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Results of redfish mesh experiment on the Flemish Cap, August 1978

by

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BACKGROUND

At the 1978 Annual ICNAF Meeting concern was expressed by Canada that the use of current regulation mesh size resulted in significant quantities of commercial size redfish floating out through the meshes at the surface and being lost from the catch during the process of taking the catch onboard (Redbook 1978, p. 45). Canada was requested by STACRES (Redbook 1978, p. 46) to conduct an experiment on commercial trawlers with scientific observers onboard, permitting the use of small meshed codends on the Flemish Cap for comparison of data with results from trawlers using regulation mesh size. In response to this request one pair of comparative trips onboard a Canadian commercial trawler was completed in August 1978.

METHODS AND MATERIALS

Observers were placed on each of two consecutive fishing trips of a 750 gross ton Canada (Newfoundland) commercial trawler to the Flemish Cap during August 1978 (Table 1). On one trip a regulation mesh sized codend (130 mm nylon) was used while on the other an undersized mesh codend (98 mm nylon) was used. The same Diamond XI midwater trawl constructed of nylon material was used on both trips and the captain and crew also remained the same. Details of position fished, depth fished, time and length of tows and quantities of fish caught were recorded for all sets. Estimates of numbers and sizes of redfish escaping from the codend at the surface were also obtained for most sets. To aid in estimating the percentage of fish which escaped that were over the acceptable commercial size of 25 cm., pieces of styrofoam 25 cm. long were thrown among any escaped redfish. Measurements of redfish caught were gathered during both trips.

RESULTS AND DISCUSSION

On both regulation and undersized mesh trips only mentella type redfish (Sebastes sp.) were recorded as being caught. The absence of marinus type redfish was probably a reflection of the depths fished (318-415 m). No redfish were discarded at sea during either trip and catches were all clean redfish catches. No other commercial species were taken which was probably the result of using a midwater trawl which fished between 7-18 meters off the bottom. Thus, the effects which using a 98 mm mesh codend would have on catches of species such as cod could not be examined from the results of these trips.

During both trips fishing was carried out on the southwestern edge of the Flemish Cap, but significant differences in the length composition of redfish caught within this area were noted. Figure 1 illustrates these differences. Catches in the eastern portion of unit 3Zl (Figure 2) at a bottom depth of 329-410 m. consisted of redfish having a unimodal type length frequency with the majority of fish occurring within the 27-45 cm. range and having

an average length of 35 cm. However, sets made during both trips to the west of this area (Figure 2) in slightly deeper water (317-415 m) caught redfish having a bimodal type length frequency with a 19-42 cm. length range and an average length of 29 cm. Because of the apparent differences in the length compositions of redfish present in these two areas as reflected by the length compositions of catches from sets made during both trips, the data from these areas will be examined separately.

Escapement Estimates

Table 2 summarizes escapement estimates made by observers on both trips. From the sets observed using regulation mesh size (130 mm) in the area where the bimodal length frequencies occurred ($\bar{L}$ = 29 cm.) an estimated 1.26% (by number) of the total catch of redfish escaped through the codend meshes at the surface. An estimated 70% of these fish were above the generally acceptable commercial size of 25 cm. Sets made using the same gear in the area where a distinctly larger run of redfish occurred (unimodal area, $\bar{L}$ = 35 cm.) resulted in an estimated escapement of 0.64% by number and 88% of the fish escaping were estimated to be over 25 cm. On the trip using a small mesh codend (98 mm.) less escapement at the surface was estimated for both areas. An estimated 0.18% escaped during the sets made in the area where the bimodal frequencies occurred and only 0.12% in the area where the larger run of redfish occurred (unimodal area). In the bimodal area 13% of the fish that escaped were estimated as being over 25 cm and in the unimodal area 100% were estimated as being over 25 cm.

Length Compositions

To provide for direct comparisons of length compositions between large and small mesh trips it was necessary to express them in terms of catch per unit of effort. Because the trips were consecutive and fishing was not done by a paired haul or alternate haul method (Clark, 1963) an average number caught per hour was used. Because there were not sufficient length samples available for both trips for comparison of night and day sets and because of marked differences in the average catch per hour between daylight and night sets (Table 3), the length compositions were compared in terms of average number per hour based on daylight catch rates. Figures 3 and 4 summarize these comparisons.

