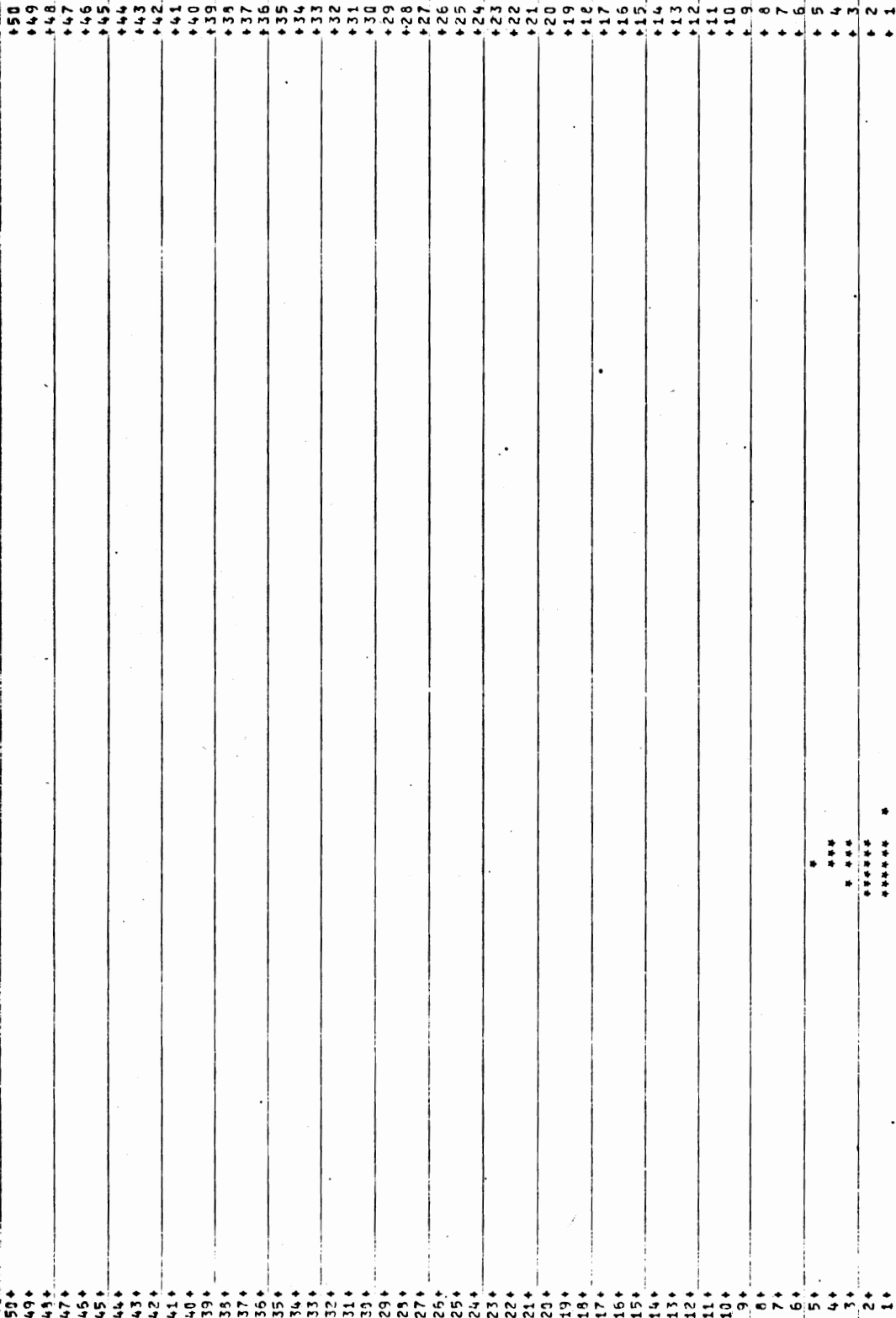
|     |   |    |
|-----|---|----|
| 50* | + | 50 |
| 49* | + | 49 |
| 48* | + | 48 |
| 47* | + | 47 |
| 46* | + | 46 |
| 45* | + | 45 |
| 44* | + | 44 |
| 43* | + | 43 |
| 42* | + | 42 |
| 41* | + | 41 |
| 40* | + | 40 |
| 39* | + | 39 |
| 38* | + | 38 |
| 37* | + | 37 |
| 36* | + | 36 |
| 35* | + | 35 |
| 34* | + | 34 |
| 33* | + | 33 |
| 32* | + | 32 |
| 31* | + | 31 |
| 30* | + | 30 |
| 29* | + | 29 |
| 28* | + | 28 |
| 27* | + | 27 |
| 26* | + | 26 |
| 25* | + | 25 |
| 24* | + | 24 |
| 23* | + | 23 |
| 22* | + | 22 |
| 21* | + | 21 |
| 20* | + | 20 |
| 19* | + | 19 |
| 18* | + | 18 |
| 17* | + | 17 |
| 16* | + | 16 |
| 15* | + | 15 |
| 14* | + | 14 |
| 13* | + | 13 |
| 12* | + | 12 |
| 11* | + | 11 |
| 10* | + | 10 |
| 9*  | + | 9  |
| 8*  | + | 8  |
| 7*  | + | 7  |
| 6*  | + | 6  |
| 5*  | + | 5  |
| 4*  | + | 4  |
| 3*  | + | 3  |
| 2*  | + | 2  |
| 1*  | + | 1  |

THE X-AXIS = LENGTH (CENTIMETERS)  
LENGTH HISTOGRAM FOR PACIFIC BONITO (SARDA CHILIENSIS)  
DURING NOVEMBER 1978.

TOTAL NO. = 834 MEAN = 42.646 STANDARD DEVIATION = 2.516

FIGURE 29. Length frequencies of Pacific bonito for November 1978.

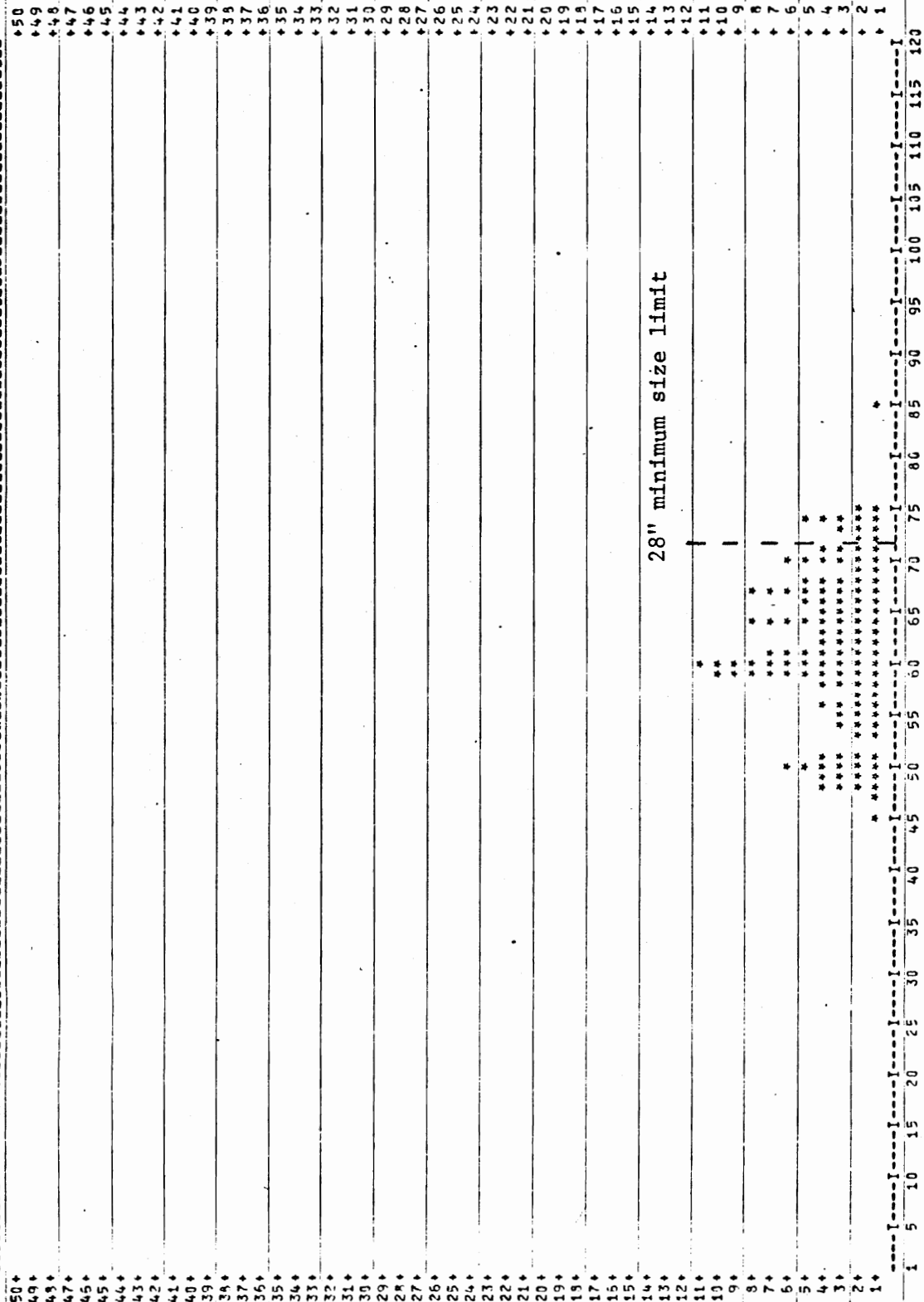
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR PACIFIC BONITO (SARDA CHILIENSIS)  
 DURING DECEMBER 1978.  
 TOTAL NO. = 21    MEAN = 42.443    STANDARD DEVIATION = 1.910

FIGURE 30. Length frequencies of Pacific bonito for December 1978.  
 Total No. Quarter 1,451    Mean Length Quarter 42.067 cm

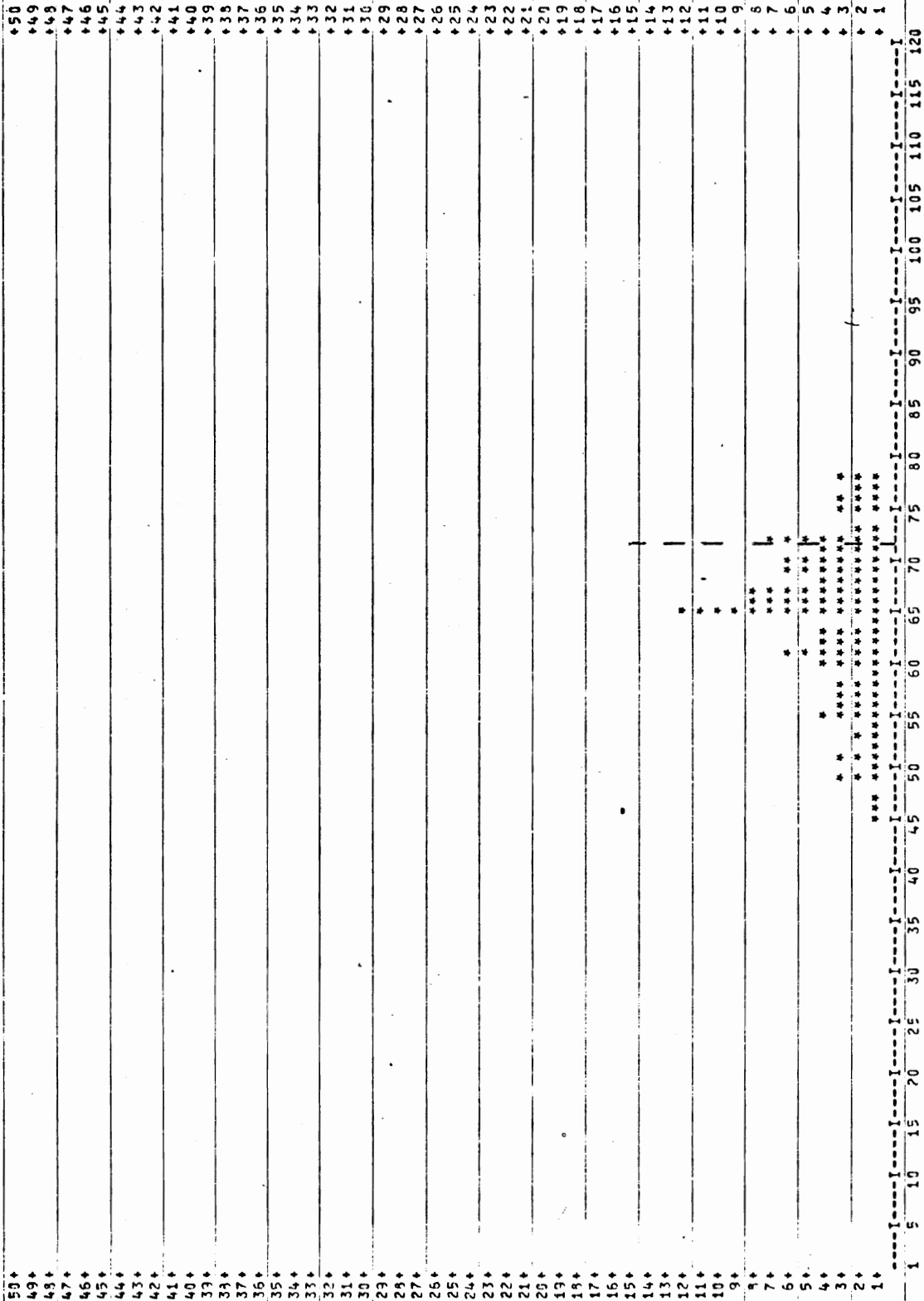
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS).  
LENGTH HISTOGRAM FOR CALIFORNIA BARRACUDA (SPHYRAENA ARGENTEA)  
DURING OCTOBER 1978.  
TOTAL NO. = 129 MEAN = 61.643 STANDARD DEVIATION = 7.723

FIGURE 31. Length frequencies of California barracuda for October 1978.

