SKATE IN DIVISIONS 3L, 3N, 3O AND SUBDIVISION 3Ps

Background

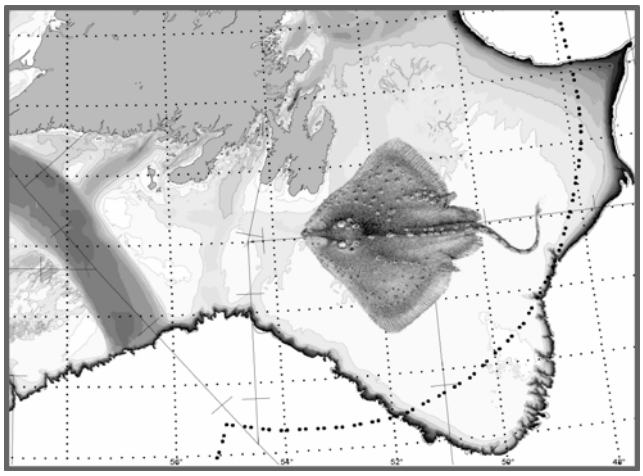
There are 8 to 10 species of skate in the waters around Newfoundland. Of these, thorny skate (Raja radiata) is by far the most common, comprising greater than 90% of those caught during research surveys. The second and third most common are the smooth (Raja senta) and spinytail skate (Raja spinicauda). Although data on skate are routinely collected during research surveys, until recently, there has been only limited examination of these data. Most of the work to date has been done on thorny skate.

Thorny skate is widely distributed in the waters around Newfoundland being found in depths ranging from about 18 meters (10 fathoms) to over 1500 meters (820 fathoms), in temperatures from -1.4° to about 6^0C on the Grand Banks and on both hard and soft bottoms. Tagging information suggests that they are sedentary species and generally do not undergo long migrations, moving less than 100 kilometers during their lives. However, recent distributional studies indicate that thorny skate on the Grand Banks perform an annual migration toward the shelf edge in the winter returning onto the bank in midsummer.

It is not known how long thorny skate live in the waters around Newfoundland. The time between tagging and recapture of some individuals suggests that they can live at least 20 years. They deposit between 6 and 40 egg cases per year (also known as mermaids' or sailors' purses) that contain single embryos. Males mature at smaller sizes than females, and size at maturity increases from north to south. Limited data suggest that reproduction occurs year round on the Grand Banks. Thorny skate feed on a wide variety of items including both invertebrates and fish. As well, significant amounts of offal have been found in the stomachs of skate captured in the vicinity of commercial fisheries.

Until recent years, there has been only limited interest in fishing for skate in the waters around Newfoundland. Previously, skate was usually discarded even though it constituted the most common non-commercial by-catch in offshore trawler catches. These by-catches were not reported in the catch statistics. Most of the reported catches before 1994 are attributable to non-Canadian fleets. With the decline of other groundfish resources, Canadian interest in skates increased, and quotas were first put in place for 1995 inside Canada's 200 mile limit. The quota was based on a 20% exploitation rate of the survey biomass estimate for 1993. This rate was subsequently considered too high and was reduced to 10%. The current TAC is set at 3,000 metric tons.

Fishers are interested in the width of the skate wing, as the wing is the product. Based on market conditions, the minimum acceptable size is about 46 cm. (18 inches).



The Fishery

Interest in skate was limited when other groundfish stocks were healthy. Catches reported to NAFO from the time of extension of jurisdiction averaged less than 3,000 metric tons (t) until 1985 when the reported catches from Division 3N increased significantly.

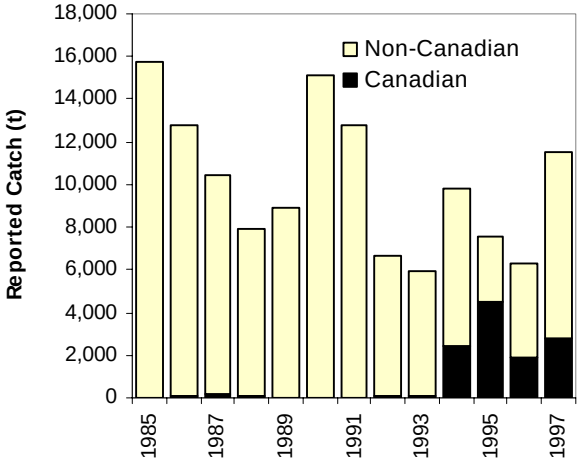
Reported Landings (thousand metric tons)

Year	77-84 Avg.	85-92 Avg.	1993	1994	1995	1996	1997	1998
TAC					6[2]	2[2]	3[2]	3[2]
Can.	.6	.1	.1	3.7	4.5	1.9	2.8	
Others[1]	2	11.3	5.9	7.4	3	4.5	8.7	
Totals	2.6	11.4	6	11.1	7.5	6.4	11.5	

