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Abundance indices for American plaice and yellowtail from stratified random surveys on the Grand Bank

by

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Introduction

Research vessel surveys of the Grand Bank have been conducted on a regular basis for many years, however up to 1971 these surveys used the line or transect method (Pinhorn 1971). In 1971 the survey method was changed to the stratified random system (Grosslein and Pinhorn 1971). Obviously, the prime purpose of these surveys is the determination of fish abundance and this paper presents some data which point to the apparent success of the surveys in providing this information.

Methods

The stratification of the Grand Bank is shown in Figures 1 and 2. The strata used to indicate abundance of American plaice are show in Figure 1 and for yellowtail, Figure 2. Strata with the longest series of data were chosen. These were all in Divisions 3L and 3N. For plaice, strata down to 150 fath (274 m) were chosen. For yellowtail, strata to a maximum of 50 fath (91 m) were used. In years in which some of the selected strata were not fished, estimates were made using strata of the same depth and in the same ICNAF Division with continuous data series. This was similar to the methods described by Bishop (1977) (Method 1).

The average numbers and weights per survey set was also related to the spawning biomass and spawning population calculated from Cohort Analysis.

The survey sets were standardized as much as possible,using the same ship, the A.T. Cameron, with the 41-5 bottom otter trawl with a lined codend. All sets were of 30 minutes duration and as far as possible, dragging was done over uniform depths.

Trends in Abundance Indices

American Plaice

The average weight and number per set in Division 3L indicated a general decline from 1971 to 1973-74 and an overall upward trend since then (Fig. 3). In Division 3N, somewhat the same trends were in evidence, but the decline in average weight per set continued until 1975. The size of fish was larger in the earlier years.

Yellowtail

Generally, the same trend as noted for plaice occurred (Fig. 4). The average number and weight

per set were highest in 1971 and 1972, declining drastically in 1973 and 1974 with an apparent general recovery since then.

Relationship between Abundance Indices and Spawning Biomass and Population Numbers from Cohort Analysis

Excellent correlations were found between abundance indices (average numbers and weights per set) and estimates of spawning biomass and population numbers as calculated by Cohort analysis for plaice (Fig. 5) and yellowtail (Fig. 6). Biomass and numbers for 8 years and older for males and 10 years and older for females were used. In the case of yellowtail, males and females 7 years and older were used.

Discussion

Of the various demersal species surveyed in Subarea 3, one would probably expect to get the best results from flatfish from the random stratified method since, at least for plaice and yellowtail, there appears to be only minimal movement of the adult fish. There is no evidence of massed spawning or feeding concentrations which would dictate seasonality to surveys. Diurnal movement, while recorded for plaice (Pitt 1967) is probably related to local feeding conditions and is not evident in yellowtail.

No consideration was given to the relatively large variances about the average values from the survey sets. The trends in the average values appear, however, to be a valid indication of abundance especially when considered along with the correlation with spawning stock biomass and numbers.

One of the problems with the surveys is the fact that the younger age groups were caught only in relatively low quantities. This was especially so with yellowtail and this problem will have to be approached with gear designed especially for this purpose.

References

Grosslein, M. D. and A. T. Pinhorn. 1971. Progress in development of a co-ordinated survey program in the ICNAF Area. Intern. Comm. Northw. Atlant. Fish. Res. Doc. 71/128, Ser. No. 2634 (mimeo).

Pinhorn, A. T. 1971. Objectives and characteristics of existing and proposed groundfish surveys by the Fisheries Research Board of Canada Biological Station, St. John's, Newfoundland. Intern. Comm. Northw. Atlant. Fish. Res. Bull. 71/36, Ser. No. 2527 (mimeo).

Pitt, T. K. 1967. Diurnal variations in the catches of American plaice (Hippoglossoides platessoides, Fabr.) from the Grand Gank. Intern. Comm. Northw. Atlant. Fish. Res. Bull. No. 4: 53-58.

