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Comments on the Delineation of Red and Silver

Hake Stocks in ICNAF Subarea 5 and Statistical

Area 6

by

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ABSTRACT

Stock identification studies and seasonal distribution as indicated by U.S. groundfish survey catches suggest possible delineations of red and silver hake stocks in Subarea 5 and Statistical Area 6. Considering the lack of definitive data and the potential assessment and management problems associated with the proposed stock groupings, the most acceptable approach may be to define the stocks by (1) 5Zw-6, (2) 5Ze, and (3) 5Y.

INTRODUCTION

Two red hake and three silver hake stocks are presently under quota regulation in ICNAF Subarea 5 and Statistical Area 6. The red hake stocks, as presently delineated for management, occupy (1) Subdivision 5Ze east of the 69° W longitude line and (2) the portion of 5Ze west of the 69° W line as well as Subdivision 5Zw and Statistical Area 6. The silver hake stocks, for management purposes, occupy (1) Division 5Y, (2) Subdivision 5Ze, and (3) Subdivision 5Zw and Statistical Area 6. The purpose of this paper is to (1) review the results of past studies dealing with the identification of these stocks; (2) briefly examine the seasonal distribution of these two species, indicated by U.S. groundfish survey catches, as it relates to the question of stock identity; and (3) suggest possibilities for the realignment of the stocks by area.

RED HAKE

Rikhter (1968) reported the existence of separate stocks (1) on the northwest slope of Georges Bank, (2) on the southwest slope of Georges Bank, and (3) from 5Zw to Hudson Canyon based on morphometric, otolith, and growth rate differences. He indicated an undetermined amount of mixing between the latter two stocks. Rikhter (1970) indicated only two stocks in the SA 5-6 area, the first inhabiting the southern and southwestern parts of Georges Bank and the second extending southwesterly from Cape Cod. A chart in the latter paper showed the zone of overlap between the two stocks occurring approximately between 70° 10' W and 70° 50' W longitude.

Three red hake stocks were assumed by Anderson (1974): (1) Georges Bank (statistical areas 522-525 - see Figure 1), (2) Southern New England-Middle Atlantic (statistical area 526, 5Zw, and SA 6), and (3) Gulf of Maine (5Y and statistical area 521). Landings from the latter area, averaging only 2,200 MT in 1960-72 (Anderson, 1974), have not been of significant magnitude recently to justify assessment consideration.

U.S. groundfish survey catches indicate seasonal distribution and movement patterns of red hake. Number per tow from selected surveys were plotted to illustrate these patterns (Figures 2-5). Winter (Figure 2) and spring (Figure 3) surveys indicate the general absence of red hake from the shallower (less than 60 fathoms) portion of Georges Bank with fish concentrated in deep water to the northwest of Georges Bank and in the Gulf of Maine as well as along the continental shelf south and west of Georges Bank. Summer (Figure 4) and fall (Figure 5) surveys show a widespread distribution of fish in both shoal and deep water. These data denote the annual movement from deep to shoal water in spring and early summer and the return to deep water in fall and early winter.

The fish occupying the northwest shoals of Georges Bank and the shoal areas of the Gulf of Maine during summer and fall both probably occupy the deep water area north and northwest of Georges Bank during winter and spring. If this is so, either mixing of two separate stocks occurs or they constitute a single stock of which part migrates inshore to spawn and part remains offshore.

Fish from the stock on the southern and southwestern part of Georges Bank most likely occupy shoal portions of Georges Bank (e.g. strata 13, 16, 19 - see Figure 6) during summer and fall. It is possible that some mixing may occur during that time with the stock occupying the northwest part of Georges Bank.

Winter and spring surveys tend to suggest separate concentrations of fish on the southern and southwestern slopes of Georges Bank and in the area extending from 5Zw to Hudson Canyon, although there is not a complete separation of the two groups. Summer and fall surveys show a widespread distribution from Georges Bank to Hudson Canyon supporting the concept of mixing between these stocks.