The length compositions based on numbers per hour for the area of bimodal frequency occurrence indicate a larger number of redfish in the 21-30 cm. range and the 36-45 cm. range when using the 98 mm. mesh codend. However, the 31-35 cm. range indicate a substantial decrease in the number of fish caught using the 98 mm. mesh codend as compared to catches using the 130 mm. mesh. Other experiments have had similar results, with large mesh gear catching less small fish than smaller mesh gear, but on the other hand catching more large fish. Clark (1963), for example, found that otter trawlers using a 114 mm. mesh on George's Bank landed about 8% more large haddock and 19% less scrod haddock than small meshed vessels (74 mm.). Templeman (1963) also found that during alternate haul experiments in Hermitage Bay the catch of redfish at the larger sizes with a large mesh trawl (117 mm.) was greater than that of a small mesh trawl (74 mm.). These increased catches of large fish by the larger mesh gear can probably be attributed to an increased efficiency of the gear resulting from improved hydrodynamic properties of the trawl (Templeman, 1963; Clark, 1963). A comparison of the length compositions for the unimodal area show that for this larger run of redfish the 130 mm. mesh codend catches more fish between 21 and 40 cm., but that at the 40-45 cm. group this trend is reversed slightly and the 98 mm. mesh codend catches the most fish.

CONCLUSIONS

Redfish escapement at the surface through the meshes of a 130 mm. codend seems to be relatively small, varying from 1.26% by numbers in areas where small and large fish occur to 0.64% by numbers in areas where a larger run of fish occur. The escapement of commercial size fish is even lower than this since only 70-90% of all escaped fish are above 25 cm. in length. It was found that by using an undersized mesh codend (98 mm.) total escapement was almost negligible (.12 to .18% by numbers). However, associated with the lowering of the mesh size from 130 mm. to 98 mm. there was not only a decrease in redfish escapement and an increase in the numbers of smaller size fish caught, but there were also fewer fish caught at the larger lengths perhaps resulting from an increased efficiency of the larger mesh gear in fishing larger fish. Results of the two trips completed to the Flemish Cap show a net decrease in catch rates (by weight) when using a 98 mm. mesh as opposed to using a 130 mm. mesh codend.

REFERENCES

Clark, John R. 1963. Size selection of fish by otter trawls, results of recent experiments in the Northwest Atlantic. ICNAF Spec. Pub. 5, p. 24-95.

Templeman, Wilfred. 1963. Otter-trawl covered codend and alternate haul mesh selection experiments on redfish, haddock, cod, American plaice and witch flounder. ICNAF Spec. Pub. 5, p. 201-217.

Table 1 - Summary of Flemish Cap Redfish mesh experiment trips (August 1978)

TRIP	CODEND MESH SIZE	FISHING DATES	FISHING DEPTHS (M)	SETS (HOURS) FISHED	ICNAF DIV. (UNIT)*
A	130 (mm)	August 6-12	329-384	24 (79.8)	3M (321,324)
B	98 (mm)	August 19-25	318-417	18 (72.4)	3M (321)

* Attached map indicating Canadian unit areas.

Table 2 - Summary of redfish escapement estimates (by numbers)

TRIP	BIMODAL AREA ($\bar{L}$ = 29 cm.) # SETS (HRS.)	ESCAPED	>25 cm.	UNIMODAL AREA ($\bar{L}$ = 35 cm) # SETS (HRS.)	ESCAPED	>25 cm.
A (130 mm)	7(22.3)	1.26%	70%	11(40.3)	0.64%	88%
B (98 mm)	12(37.0)	0.18%	13%	4(20.3)	0.12%	100%

Table 3 - Summary of catch rates (average kg./hr.)