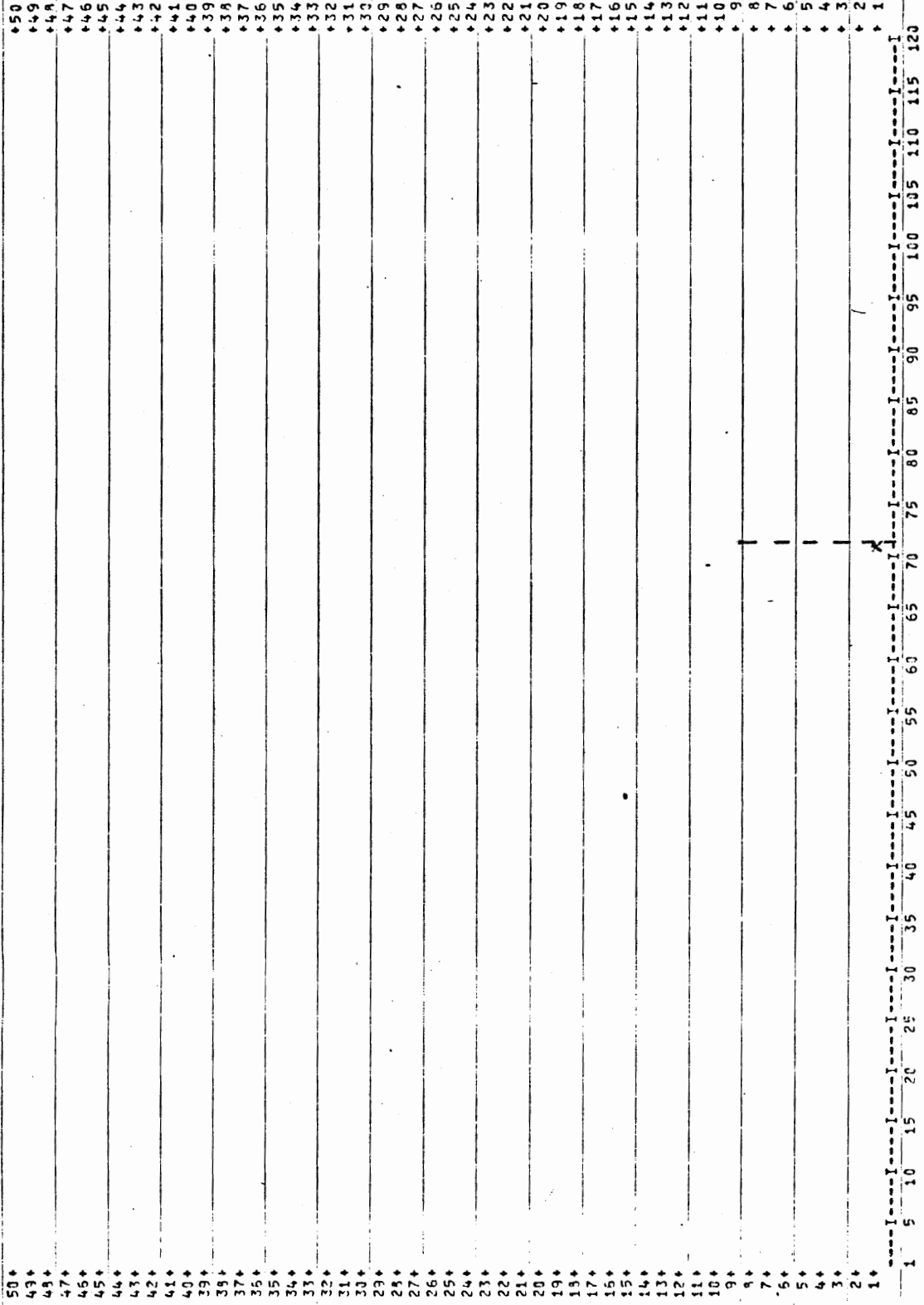
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 . MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR CALIFORNIA BARRACUDA (SPHYRAENA ARGENTEA)  
 DURING NOVEMBER, 1978.  
 TOTAL NO. = 115    MEAN = 64.235    STANDARD DEVIATION = 7.711

FIGURE 32. Length frequencies of California barracuda for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1

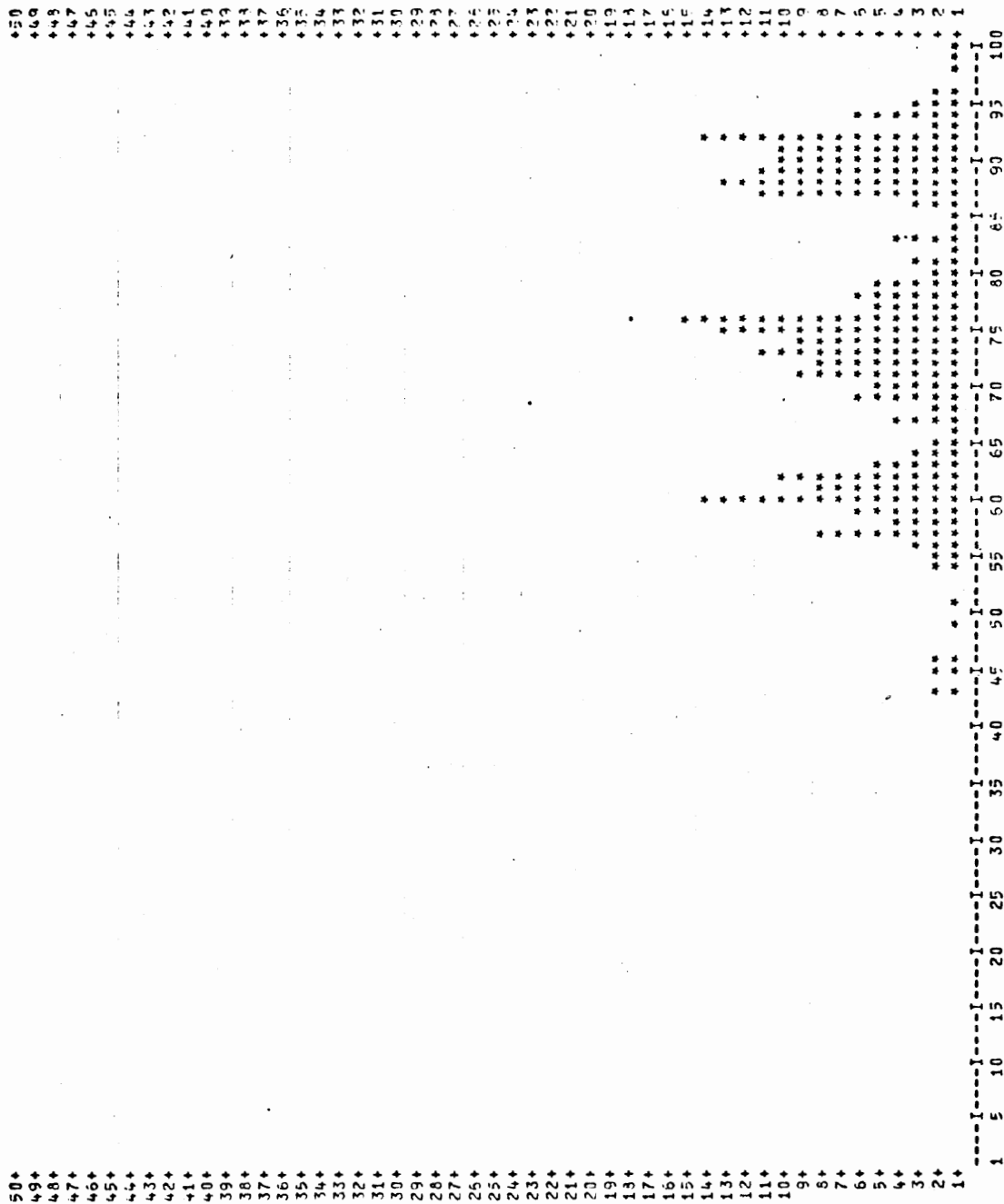


THE X-AXIS = LENGTH (CENTIMETERS)  
LENGTH HISTOGRAM FOR CALIFORNIA BARRACUDA (SPHYRAENA ARGENTEA)  
DURING DECEMBER - 1978.

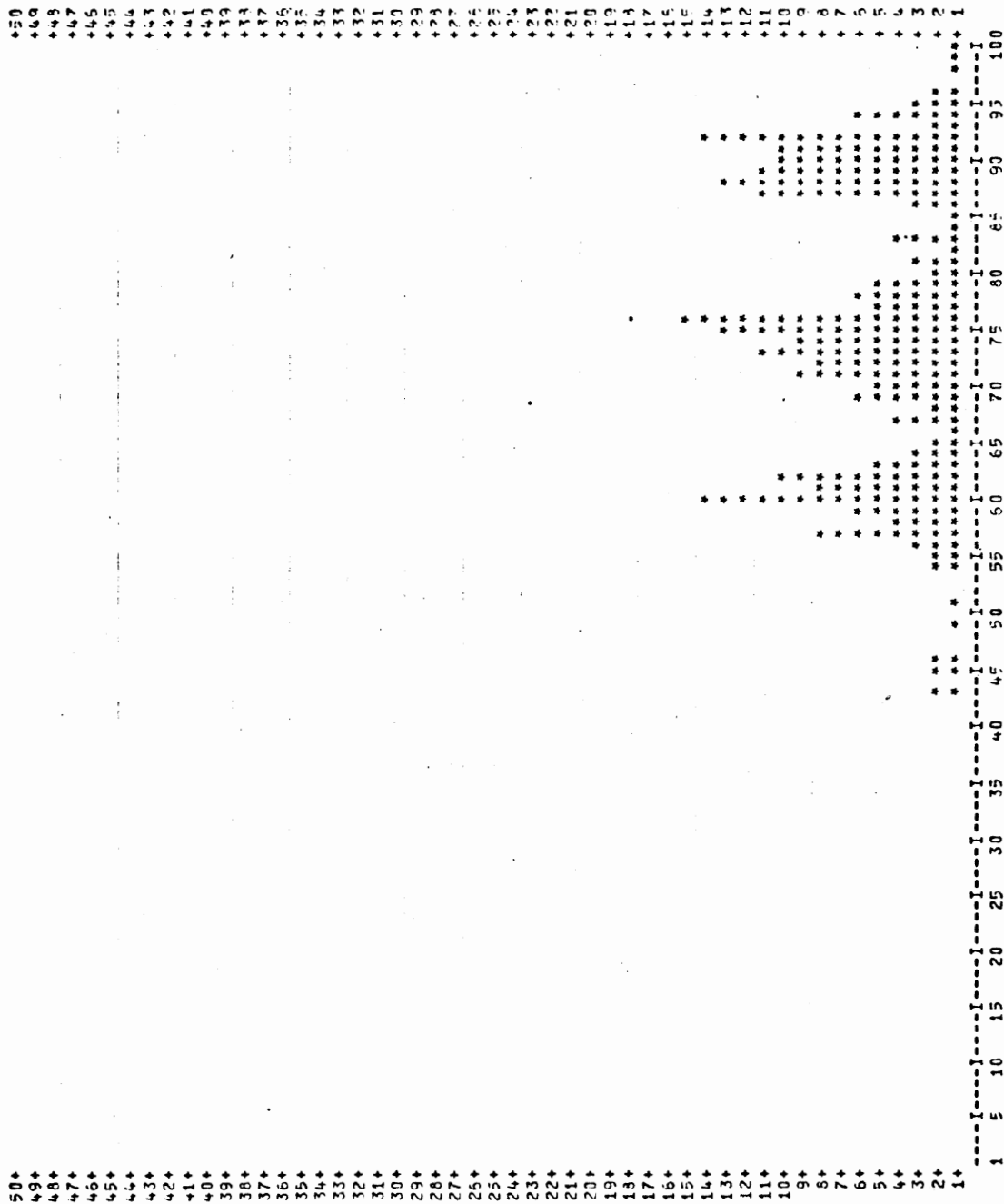
TOTAL NO. = 1 MEAN = 71.000 STANDARD DEVIATION = 9.600