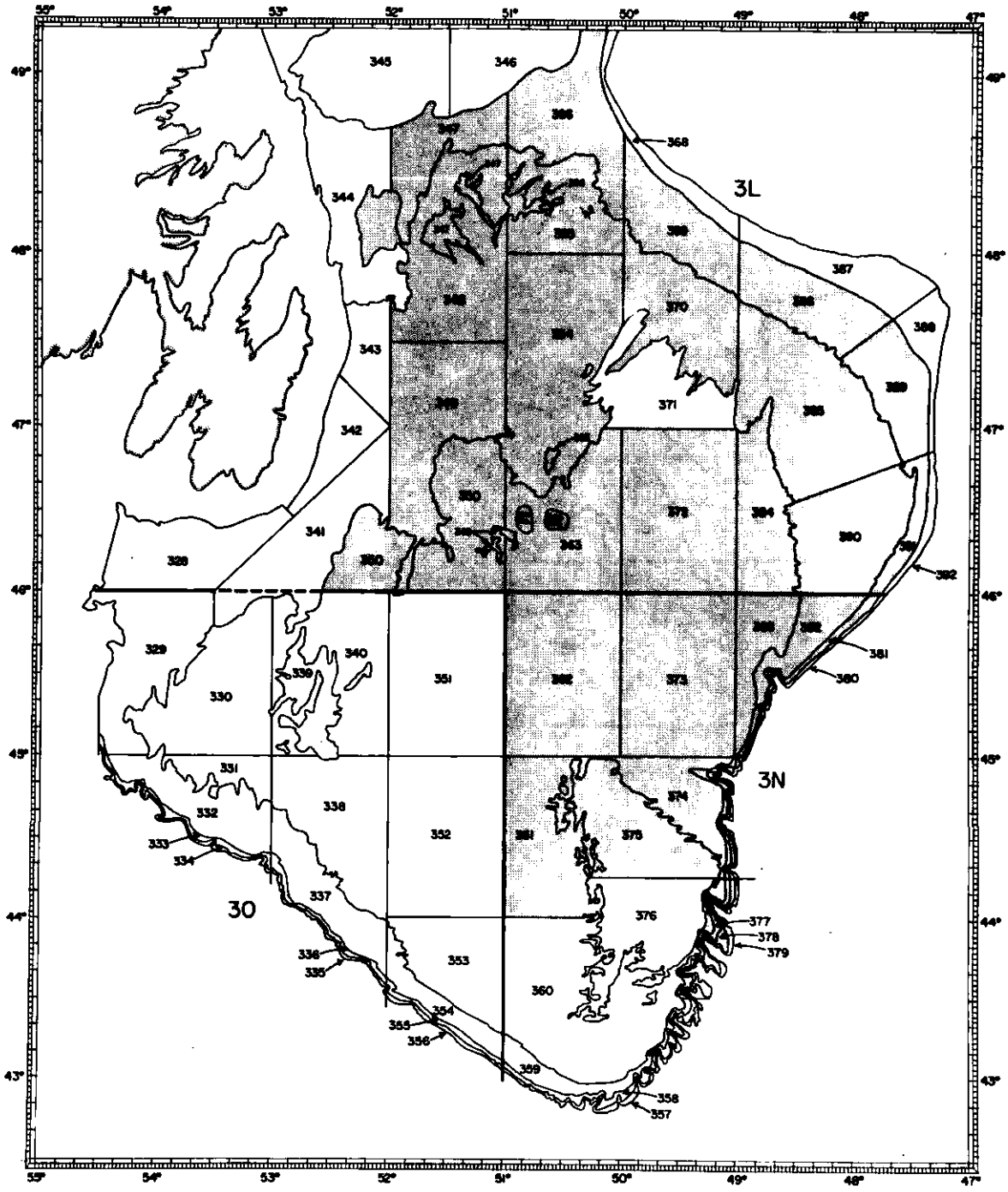

Fig. 1. Stratification of the Grand Bank with the areas used to calculate plaice average number and weight per set (shaded).