TRIP	BIMODAL AREA DAY	NIGHT	UNIMODAL AREA DAY	NIGHT
Trip A(130 mm)	3536	253	3711	1504
Trip B (98 mm)	3380	436	2328	352

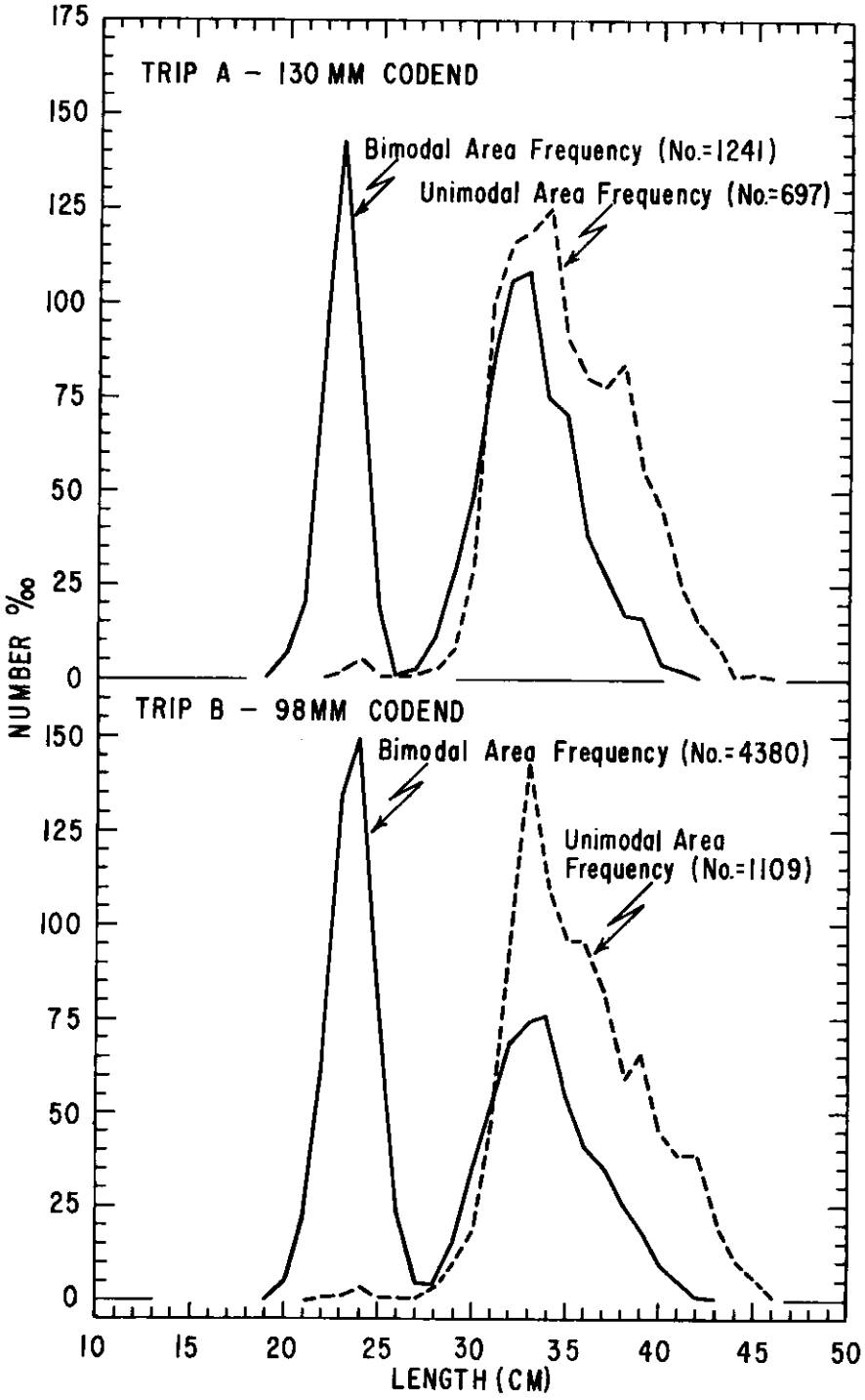

Fig. 1. Differences in length composition of redfish catches occurring in two fishing areas during two August 1978 Flemish Cap observer trips.