FIGURE 33. Length frequencies of California barracuda for December 1978.  
Total No. Quarter 245 Mean Length Quarter 62.865 cm

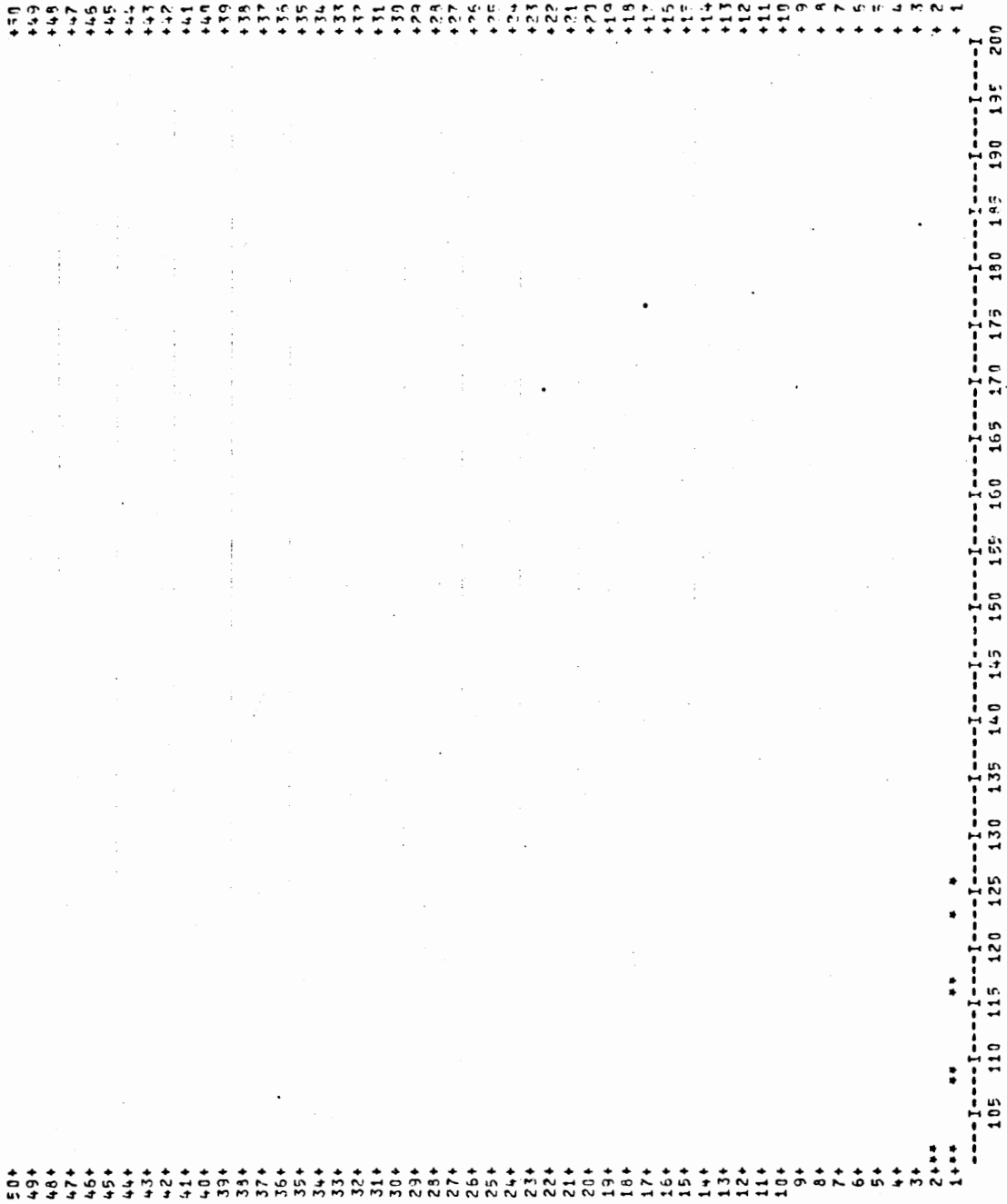
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)



THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR YELLOWTAIL (SERIOLA DORSALIS)  
 CUFINS OCTOBER 1978.  
 TOTAL NO. = 284    MEAN = 75.454    STANDARD DEVIATION = 14.409

FIGURE 34. Length frequencies of yellowtail for October 1978.

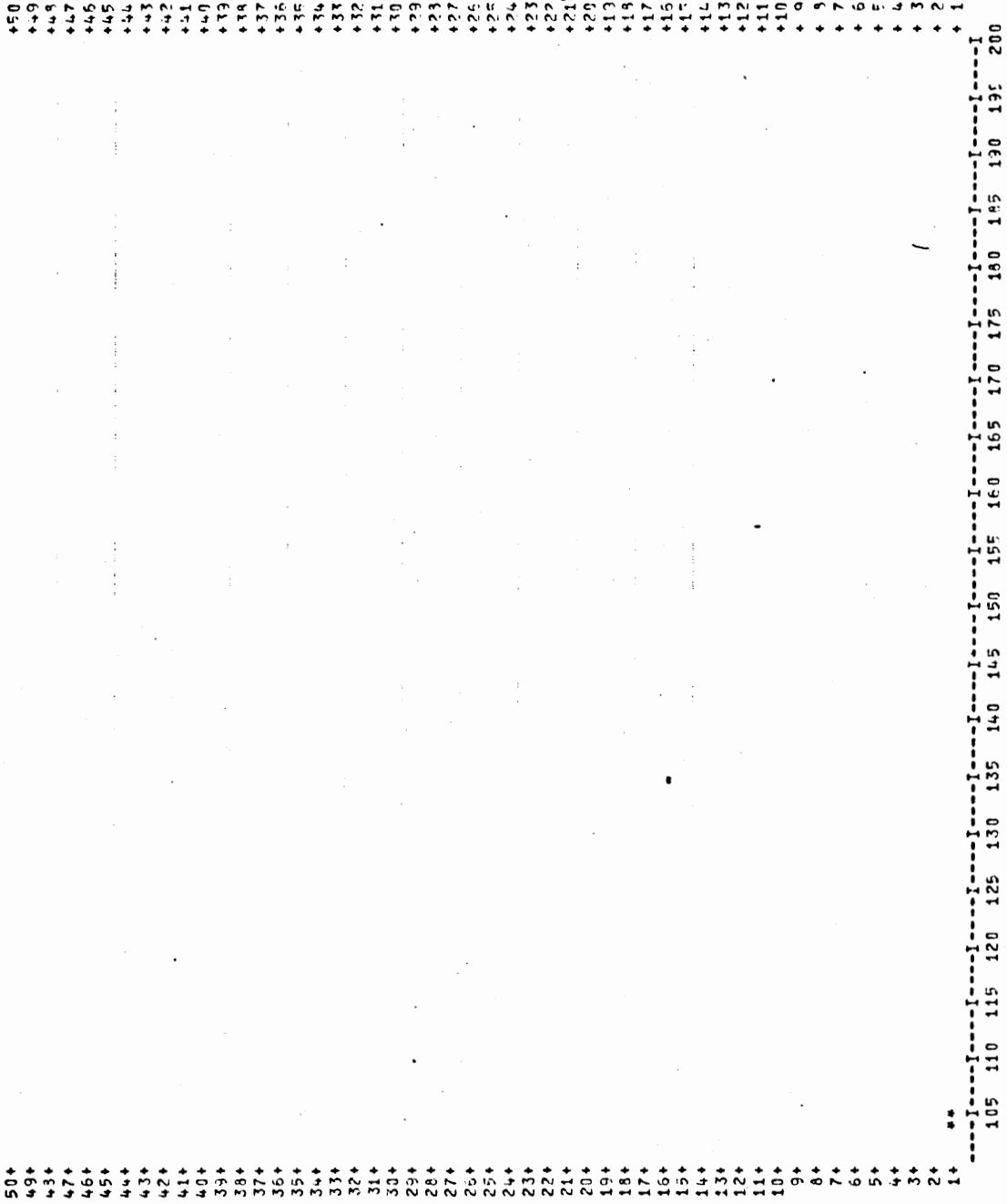


THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

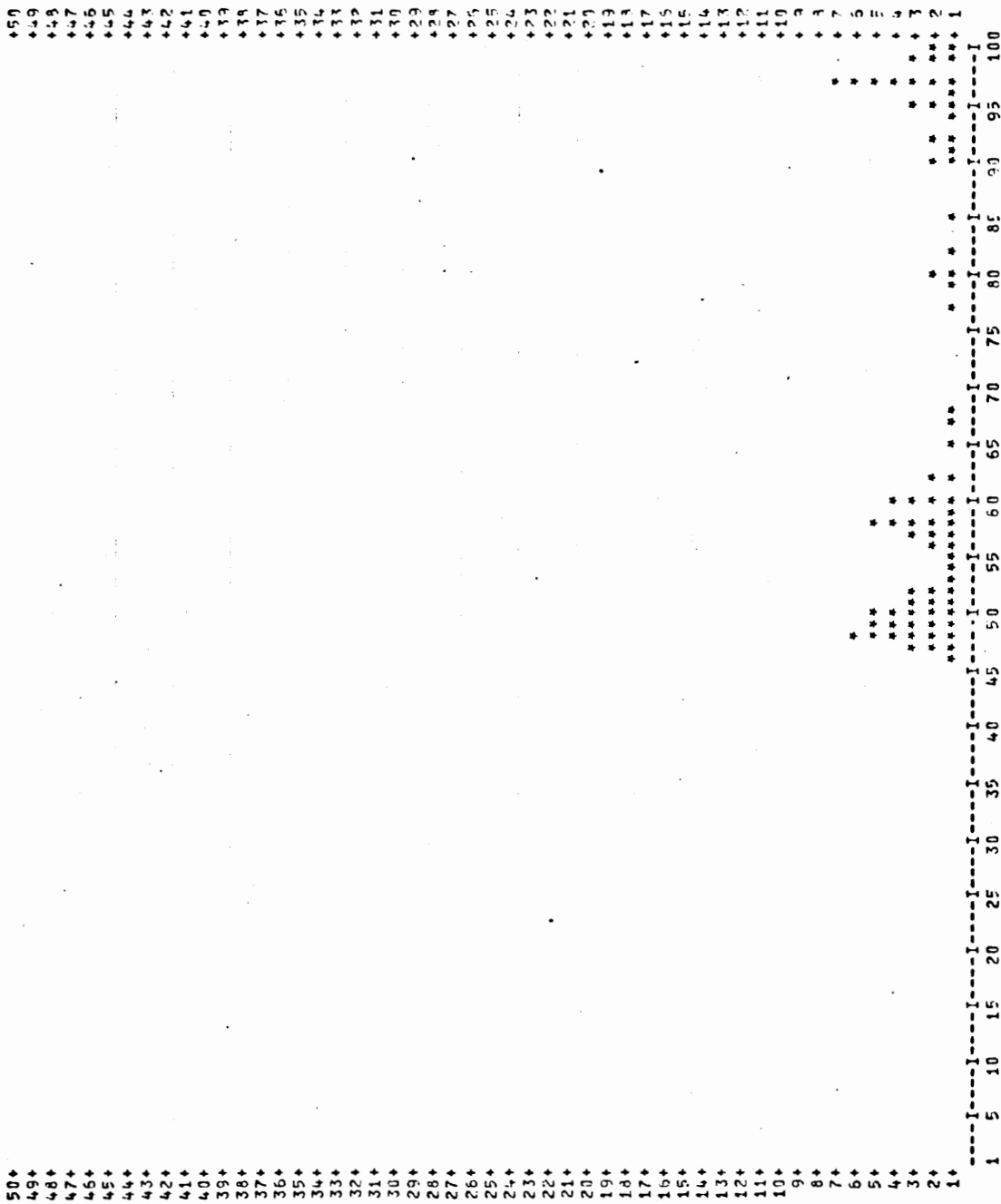
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR YELLOWTAIL (SERIOLA DORSALIS)  
 CUFING NOVEMBER 1978.  
 TOTAL NO. = 69 MEAN = 75.043 STANDARD DEVIATION = 10.690

FIGURE 35. Length frequencies of yellowtail for November 1978.  
 Total No. Quarter 353 Mean Length Quarter 76.178 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