Several possible schemes for the delineation of red hake stocks for assessment and management purposes are suggested. Contrary to the 1972 Assessment Subcommittee Report (ICNAF Redbook 1972, Part I), the eastern boundary of the Southern New England-Middle Atlantic stock should be the 70° W longitude line (5Zw - 5Ze line) instead of the 69° W line, so as to conform with the findings of Rikhter (1970). If the concept of one stock occupying only the southern and southwestern part of Georges Bank and another stock occupying the northern part of Georges Bank and the Gulf of Maine was accepted, then the former could be delineated by U.S. statistical areas 524-526 and the latter by Division 5Y and statistical areas 521-523 (Figure 1). The three proposed stock groupings would be encompassed, respectively, by sampling strata (1) 1-8, 61-76, (2) 9-19, and (3) 20-30, 36-40 (Figure 6).

The use of the 70° W line instead of the 69° W line as the boundary between the Southern New England-Middle Atlantic and Georges Bank stocks eliminates the problem with catch statistics for assessment and management. However, the use of the proposed delineation for the other two stocks creates this very same problem since only U.S. landings are presently reported by statistical area. Since there are no precise scientific data on which to base the proposed stock delineations, the simplest approach from both an assessment and management standpoint may be to delineate the stocks by (1) 5Zw-6, (2) 5Ze, and (3) 5Y. Additional and more conclusive stock identification studies are necessary before a further refinement of the various stock boundaries is possible.

SILVER HAKE

Conover *et al.* (1961) reported two distinct silver hake stocks, one in the Gulf of Maine and one south of Cape Cod, from an analysis of various morphometric measurements. This study did not find any significant differences between inshore Gulf of Maine fish and offshore (northwest Georges Bank) fish. Nichy (1969) showed a difference in otolith zonal formation and length at age between Gulf of Maine and Southern New England silver hake using 41° 30'N latitude as the dividing line. Konstantinov and Noskov (1969) reported that serological analysis had distinguished two stocks in SA 5-6: (1) Georges Bank and (2) Middle Atlantic, the latter stock extending from Cape Cod to Cape Hatteras. A division was suggested between the two stocks in the Nantucket Shoals area, which is the location of the 5Zw-5Ze boundary (70° W longitude line), with a mixing during fall and winter.

Recent U.S. assessment studies have considered three silver hake stocks: (1) Gulf of Maine, (2) Georges Bank, and (3) Southern New England-Middle Atlantic. The areas delineating these stocks are the same as described earlier for red hake: Gulf of Maine (5Y and statistical area 521), Georges Bank (statistical areas 522-525), and Southern New England-Middle Atlantic (statistical area 526, 5Zw and SA 6).

The inclusion of statistical area 521 (part of 5Ze) in the Gulf of Maine stock is based on the fact that most of the U.S. landings from 521 come from the inshore area on the east side of Cape Cod which is separated from Georges Bank by the Great South Channel and hence are assumed to come from the Gulf of Maine stock and not the Georges Bank stock.

U.S. groundfish survey catches (Figures 7-10) indicate seasonal distribution and movement patterns virtually identical to those exhibited by red hake. These patterns suggest that fish from both the Gulf of Maine and the northwest part of Georges Bank occupy the same or adjacent deep water wintering grounds and hence may belong to the same stock. Earlier U.S. studies indicated no differences between fish from these two areas. Spawning occurs in shoal areas both inshore and offshore (on Georges Bank) as evidenced by catches of young-of-the-year in both areas during fall surveys. Young-of-the-year fish caught on Georges Bank could emanate from spawning by fish migrating onto the shoal areas from both the south and the north. Further studies are necessary to define the relationship between the Gulf of Maine and the northern Georges Bank silver hake.

In view of the preceding discussion, a possible scheme for the delineation of the three silver hake stocks is suggested. The eastern boundary of the Southern New England-Middle Atlantic stock should be kept as the 70° W longitude line instead of the 69° W line since (1) there appears to be no scientific basis for the latter and (2) it enables the use of past reported catch statistics for assessments. The Georges Bank stock could include statistical areas 524-526 (Figure 1) as suggested for the Georges Bank red hake stock. The northern Georges Bank-Gulf of Maine stock could include 5Y and statistical areas 521-523. The sampling strata delineating these stocks are the same as suggested for red hake (Figure 6).

As mentioned earlier for red hake, sufficiently definitive data are presently not available to support or justify the use of the proposed stock delineations. Therefore, the most acceptable procedure may be to define the stocks by (1) 5Zw-6, (2) 5Ze, and (3) 5Y unless future studies indicate to the contrary.