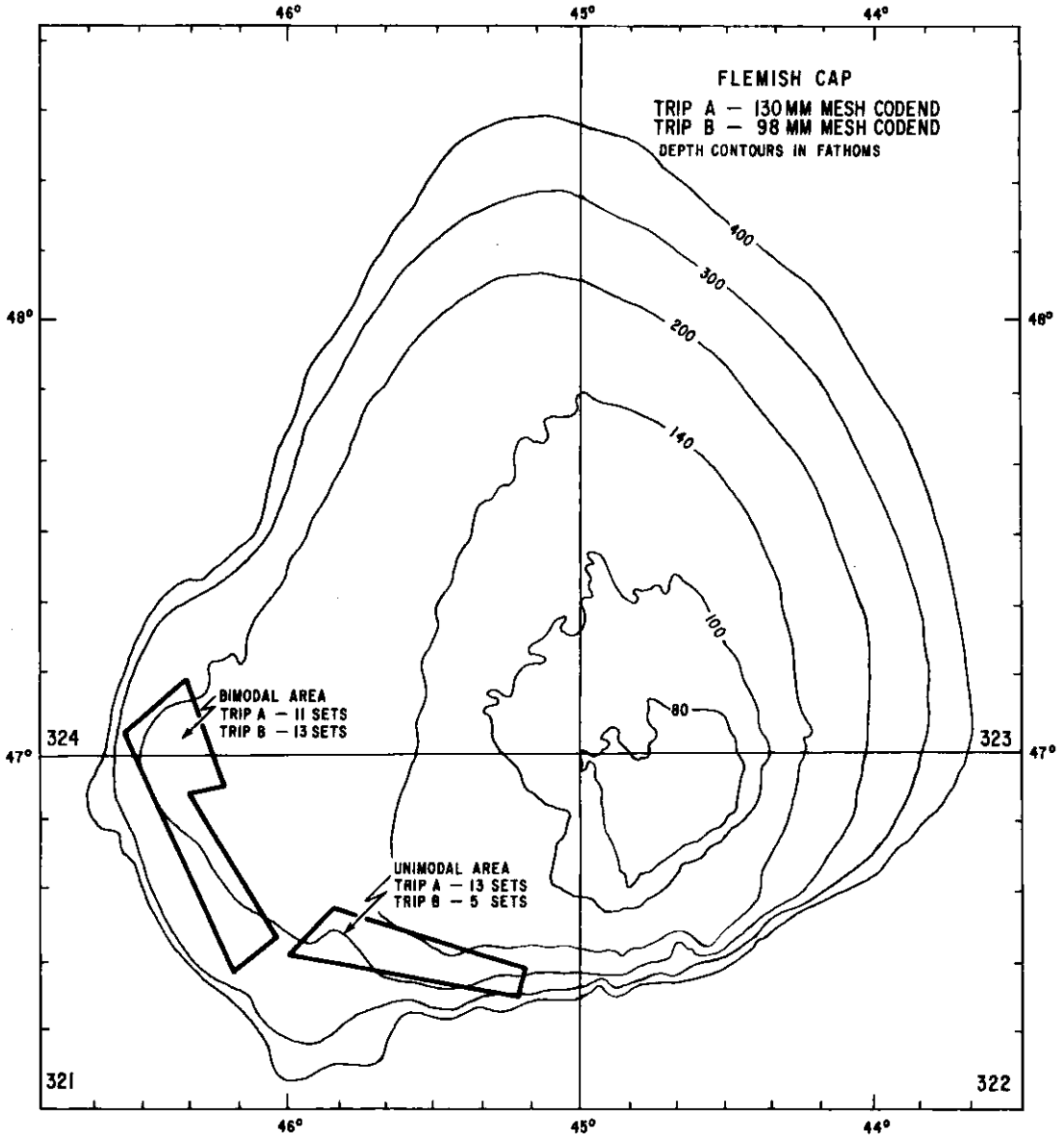

Fig. 2. Map of Flemish Cap indicating fishing localities and distinguishing two areas where variation in length composition of redfish catches occurred during two August 1978 observer trips.