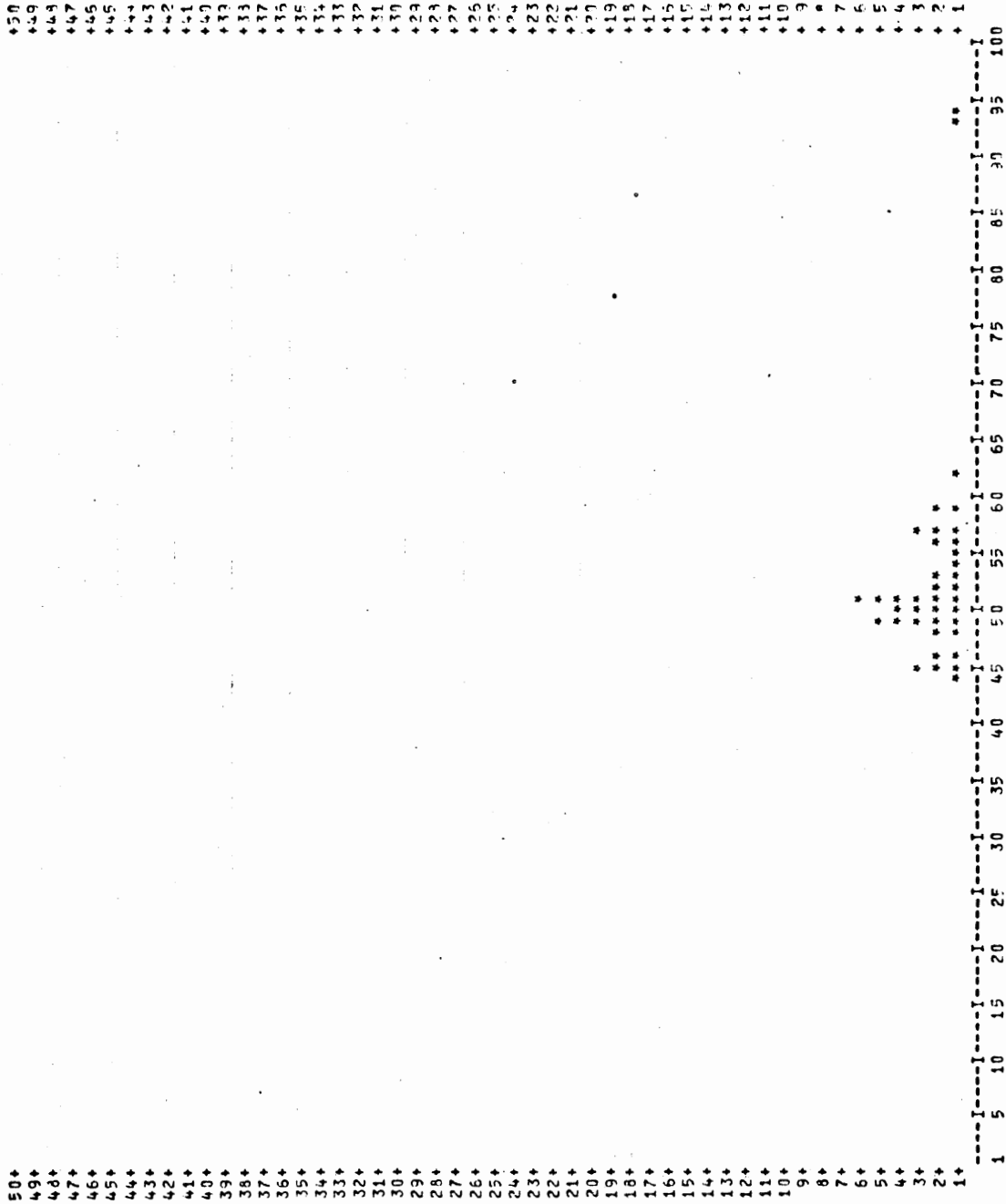
THE Y AXIS = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR YELLOWFIN TUNA (THUNNUS ALBACARES)  
 DURING OCTOBER  
 TOTAL NO. = 90    MEAN = 73.578    STANDARD DEVIATION = 22.670

FIGURE 36. Length frequencies of yellowfin tuna for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1

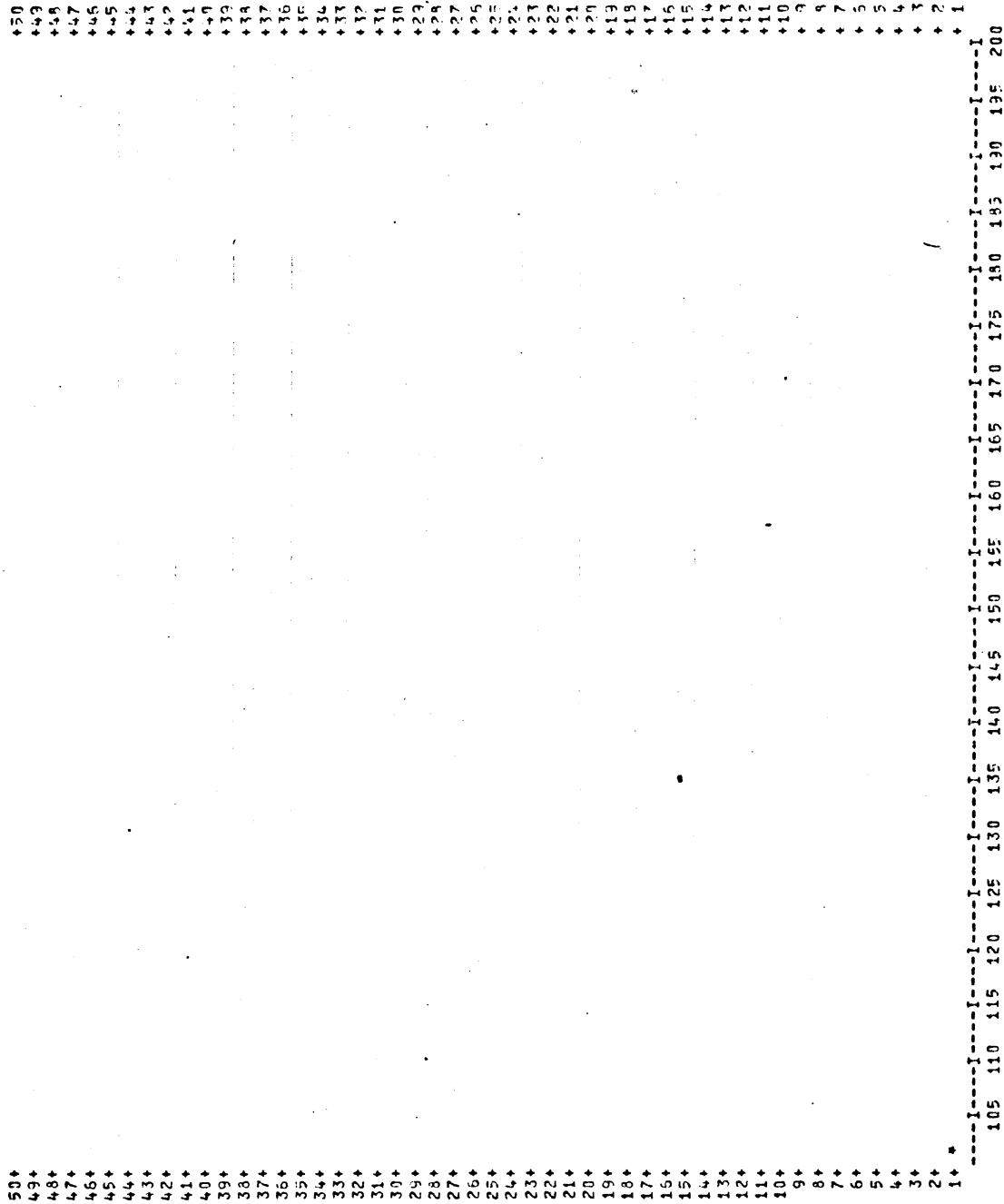
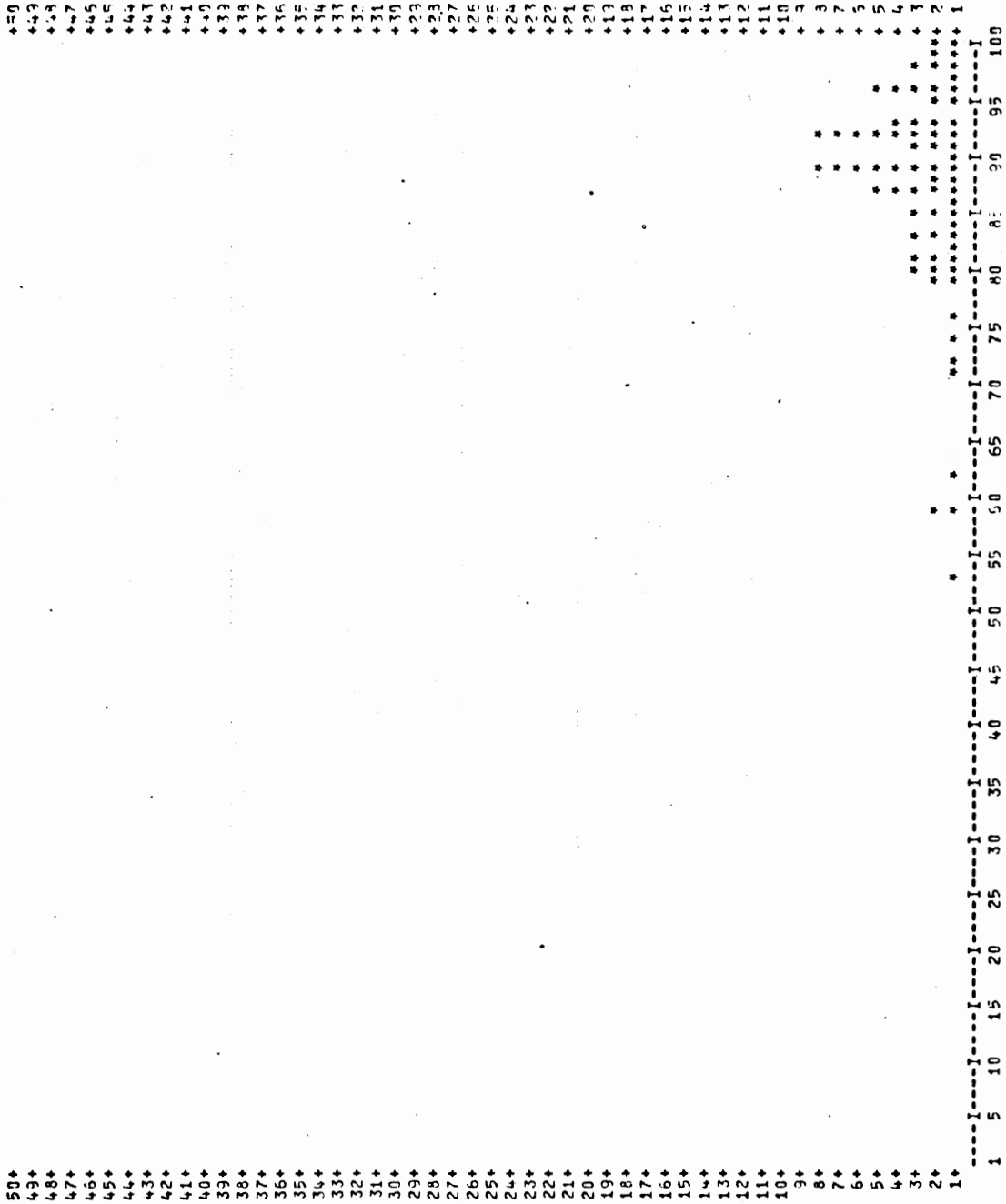


FIGURE 37. Length frequencies of yellowfin tuna for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