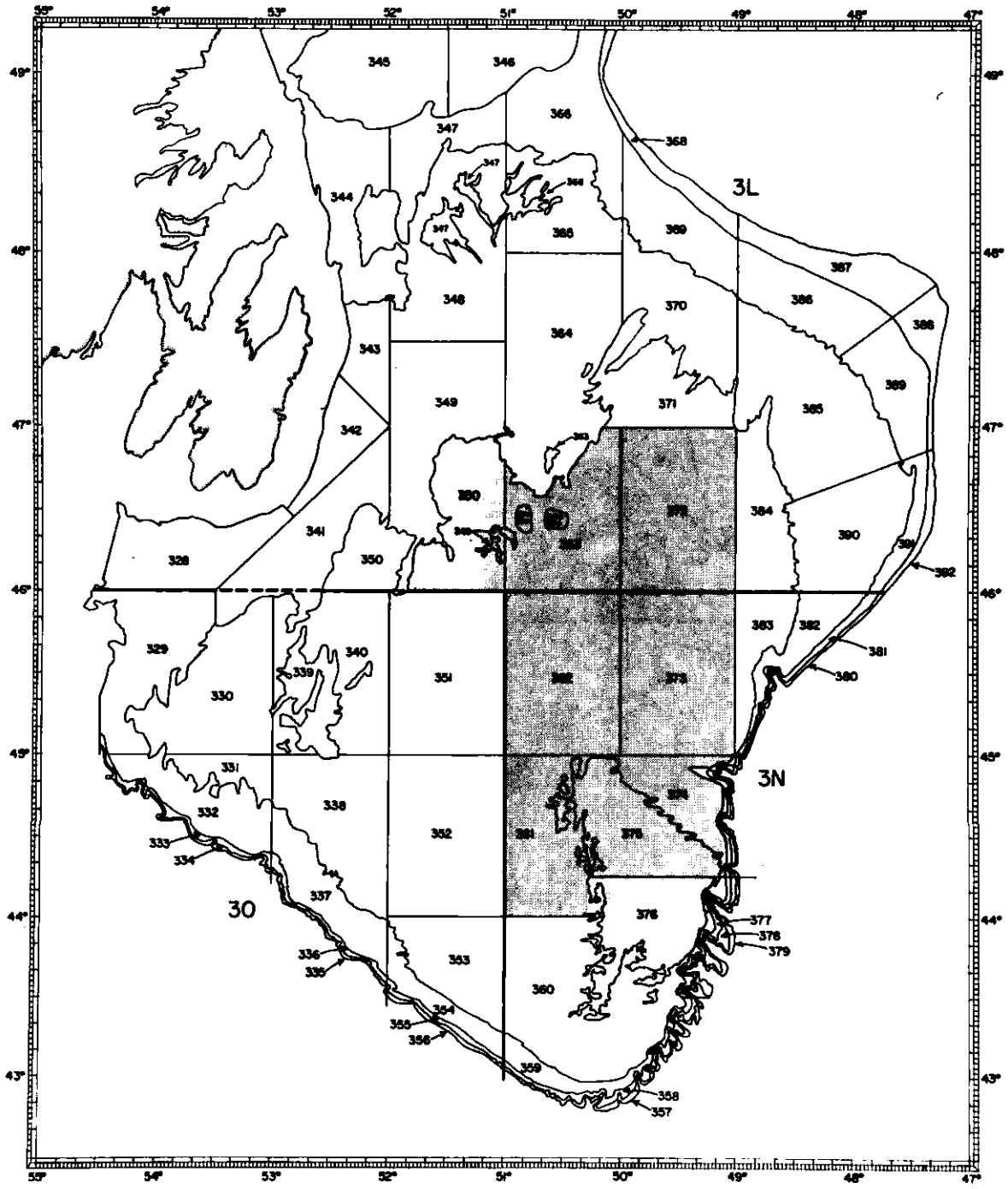

Fig. 2. Stratification of the Grand Bank with the areas used to calculate yellowtail average number and weight per set (shaded).