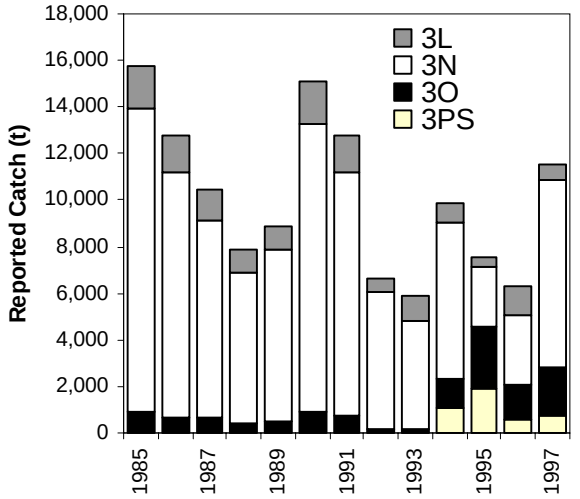
[1] Estimated by Canadian Surveillance
[2] for Canadian waters only

The elevated catches that continued into the last half of the 1980's were due to directed effort and bycatch from outside 200 miles. Canadian surveillance has determined that some of these catches during the 1980's, reported as skates, may have actually been other species such as flatfish or cod. During the 1990's however, Canadian surveillance estimated catches outside 200 miles that were higher than those reported. Surveillance estimates rather than statistics reported to NAFO were used for landing statistics for countries other than Canada (1985-1997).

As well, reported Canadian catches prior to 1995 are higher than actual because of the



conversion factor between wing weight and round weight used by Statistics Branch. Prior to 1995 a conversion of 4 was used. More recent work indicated that a conversion of 2.7 is more



appropriate and this value has been applied by Statistics Branch since 1995. In the figure below, landings prior to 1995 have been adjusted using the 2.7 factor.

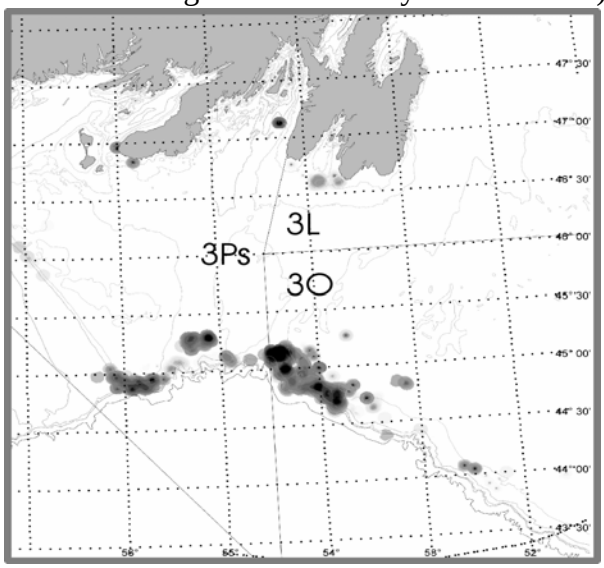
Based on observer data, unreported discarded bycatch in other fisheries averaged about 3,000 t annually during the early- to mid-1980's in Divisions 3LNO and Subdiv. 3Ps. Estimates from the more recent period are unavailable but are thought to have been about the same until the collapse in the 1990's of many of the offshore fisheries that had generated the skate bycatch in the 1980's.

After 1993, the Canadian catch component, previously less than 2%, made up about 35% of the total reported catches.

As the new Canadian fishery developed, reported catches increased from about 90 t in 1993 to about 3,300 t in 1994 and 4,500 t in 1995. The quota for 1995 was 6,000 t, lowered to 2,000 t in 1996 then increased to 3,000 t in 1997 based on the recommendation of the FRCC. The lowered quota resulted in catches of about 1,900 t and 2,800 t in 1996 and 1997 respectively. Allocations were set at 45.8% for mobile and 54.2% for fixed gears.

Steps were also taken in 1996 and 1997 to spread fishing effort throughout the management area to minimize possible negative effects of concentrating it in any one area. This too was based on the recommendation of the FRCC. The 1997 and 1998 quota of 3,000 t was split among areas as follows: 3LN–15%, 3O–50%, and 3Ps–35%. These divisional allocations were based on biomass distribution observed during the 1992 to 1996 research surveys.