THE Y AXES = FREQUENCY(NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1

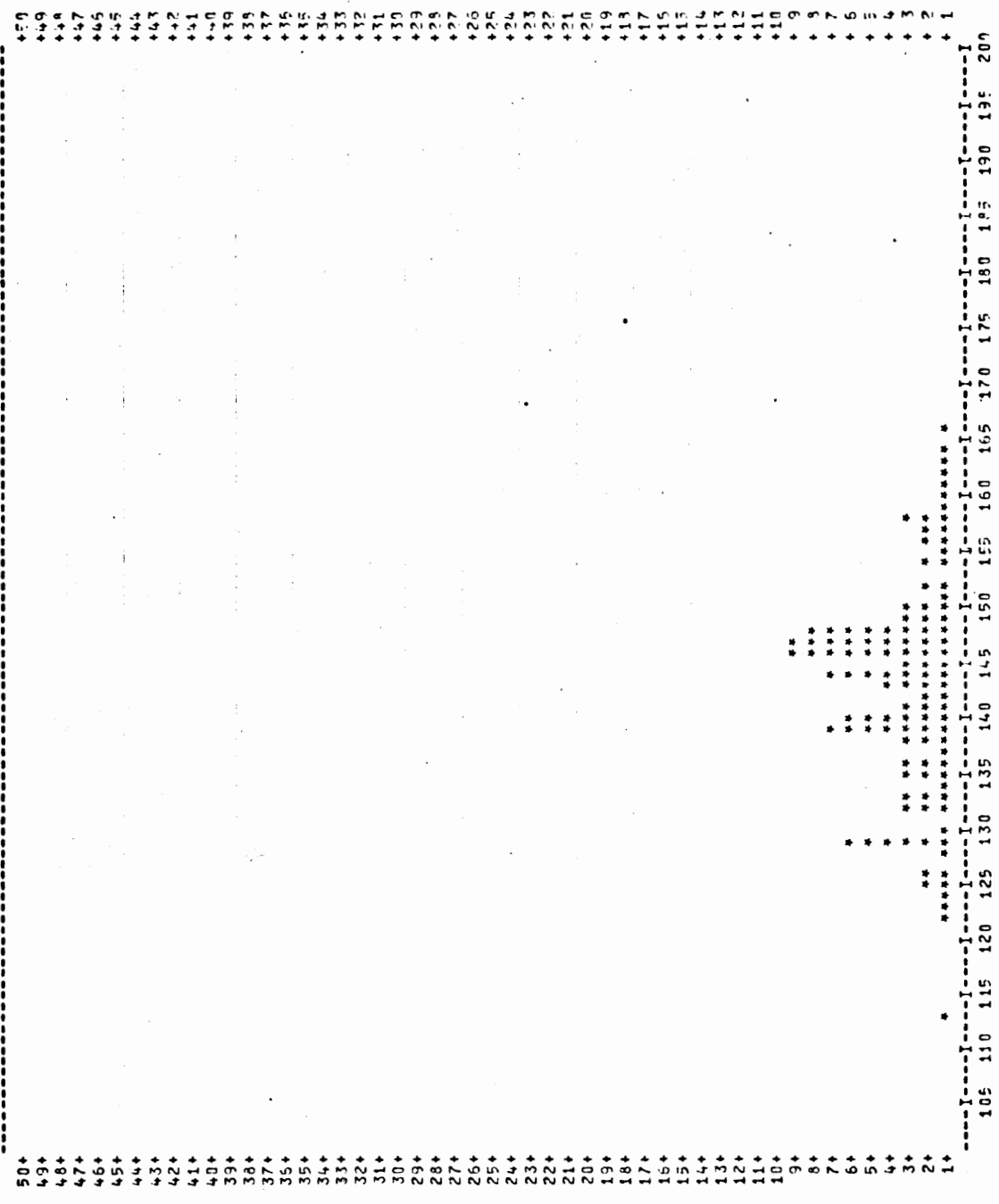


THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR YELLOWFIN TUNA (THUNNUS ALBACARES)  
 CUSING DECEMBER 1978.  
 TOTAL NO. = 122    MEAN = 104.197    STANDARD DEVIATION = 26.108

FIGURE 38. Length frequencies of yellowfin tuna for December 1978.  
 Total No. Quarter 253    Mean Length Quarter 85.409 cm



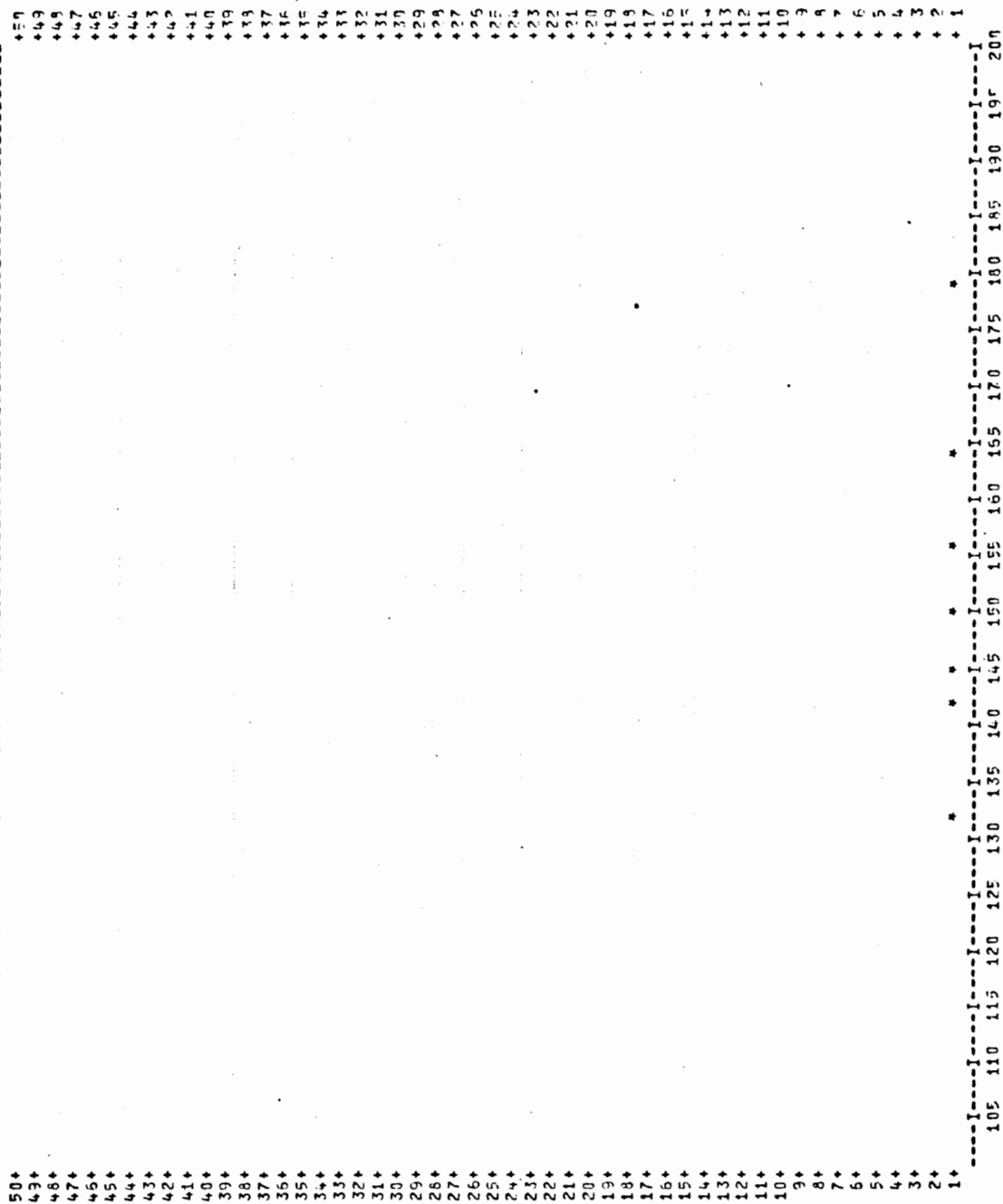
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
LENGTH HISTOGRAM FOR WAHOO (ACANTHOCYBIUM SOLANDERI)  
OCTOBER 1978  
TOTAL NO. = 117    MEAN = 142.863    STANDARD DEVIATION = 9.951

FIGURE 39. Length frequencies of wahoo for October 1978.

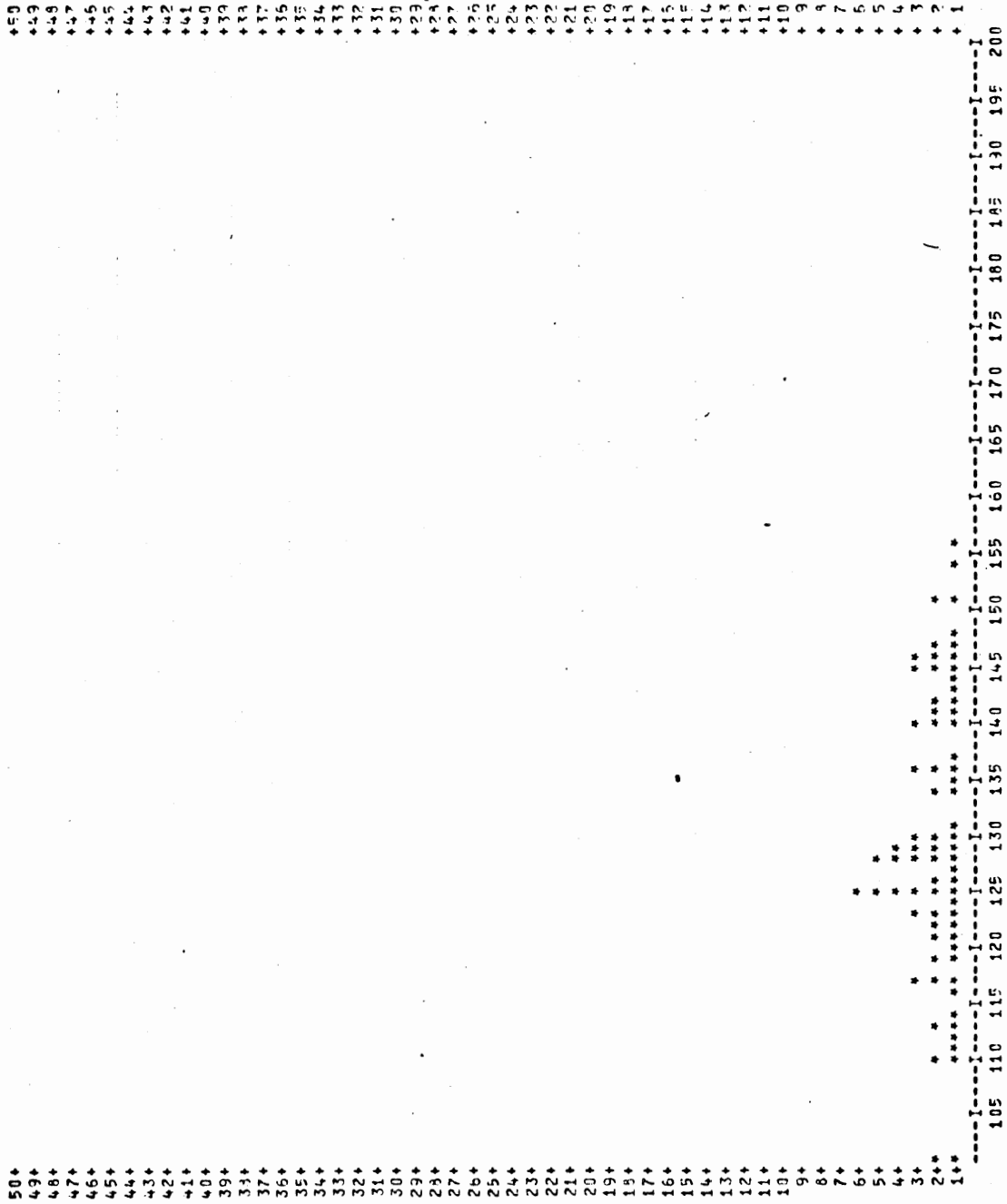
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR WAHOO (ACANTHOXYBIUM SOLANDERI)  
 CUPING NOVEMBER 1978.  
 TOTAL NO. = 7    MEAN = 152.571    STANDARD DEVIATION = 14.341

FIGURE 40. Length frequencies of wahoo for November 1978.

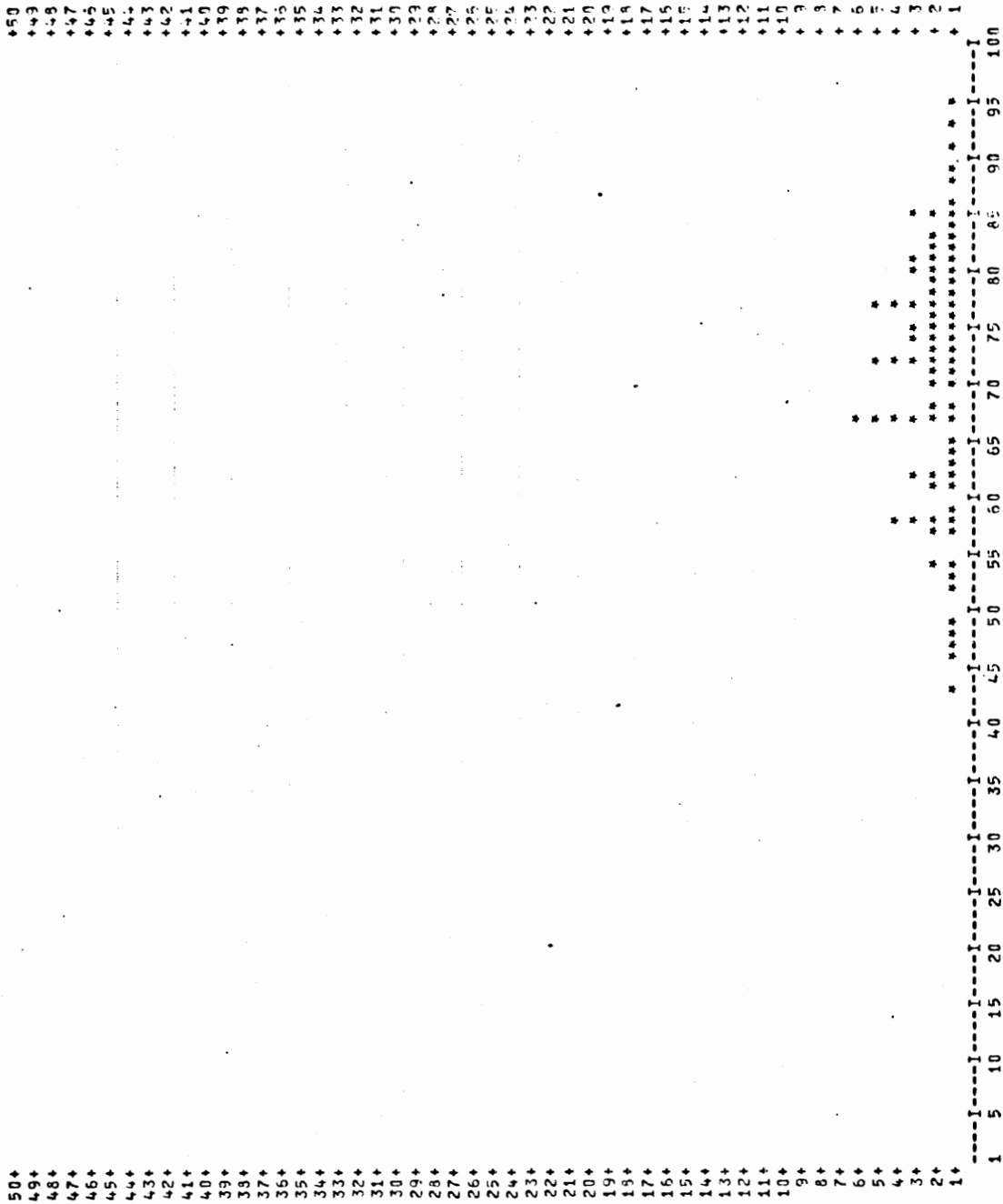
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
LENGTH HISTOGRAM FOR WAHOO (ACANTHOXYBIUM SOLANDERI)  
DURING DECEMBER 1978.  
TOTAL NO. = 75 MEAN = 129.907 STANDARD DEVIATION = 12.449