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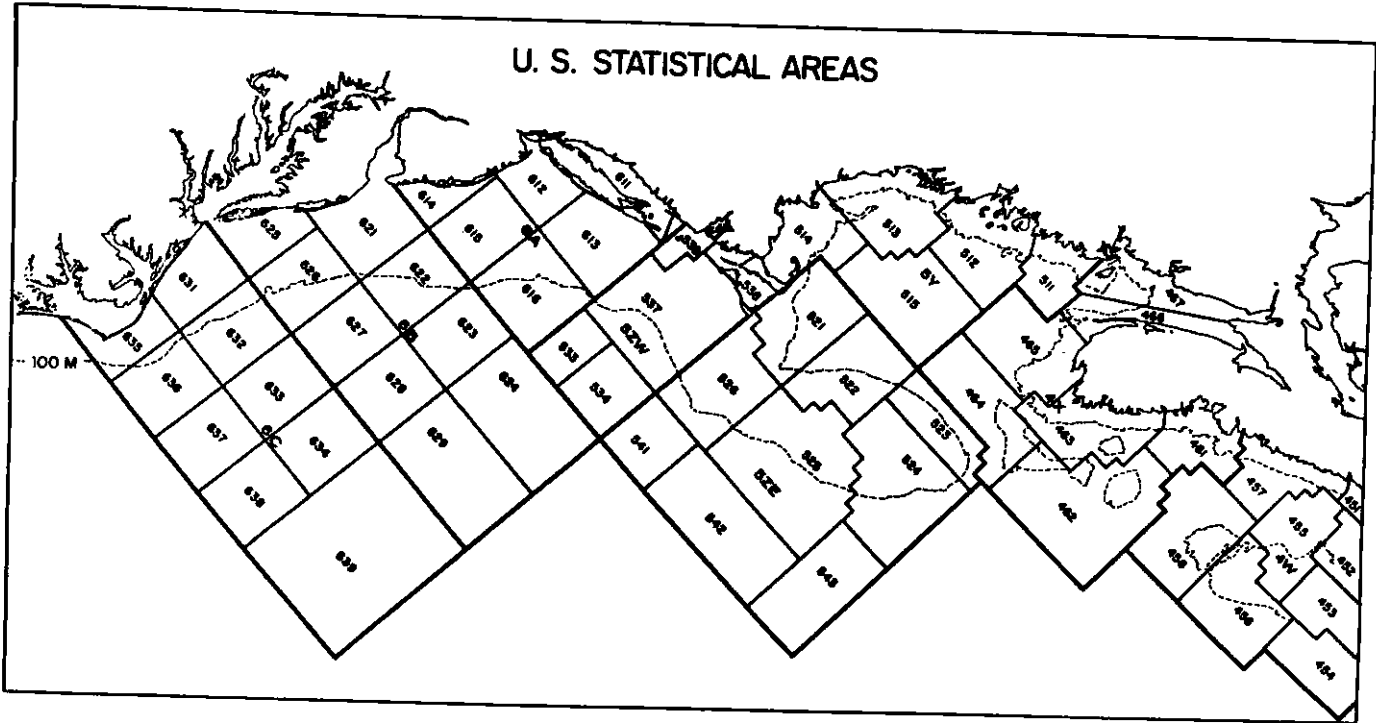


Fig. 1. US statistical areas for reporting catch and effort data.