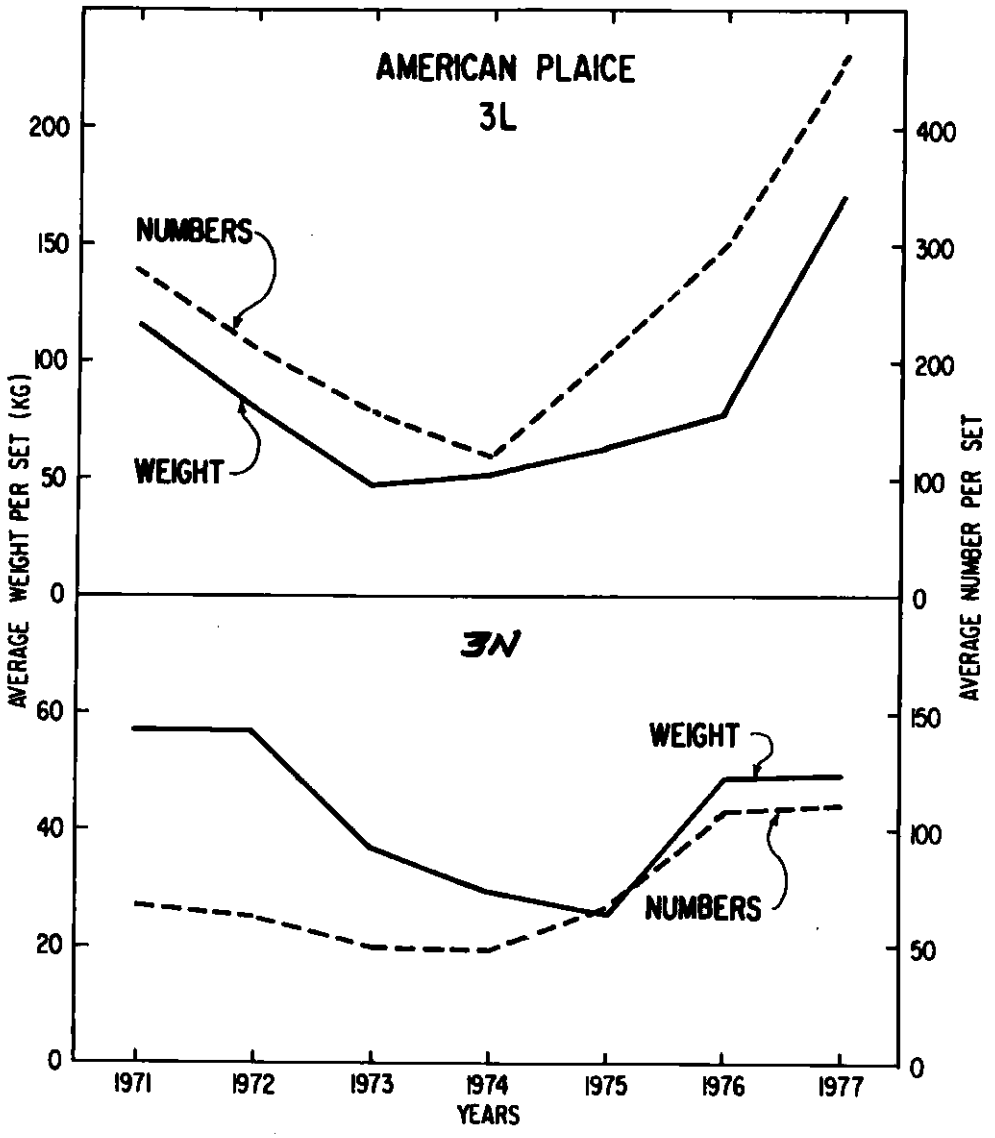

Fig. 3. Average number and weight per set of plaice from stratified random surveys in Divisions 3L and 3N.