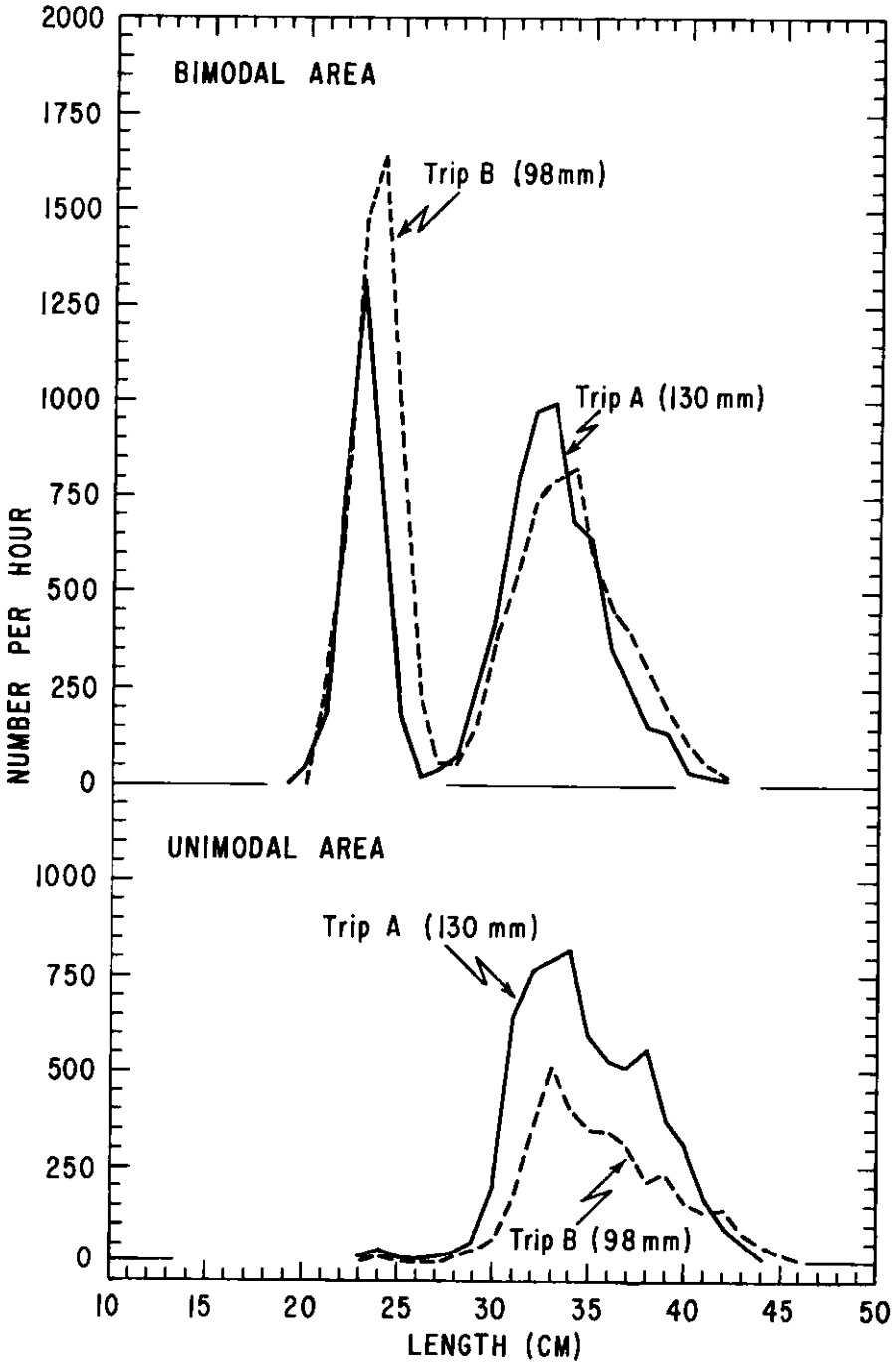

Fig. 3. Comparison of length compositions of redfish catches based on average catch per hour for daylight sets.