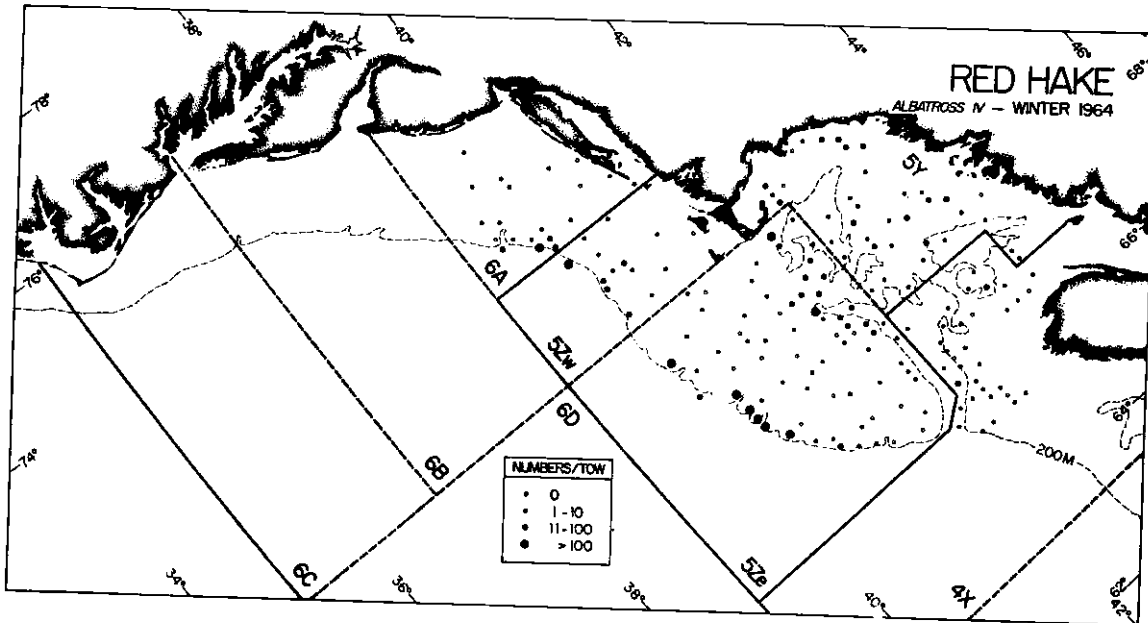


Fig. 2. The distribution of red hake catches (numbers/tow) during the winter 1964 (January 16-February 15) Albatross IV groundfish survey.

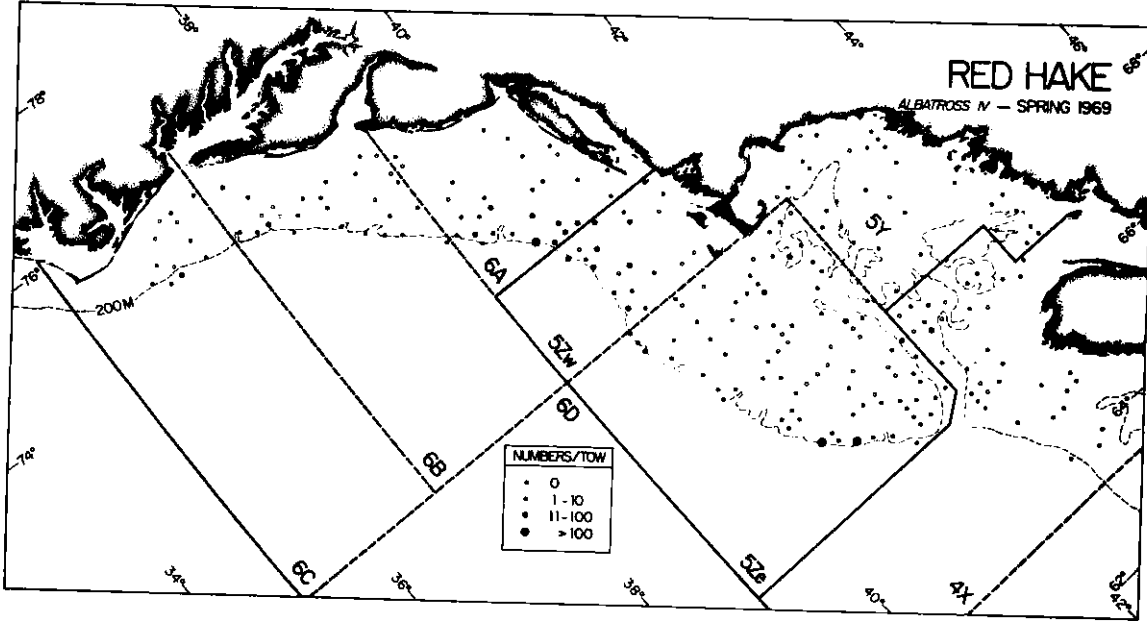


Fig. 3. The distribution of red hake catches (numbers/tow) during the spring 1969 (5 March-10 April) Albatross IV groundfish survey.