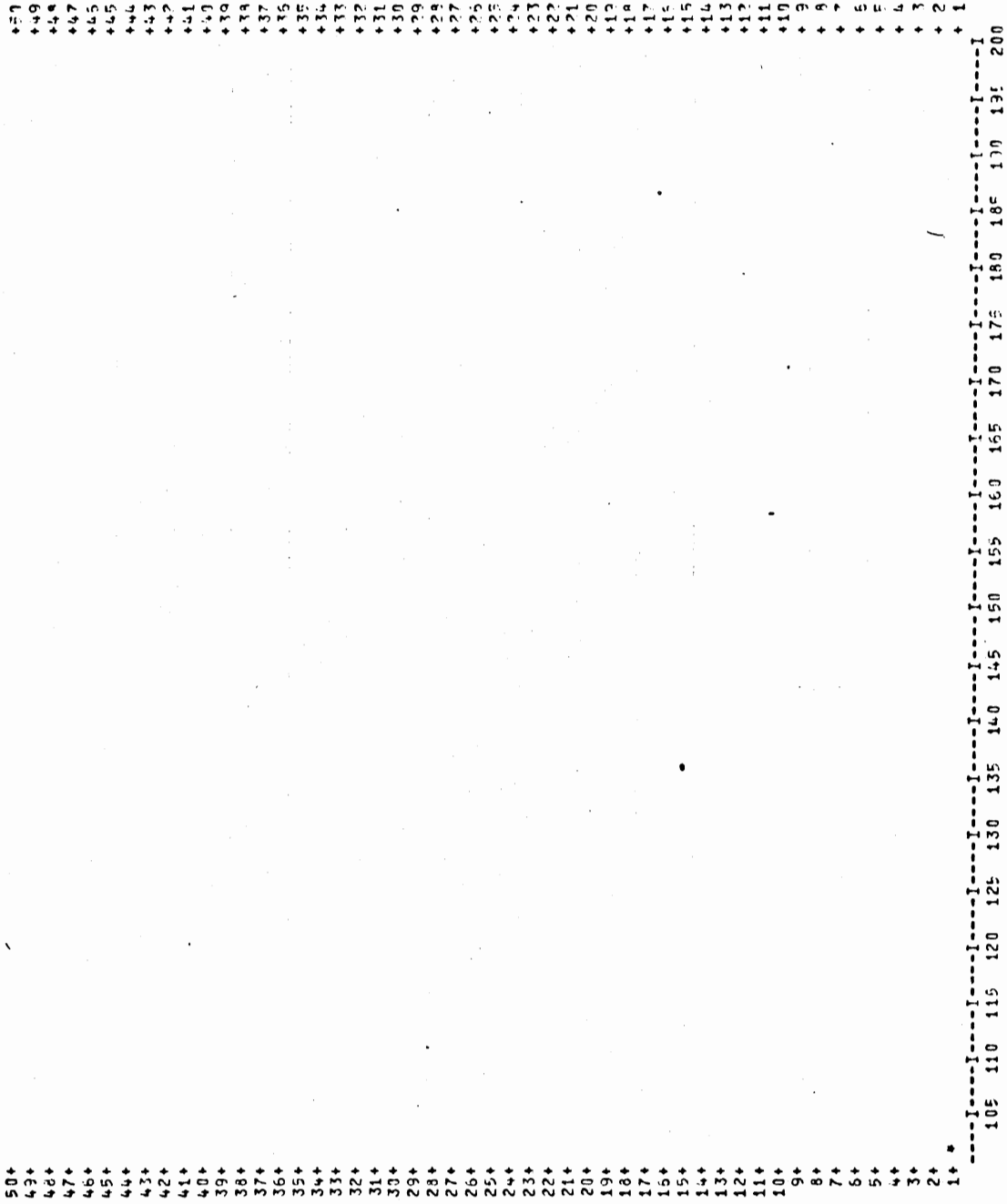
FIGURE 41. Length frequencies of wahoo for December 1978.  
Total No. Quarter 199 Mean Length Quarter 138.319 cm

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

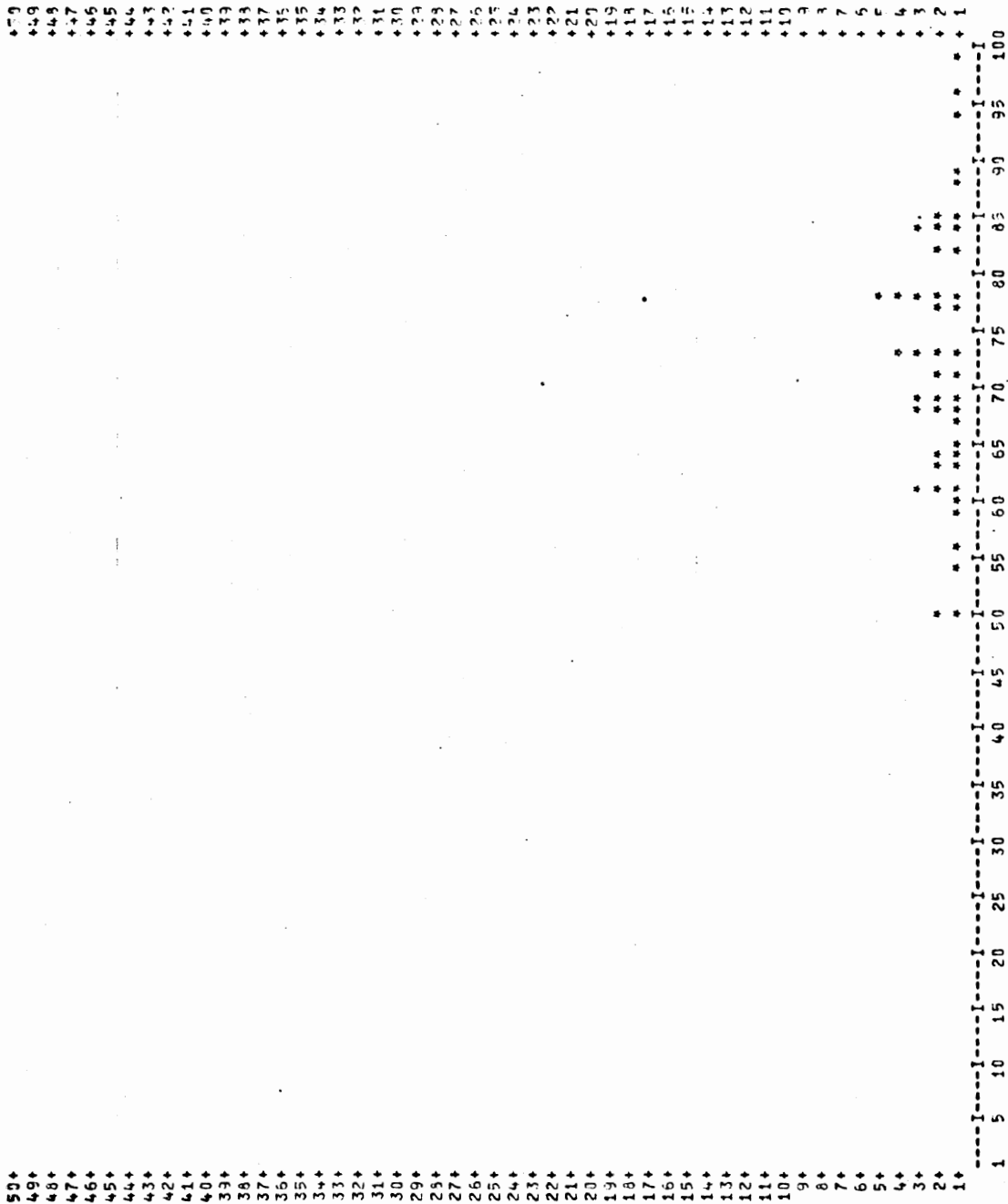
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR SNOWY GROUPEE (EPINEPHELUS NIVEATUS)  
CUPING OCTOBER 1978.  
TOTAL NO. = 81 MEAN = 71.247 STANDARD DEVIATION = 12.074

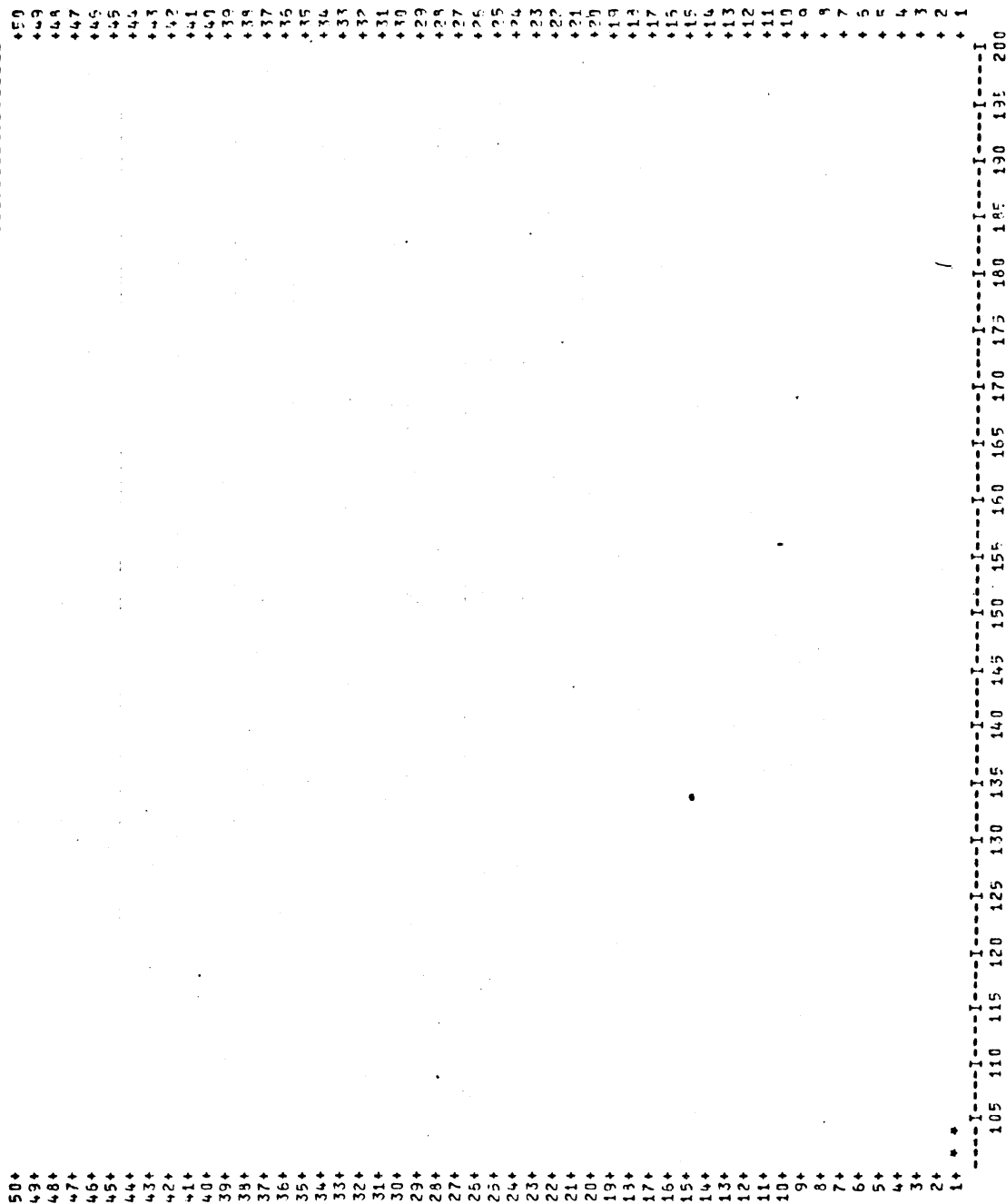
FIGURE 42. Length frequencies of snowy grouper for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