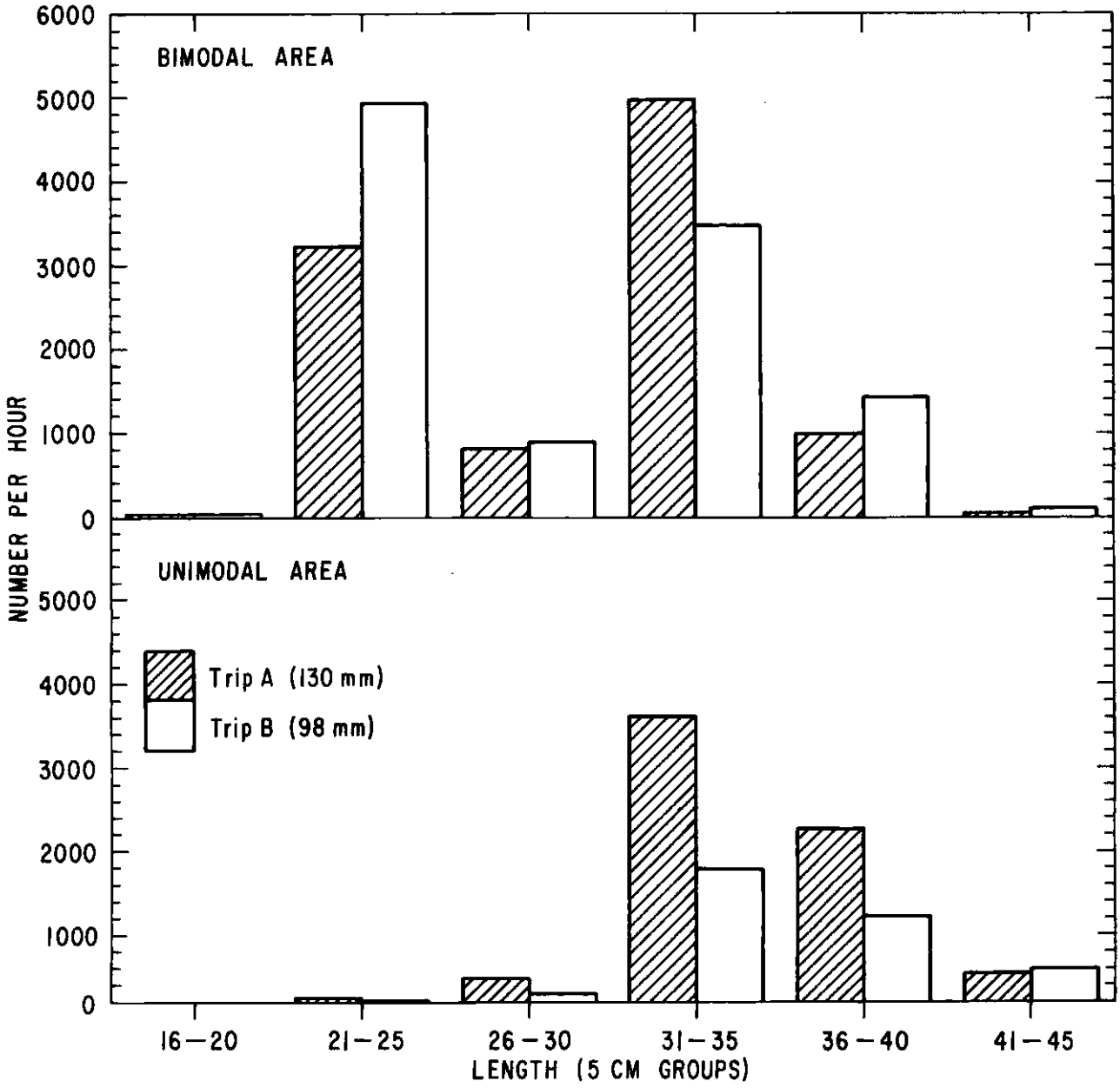

Fig. 4. Comparison of length compositions (by 5 cm. groupings) of redfish catches based on average catch per hour for daylight sets.