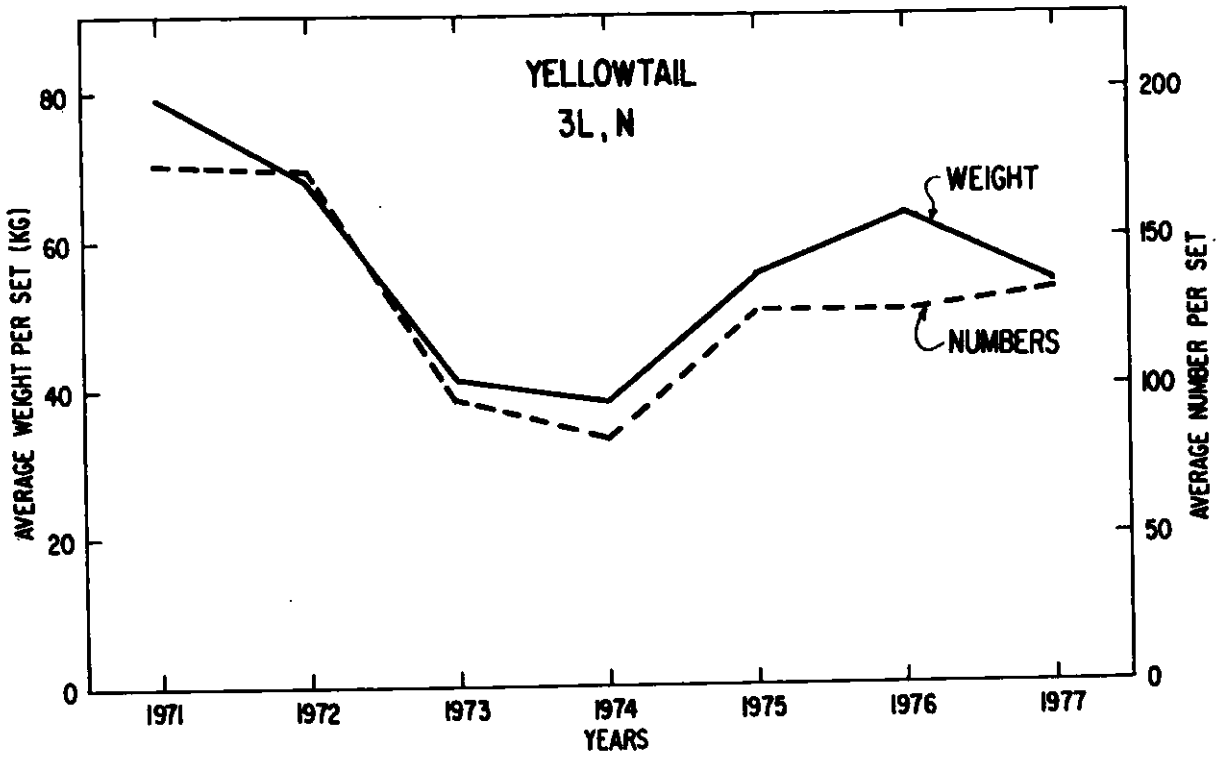

Fig. 4. Average number and weight per set of yellowtail from stratified random surveys in Divisions 3LN.

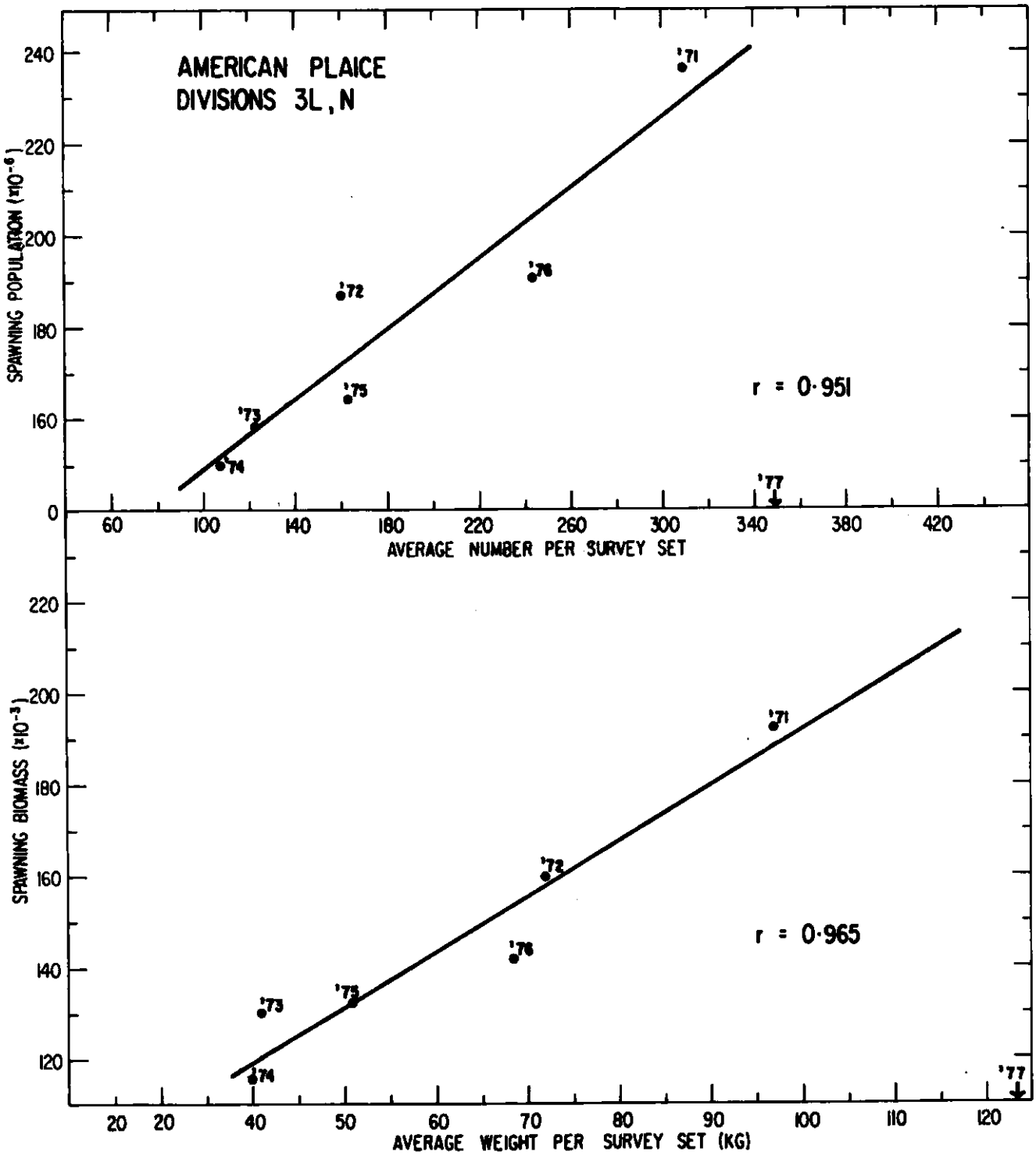

Fig. 5. Spawning biomass and numbers of plaice from Cohort Analysis plotted on average number and weight per set.