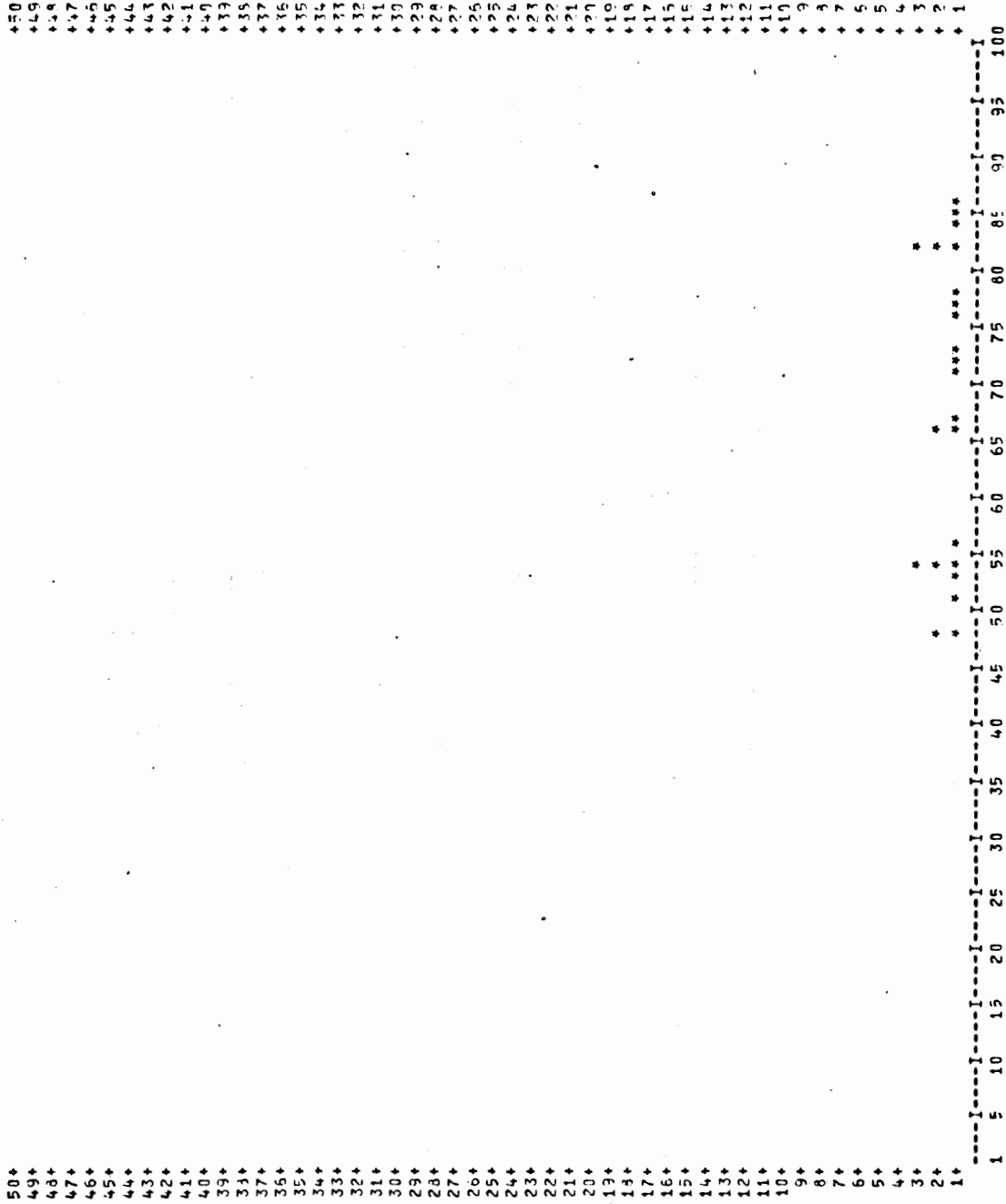
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
 LENGTH HISTOGRAM FOR SNOWY GROUPEE (EPINEPHELUS NIVEATUS)  
 DURING NOVEMBER 1978.  
 TOTAL NO. = 48      MEAN = 73.854      STANDARD DEVIATION = 12.879

FIGURE 43. Length frequencies of snowy grouper for November 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1

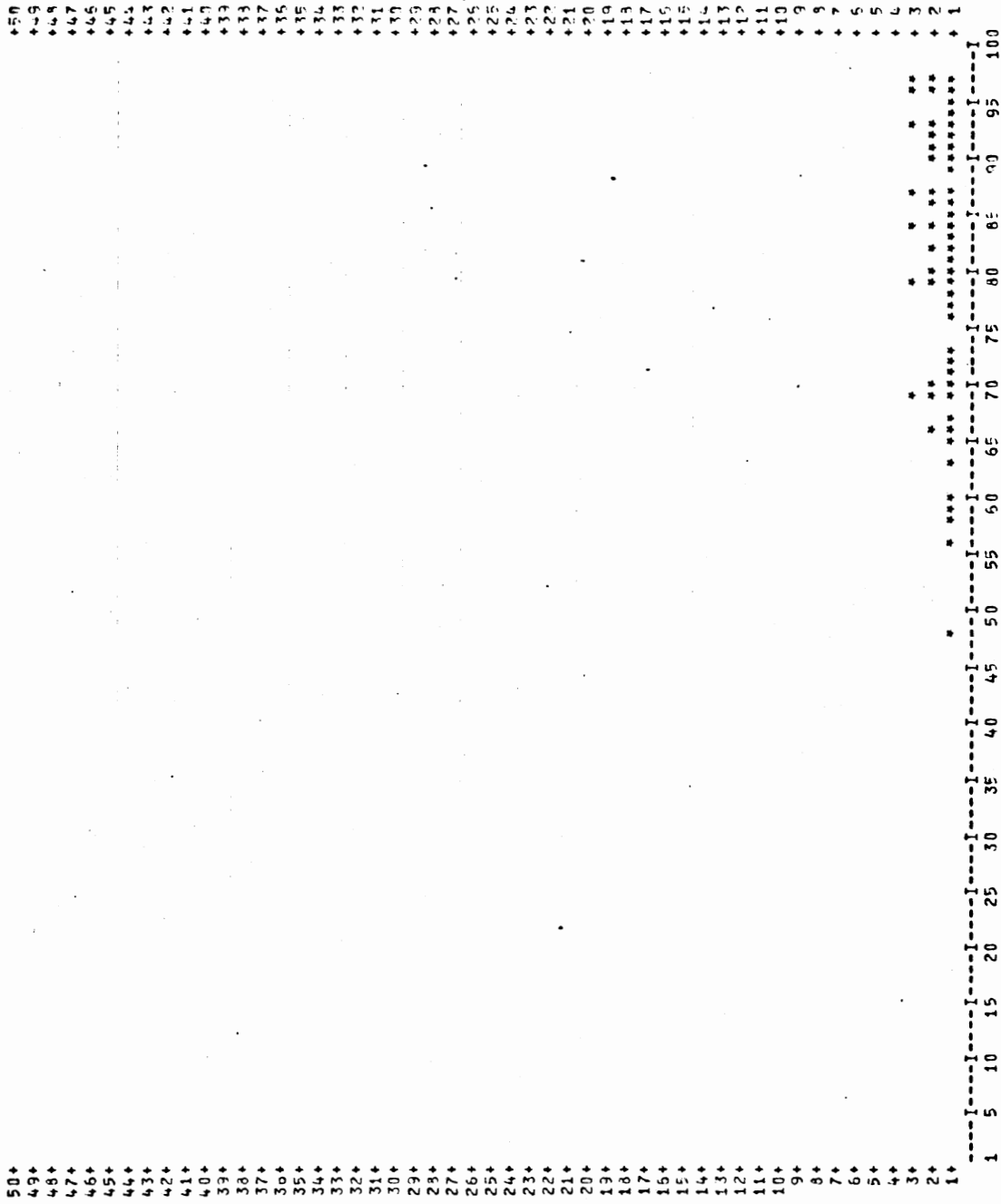


LENGTH HISTOGRAM FOR SNOWY GROUPEP (EPINEPHLUS NIVICATUS)  
 TOTAL NO. = 23      MEAN = 68.043      STANDARD DEVIATION = 12.865  
 THE X-AXIS = LENGTH (CENTIMETERS)

FIGURE 44. Length frequencies of snowy grouper for December 1978.  
 Total No. Quarter 152      Mean Length Quarter 71.585 cm



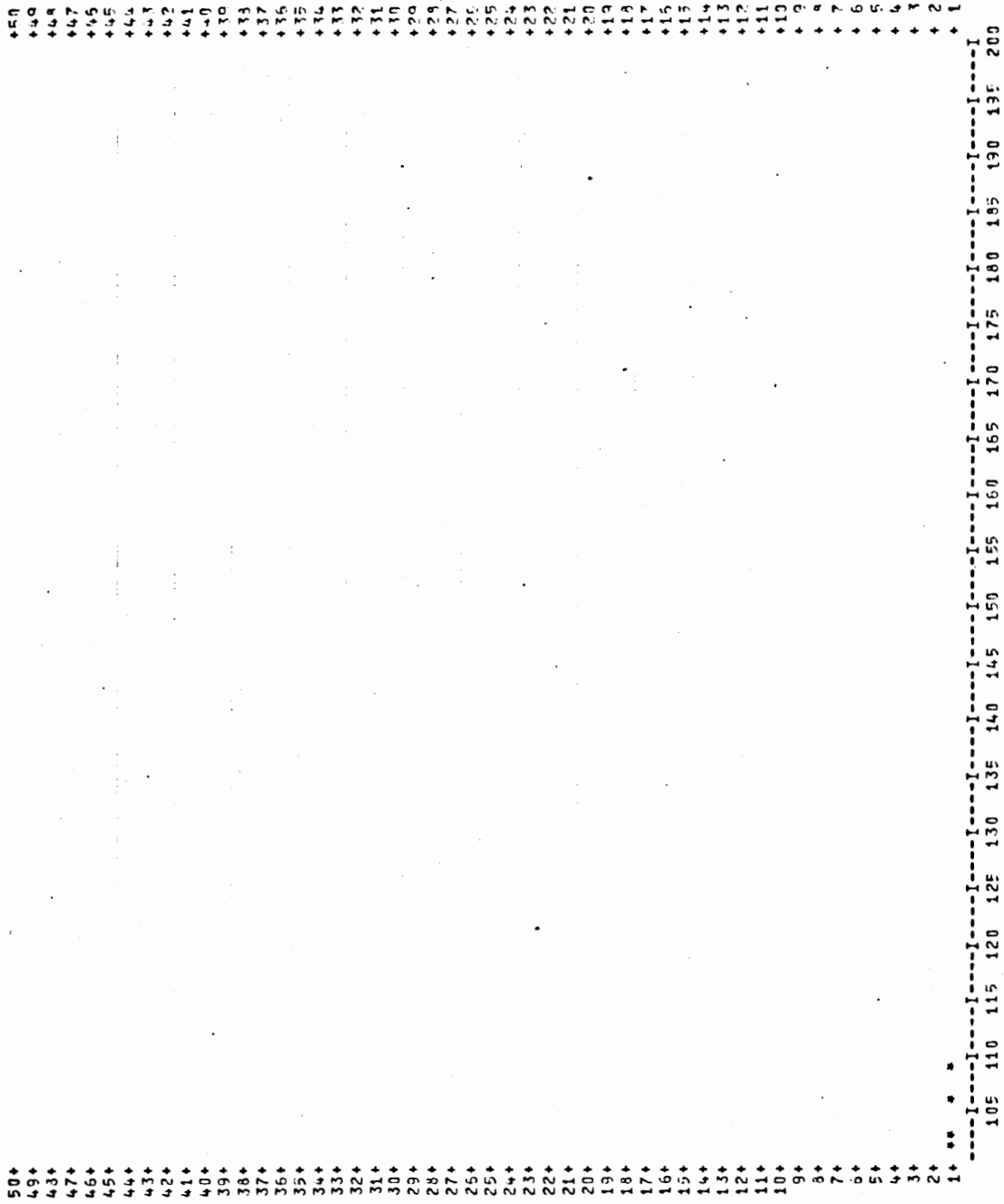
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