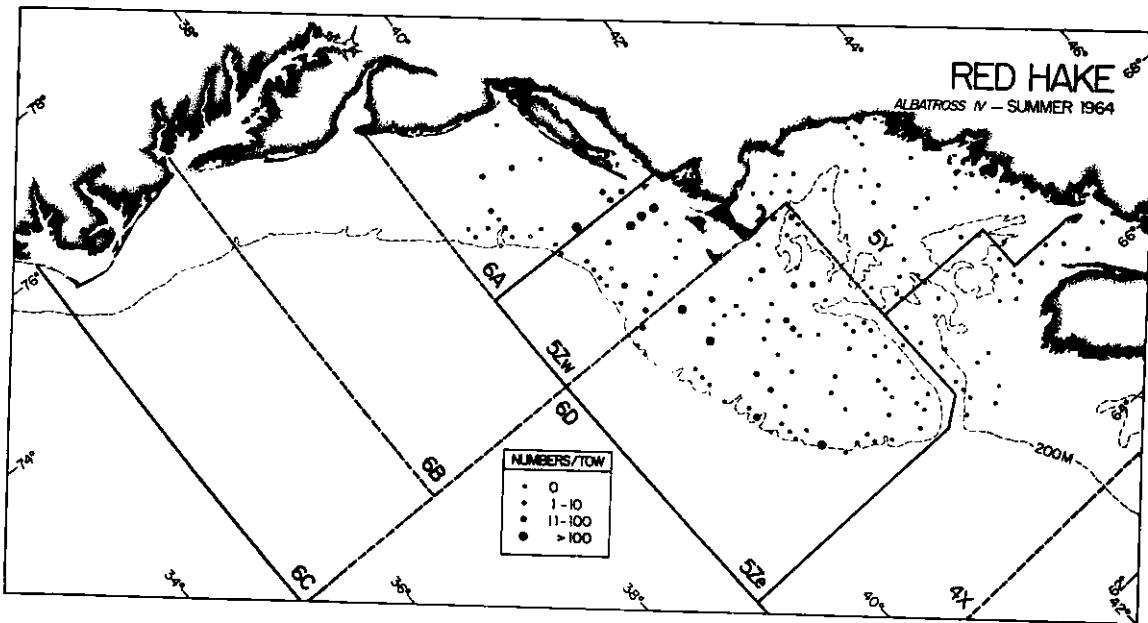


Fig. 4. The distribution of red hake catches (numbers/tow) during the summer 1964 (27 July-22 August) Albatross IV groundfish survey.

