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Canadian Investigations of Scombroid Fishes -

A Review

by

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*Schwefel - Langbein  
Haben große,  
Tibbo Mella-Ortel  
senden.*

INTRODUCTION



Scombroid fishes are relatively unimportant to the Canadian fishing industry. Collectively they contribute less than 2% of the weight, and less than 5% of the value, to commercial landings on the Atlantic coast. Any major expansion of the industry, however, will undoubtedly include this group of fishes and there is already a rapidly developing interest, particularly in tunas. Long-term research has been concerned with general life history, distribution, and apparent abundance of the various species. More recently, most of the effort has been diverted to swordfish, for which the fishery may already have reached its maximum yield.

THE FISHERIES

Mackerel

Mackerel are summer visitors to the Canadian area. Long-term landings ranged from a high of 24,000 metric tons in 1939 to a low of 4,000 metric tons in 1959. The fishery, carried on chiefly in inshore waters along the Nova Scotia coast and in shallow areas of the Gulf of St. Lawrence, has been remarkably stable in the past four years with landings of approximately 11,000 tons annually.

Swordfish

The swordfish fishery, which was prosecuted for many years by harpoon along the edge of the continental shelf during

the summer months, underwent a dramatic change in 1963 when virtually every vessel in the fleet started longlining. The overall effect was expansion of the area and season of operations and doubling of the catch. The fishery is now carried on throughout the year, extending from the Flemish Cap to Cape Hatteras, and offshore to and beyond the boundaries of the Gulf Stream. Harpooning is used as a supplementary fishing method during the summer months. Landings in 1963 increased from the previous 10-year average of about 2,700 metric tons, to more than 7,500 tons and have since been maintained at approximately 5,000 tons.

Tuna

The accompanying Table gives tuna landings by statistical regions from 1963 to 1967. The fishery is small and catches consist chiefly of bluefin from inshore waters off Nova Scotia and Newfoundland. Swordfish fishermen land bluefin, bigeye, yellowfin and albacore, but species are not identified in statistical records. A purse-seine fishery for small bluefin and skipjack off the east coast of the United States was first prosecuted by Canadians in 1963, but the catch was poor in 1965, and the fishery was abandoned in 1966. A major effort to catch yellowfin and skipjack in the eastern Pacific and the Gulf of Guinea was started late in 1967, although three Canadian vessels made sporadic attempts to fish both areas since 1965.

Canadian tuna landings (metric tons  
round weight), 1963-1967

Year	E. Nova Scotia	Halifax	Lunenburg	SW Nova Scotia	S. New Brunswick	Nfld.	Total
1963	6.9	19.5	127.4	76.8	336.6	66.5	633.7
1964	15.2	17.3	191.1	98.6	992.5	65.9	1380.6
1965	3.2	16.4	98.0	58.8	475.4	56.7	708.5
1966	22.1	34.4	109.6	30.1	0	80.4	276.6
1967	3.9	18.2	206.9	78.1	0	44.1	351.2

## BIOLOGICAL STUDIES

### Mackerel

Research on mackerel has been concerned chiefly with identification of stocks and general life history. Commercial landings were sampled for size, age, sex, maturity, morphology and meristics, and some tagging was done. Lengths ranged from 270-420 mm, and weights from 215-825 g. A large number (7) of year-classes were included in the catches and the phenomenon of dominance is apparent. The exceptionally abundant 1959 year-class dominated the catch from the year of full recruitment (1961) until 1966. The 1964 year-class was prominent in 1966 and dominant in 1967.

Releases and recaptures of tagged mackerel (4,000 releases and 124 recaptures) indicate a migration in late May from the vicinity of Georges Bank towards the coast of Nova Scotia and thence into the Gulf of St. Lawrence. In late autumn mackerel withdraw towards Georges Bank.

Sette (1950) postulated segregation of North American mackerel into two major groups and his hypothesis was tested. Results showed differences between northern and southern segments of the stock, but these were chiefly in size and age composition and in the time and extent of migration, suggesting that there is only one population of mackerel in the Northwest Atlantic.