Observer data (refer to the map below, darker shades denoting more intensely fished areas)



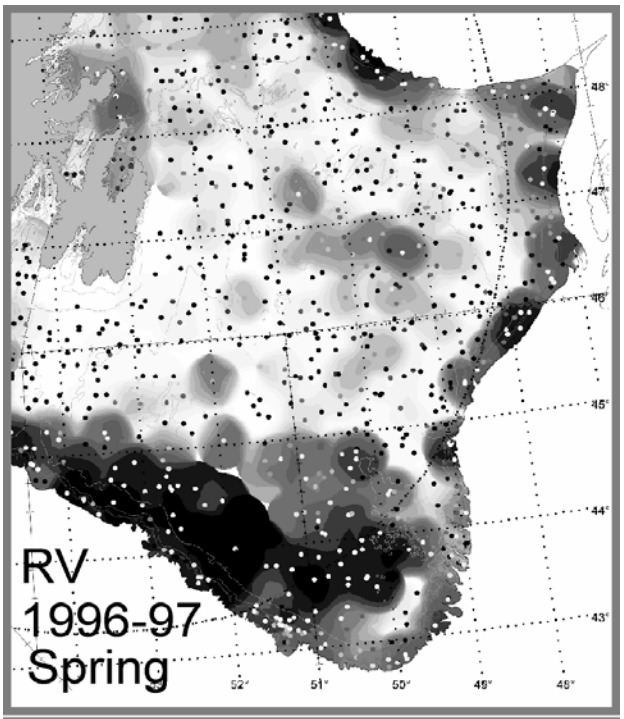
indicate that although the quota was spread among 3 areas, the Canadian effort remained concentrated in southwestern 3O and southern 3Ps.

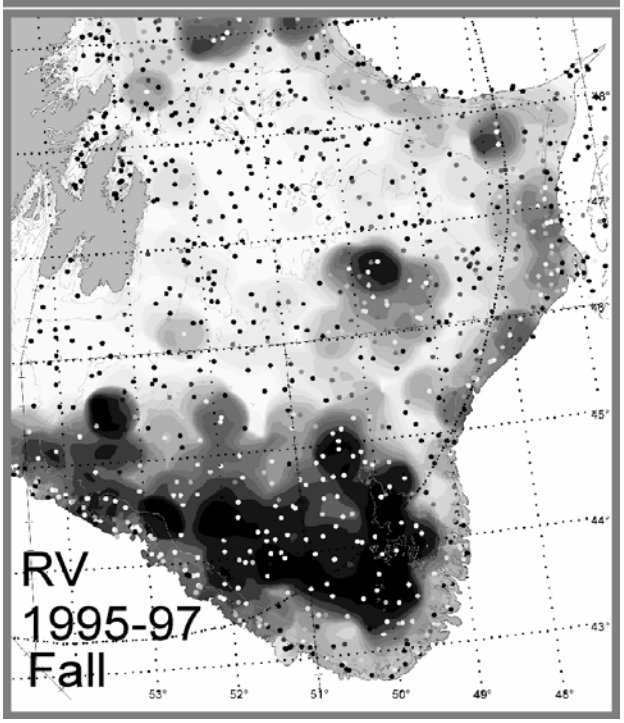
Preliminary data to October 1998 indicate a Canadian catch of about 2,100 t, with 1,200 t

being taken in 3Ps and most of the remainder in 3O. Foreign catches for 1998 are not yet available.

Resource Status

A comparison of thorny skate distribution from 1995-1997 spring and fall research vessel surveys suggests that skate move off the Grand Banks towards the shelf edge in the winter/spring, with a portion of the population moving into deeper, un-surveyed waters.

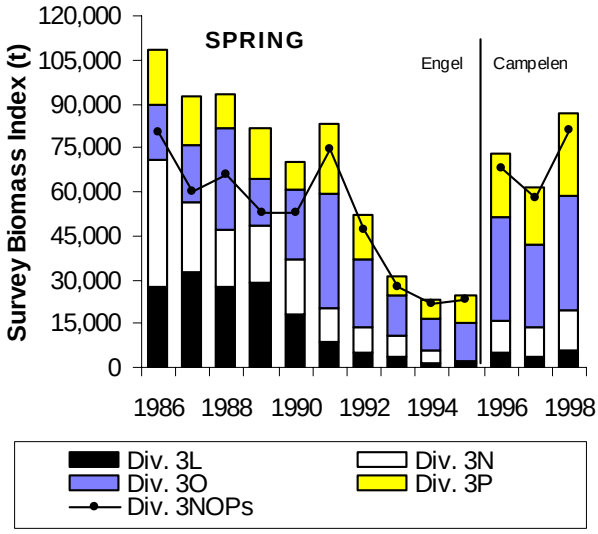




Further support for this movement into un-surveyed areas can be derived from fishery data. Bycatch rates of skate in deepwater (slope) fisheries during Dec.-Jun. 1995-1997 were about double those of Jul.-Nov. Such movement out of the surveyed area would affect skate availability to research surveys and hence, account for the observation that spring biomass indices were on average 40% lower than those for fall.