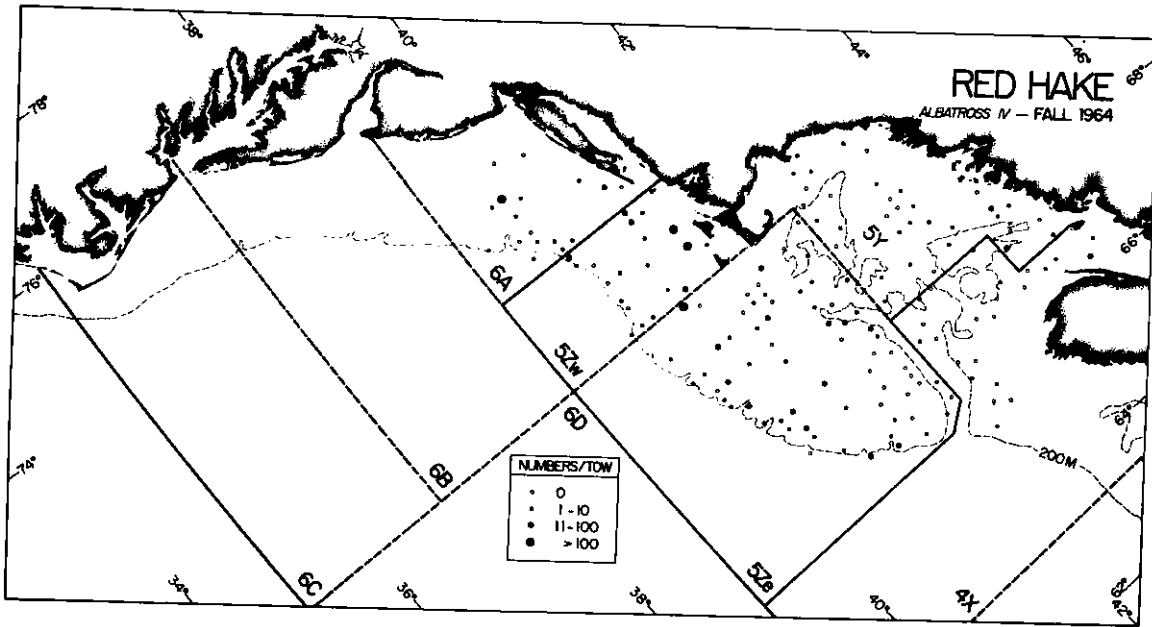


Fig. 5. The distribution of red hake catches (numbers/tow) during the fall 1964 (22 October-25 November) Albatross IV groundfish survey.

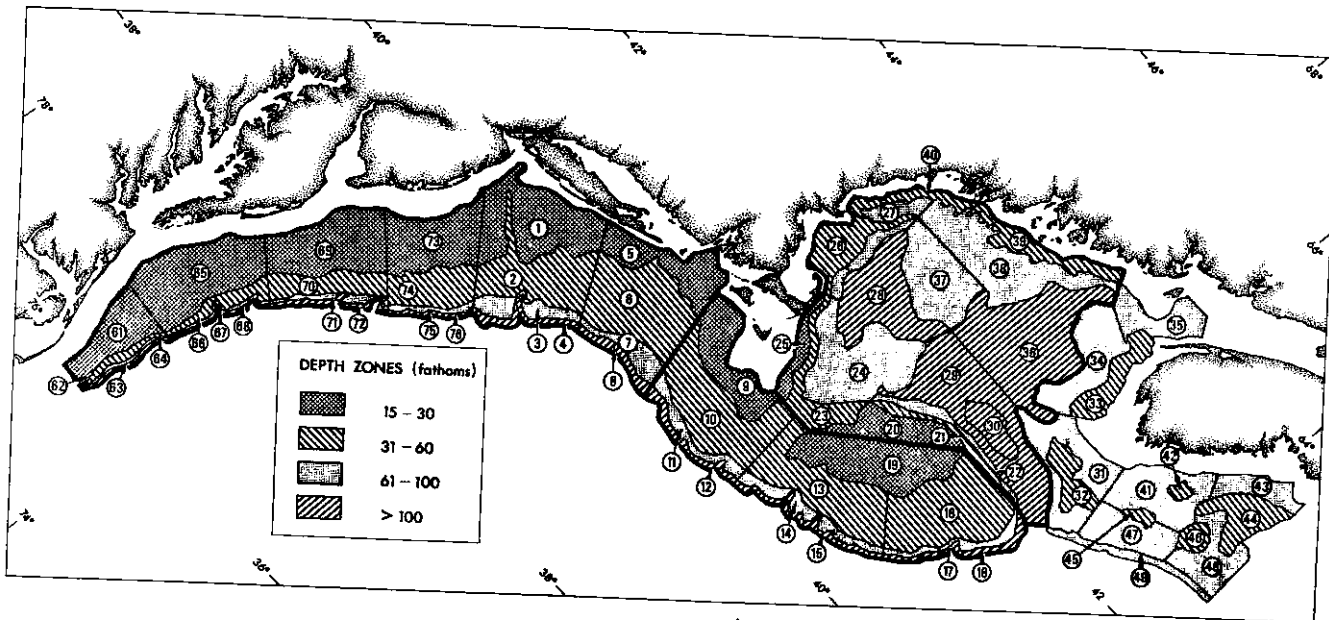


Fig. 6. US groundfish survey sampling strata delineating the proposed red and silver hake stocks in ICNAF Subarea 5 and Statistical Area 6.