### Swordfish

Most data on swordfish have been collected since the conversion of the fishery to longlining. Individual fish were measured either in considerable detail for morphometric analysis and description, or for a few standard characters. Stomach contents, sex, and maturity were recorded and samples retained for study. Although fish 2.25-450.0 kg round have been landed, most fish were 12-180 kg, with less than 1% below and 4% above

this range. Harpooned fish are generally large (average weight 120 kg), whereas longlined fish may be as large but, depending on area, the average weights are usually from 50-85 kg. Such variation appears to be due to differences in water temperature preferences of fish of different sizes. Small fish tend to remain in warmer water while the larger ones move into colder areas, particularly along the continental shelf. The normal surface temperature range for swordfish is 14-22°C with fish under 60 kg usually taken where the temperature is over 19°C.

*Brevidens  
Hakunose*

Plankton tows for larvae and examination of gonads indicate that spawning does not occur in the general area of the Canadian fishery. Reports are received from fishermen of apparently mature ovaries but these are rare. Ova diameters examined ranged from 0.01-0.18 mm, in contrast to a ripe diameter in excess of 1.5 mm. Larval surveys from January-April between the east Caribbean and the Gulf Stream south and west of 67°W took small numbers of larvae, suggesting a wide area and protracted season for spawning.

Analysis of stomach contents indicates that swordfish feed on relatively few species in the northern part of their West Atlantic range. In the north, mackerel, barracudinas, silver hake, redfish, and herring are the most important food species by volume. Myctophids are frequently found but contribute little volume. Squid are important and comprise nearly one fifth of the total volume. The condition of food items suggests that the swordfish frequently uses its sword to attack and disable even small individual fish before ingesting them.

The wide range and the southern spawning areas of swordfish suggest long migrations but only 84 fish were judged viable for tagging in 22 longline cruises since 1964. There has been only one return to date--a fish recaptured about

110 km from the release point after two years at liberty. An improved method for marking free-swimming swordfish, using a harpoon that ejects the tag on contact, was introduced in 1967; 20 swordfish were tagged by this method in 1968.

### Tuna

Tuna of various species were sampled for size, age, morphometrics, sex, and stomach contents from inshore, purse-seine, and longline fisheries.

The main species is bluefin which is encountered in all three fisheries. Large bluefin of 135-450 kg appear inshore during the summer along the Canadian coast, occasionally as far north as south Labrador. Smaller bluefin (4-90 kg) are purse-seined off the United States coast between Virginia and Massachusetts during the same period. Bluefin of all sizes over 10 kg are taken incidentally on swordfish longlines throughout the area of that fishery. A total of 618 bluefin were tagged, 330 large fish from the coastal fishery, 14 from longlines offshore, and 274 small fish from purse seines off the United States coast. Returns to date (53) show little area change except for one transatlantic migrant that moved from off New Jersey to the Bay of Biscay, and for two large fish tagged in St. Margaret's Bay, Nova Scotia, and recaptured off Cape Cod, Mass.

Yellowfin tuna were sampled from the purse-seine fisheries in the Gulf of Guinea and eastern Pacific, and from swordfish longlines in the northwest Atlantic. Some tagging was carried out in these areas, with 378, 44, and 10 fish respectively released in these three regions.

Bigeye and albacore were taken in small numbers by swordfish longlines in the northwest Atlantic, and 18 bigeye were tagged.

Data on skipjack were collected in the three purse-seining areas noted separately for bluefin and yellowfin. Small numbers (total 164) were tagged in each area.

### Shark

Incidental captures on swordfish longlines also include numerous sharks of several species. These fish were measured, usually for fork length only, sexed, and their stomach contents examined. Substantial numbers (total 986) were tagged. Five recaptures of blue sharks and one of another carcharhinid suggest migrations of several hundred kilometers.

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