50+  
49+  
48+  
47+  
46+  
45+  
44+  
43+  
42+  
41+  
40+  
39+  
38+  
37+  
36+  
35+  
34+  
33+  
32+  
31+  
30+  
29+  
28+  
27+  
26+  
25+  
24+  
23+  
22+  
21+  
20+  
19+  
18+  
17+  
16+  
15+  
14+  
13+  
12+  
11+  
10+  
9+  
8+  
7+  
6+  
5+  
4+  
3+  
2+  
1+

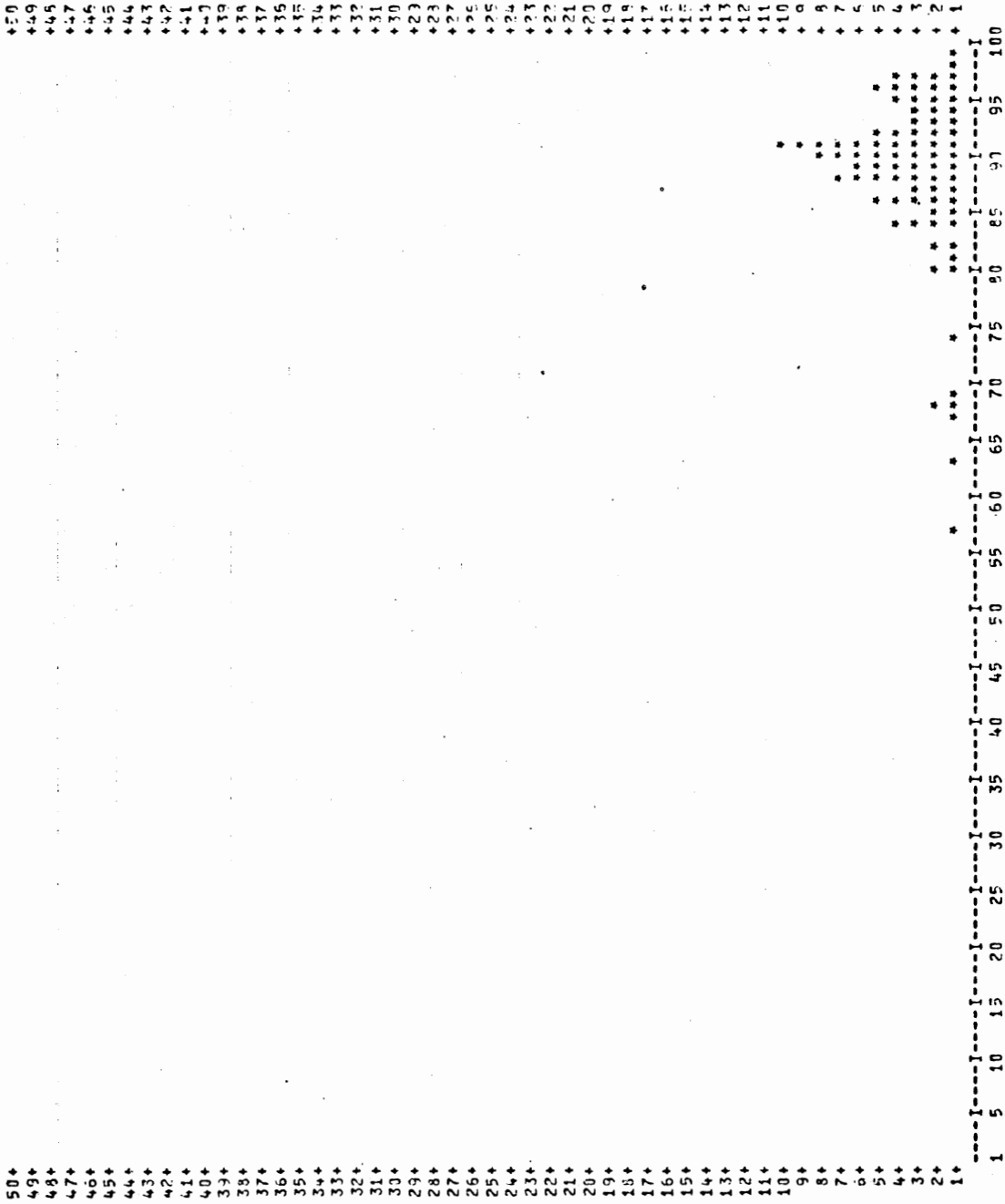
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
 MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPIRUS)  
 CUPING OCTOBER 1978.  
 TOTAL NO. = 61    MEAN = 81.951    STANDARD DEVIATION = 13.288

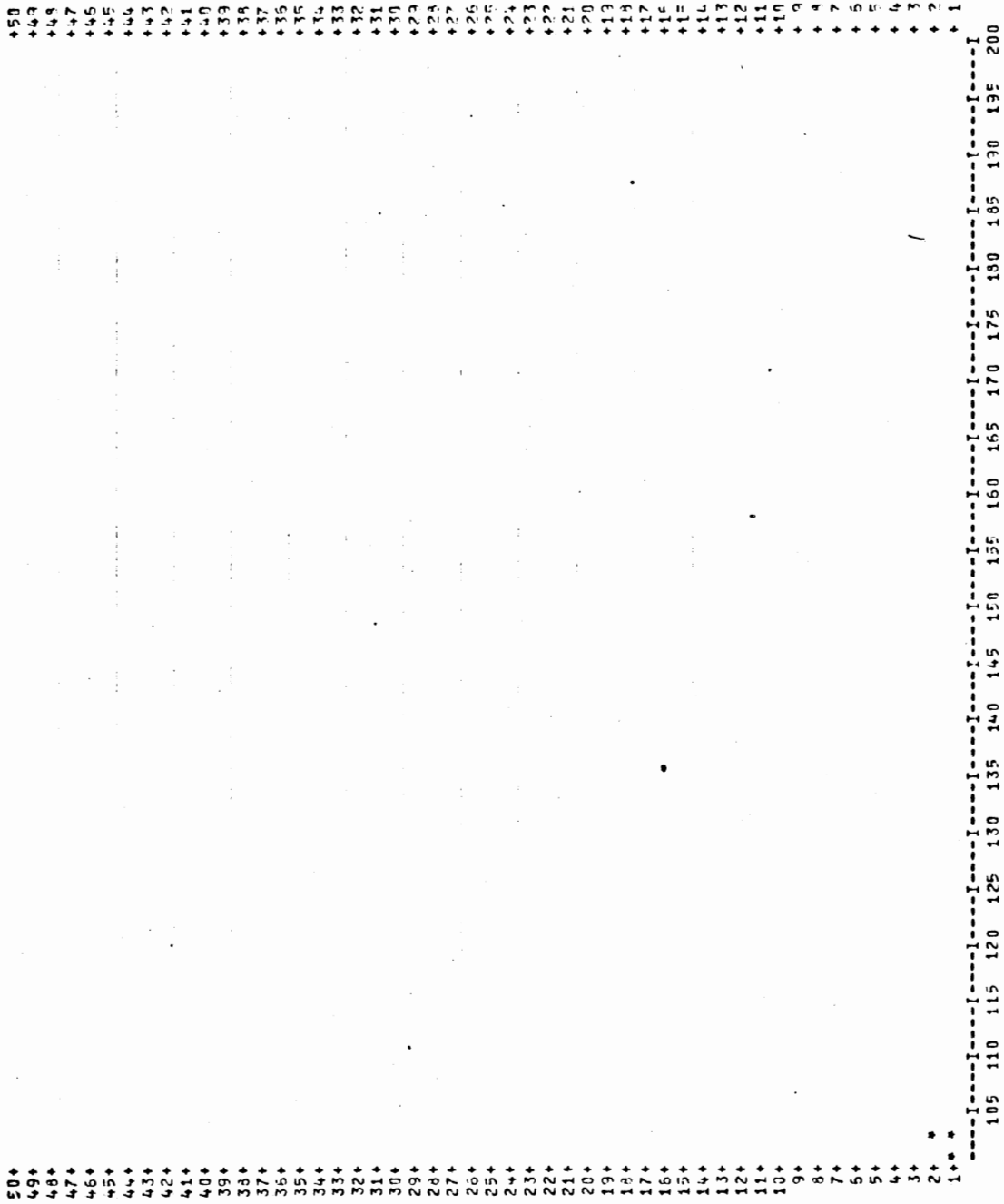
FIGURE 45. Length frequencies of dolphinfish for October 1978.

THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)

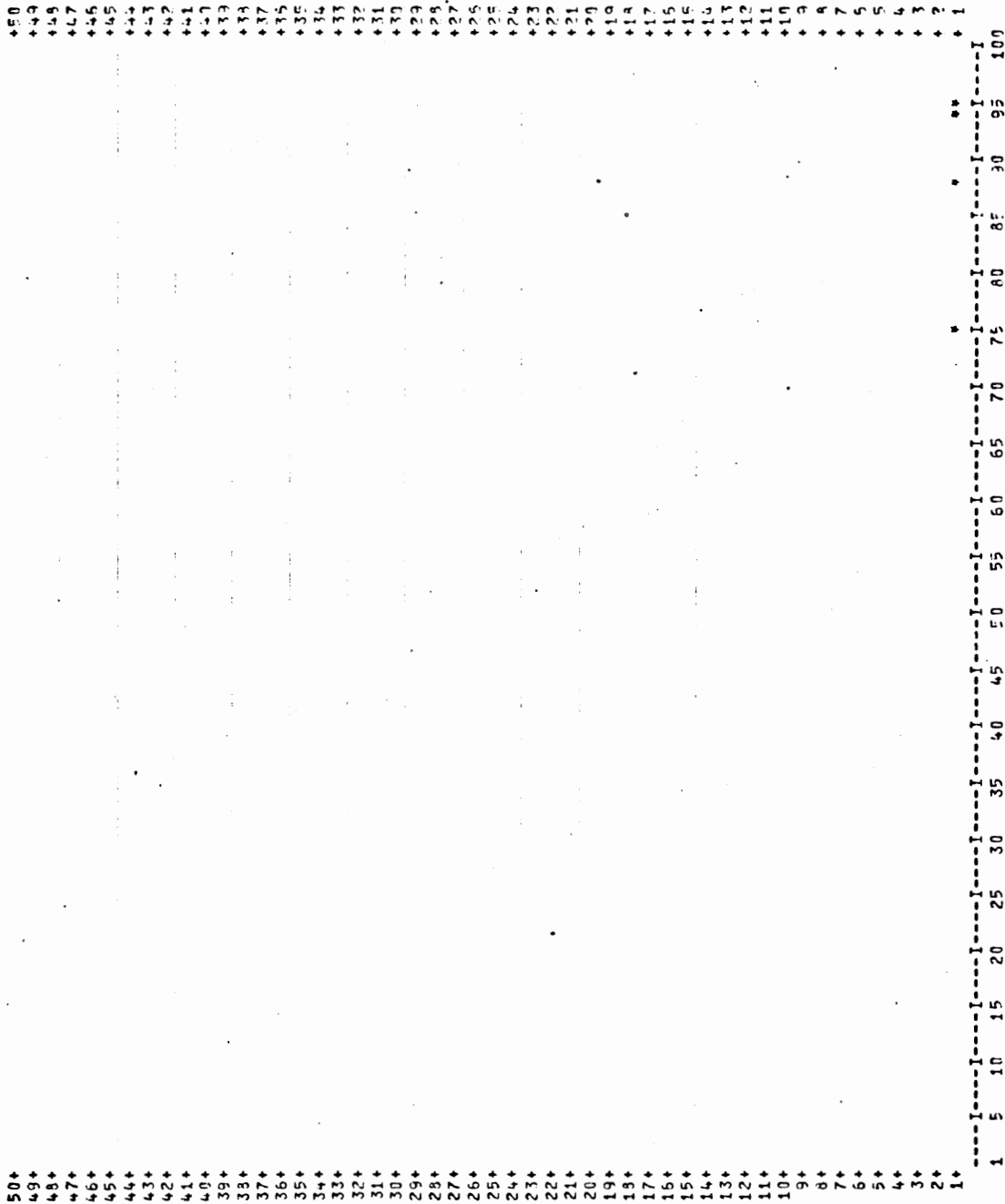
THE Y AXES = FREQUENCY (NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



THE X-AXIS = LENGTH (CENTIMETERS)  
LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPOCUS)  
CUPING NOVEMBER 1978.  
TOTAL NO. = 86 MEAN = 88.616 STANDARD DEVIATION = 8.195

FIGURE 46. Length frequencies of dolphinfish for November 1978.

THE Y AXES = FREQUENCY(NUMBER OF FISH)  
MULTIPLICATION FACTOR = 1



LENGTH HISTOGRAM FOR DOLPHINFISH (CORYPHAENA HIPPURUS)  
TOTAL NO. = 4      MEAN = 89.000      STANDARD DEVIATION = 7.669  
THE X-AXIS = LENGTH (CENTIMETERS)

FIGURE 47. Length frequencies of dolphinfish for December 1978.  
Total No. Quarter 151      Mean Length Quarter 85.907 cm