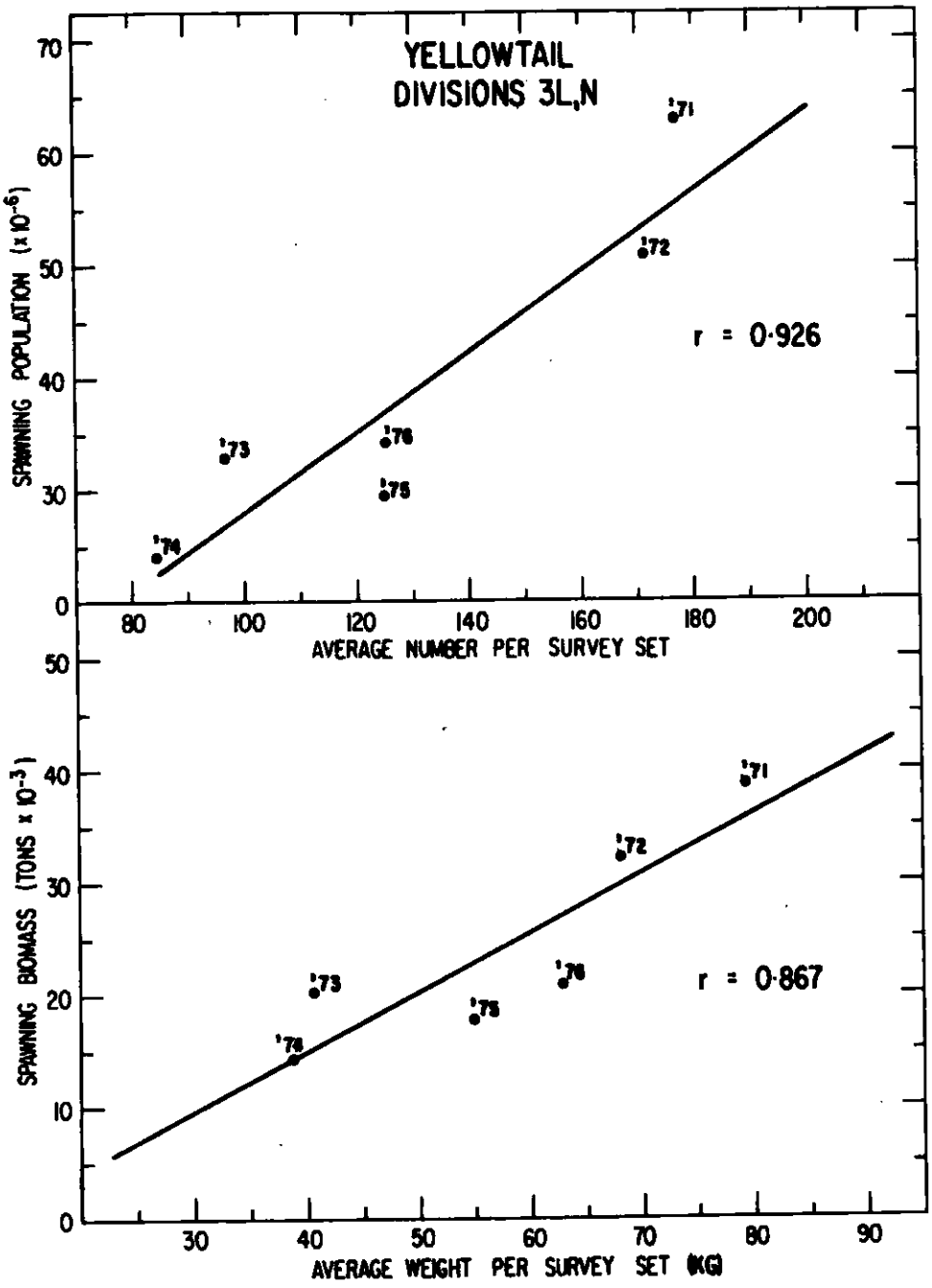

Fig. 6. Spawning biomass and numbers of yellowtail from Cohort Analysis plotted on average number and weight per set.