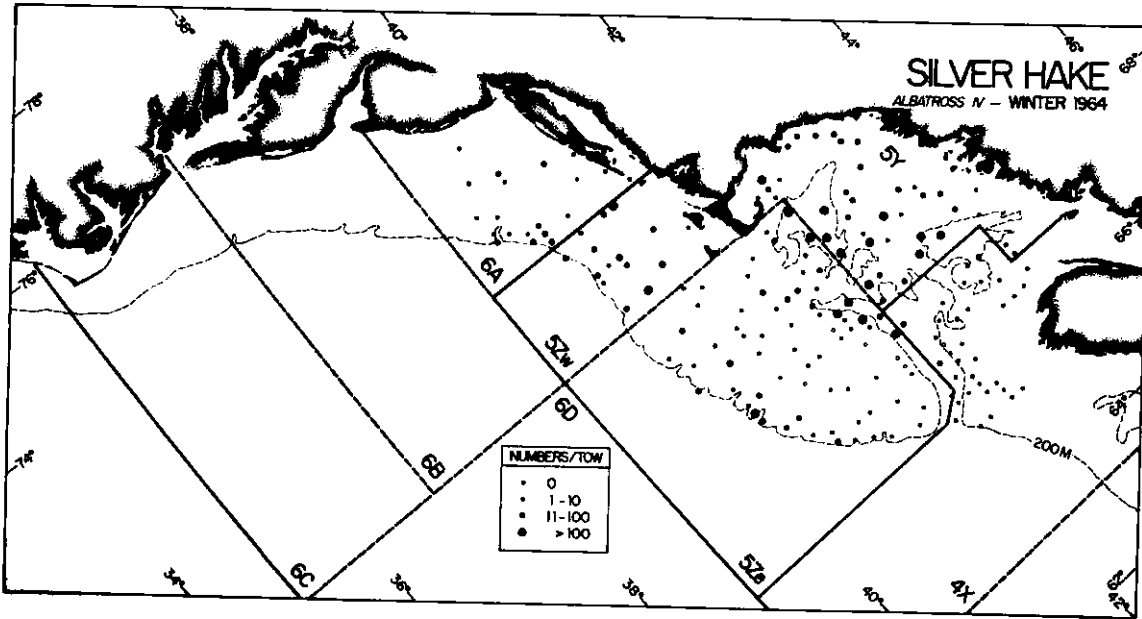


Fig. 7. The distribution of silver hake catches (numbers/tow) during the winter 1964 (16 January-15 February) Albatross IV groundfish survey.

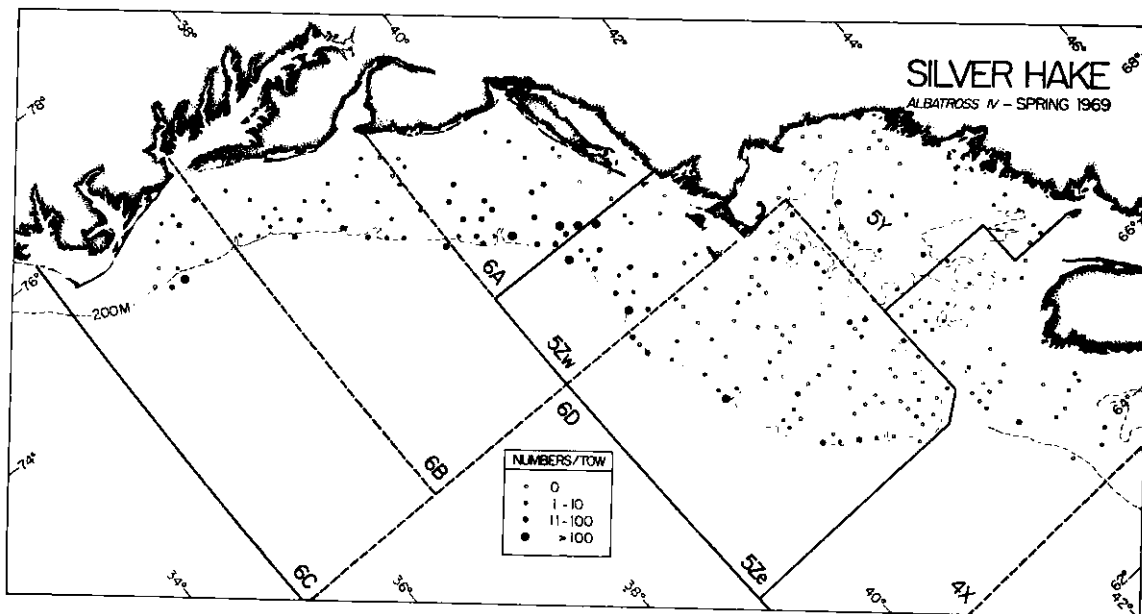


Fig. 8. The distribution of silver hake catches (numbers/tow) during the spring 1969 (5 March-10 April) Albatross IV groundfish survey.