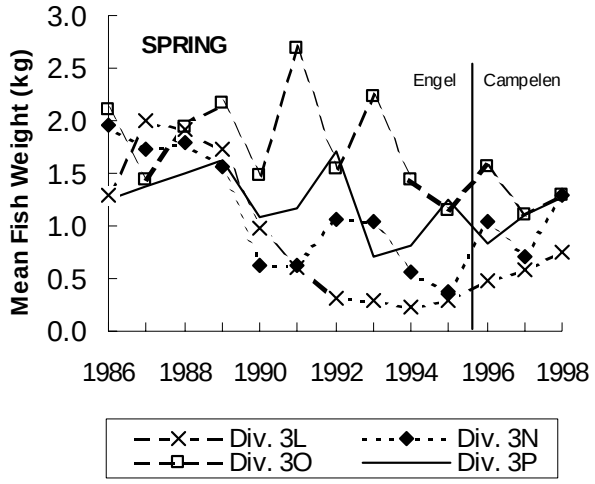
Although fall research surveys yielded higher measures of biomass (for the reasons discussed above), both indices show the same trends over time. Spring surveys were used to examine trends over time because they provided a larger spatial coverage (3Ps is not surveyed in the fall) and a longer time series.

Historic research vessel catches suggests that thorny skate on the Grand Banks and north-east Newfoundland Shelf started a slow decline over its entire distribution as early as the late 1970's or early 1980's. Biomass indices (1986-1997) indicate that the biomass of thorny skate was most affected in Div. 3L, fluctuating until 1989 then declining rapidly thereafter. The biomass in Div. 3NO and Subdiv. 3Ps (3NOPs) remained relatively stable between 1986 and 1991 then also declined until 1994. Biomass in 3NOPs reduced slightly from 1996 to 1997, but increased in 1998.



Overall, thorny skate had declined to the lowest historical levels by 1993 or 1994. A similar decline was seen in the fall surveys for areas surveyed. A change in gear from Engel to Campelen in fall 1995 likely affected catchability of skate. Thus the two periods are not comparable and trends since 1995 cannot be interpreted.

The average size of the skate in spring research survey data has been declining over the time



period examined, particularly in Divisions 3L and 3N. A slight increase in size has been observed since the introduction of Campelen gear. However, whether this is due solely to the change in gears is uncertain.

Based on sampling carried out from 1947 to 1972, females were larger at maturity in 3OPs than in 3LN. While about 50% of female skates with a wing width of 46 cm. (18 inches) are mature in divisions 3LN, only about 20% of the females in 3O and 3Ps are mature at that size. In 3O and 3Ps, about 50% are mature when the wing width is 56 cm. (22 inches).

Sources of Uncertainty

There are a number of important limitations to our knowledge of skates in the waters around Newfoundland. We lack information on such things as growth rates and age of maturity and details of the age structure of the population(s). As well, as with numerous other species, what proportion of the decline is attributable to changes in fishing mortality vs. environmental influences remains uncertain. Whatever the cause, the stock remains at its lowest historical level.

Assuming skates are a renewable resource, one would expect some evidence of renewal, some sign that skates that are caught are somehow replaced by fresh stock. Such evidence is lacking: the apparent decrease in survey biomass comes so close to matching the cumulative reported catches that it is not possible to establish a positive lower bound on the production of the stock.

Given the available data, it is not possible to determine the most appropriate exploitation rate for a sustainable fishery. The average total catch for 1996-97 was 8,930 t, which represents approximately 13% of the average spring survey estimate for the same period. This constitutes a substantial reduction from the 20% exploitation rate set in 1995. However, there is insufficient information to judge its suitability at this time.

Catches of skates outside 200 miles remain unregulated. There are indications that catch information from outside 200 miles continues to be unreliable. As well, discarding inside 200 miles for the period since 1985 still remains to be quantified.

Outlook

Analysis of research data suggests that thorny skate declined earlier and at a greater rate to the north. The decline starting in the early 1980's accelerated in the early 1990's. For the last few years, after reaching its lowest level in all areas, the biomass shows no sign of recovery through 1997.

Distributional studies suggest that a portion of the skates go through an annual migration. As they move onto the shelf in the summer and fall, they tend to aggregate into an area overlapping Divisions 3N, 3O and Subdiv. 3Ps partially separated from a smaller concentration in Div. 3L. Historically, the two concentrations were more closely associated. Skates also tend to be

sedentary, forming local aggregations, except for this apparent seasonal migration. For this reason local concentrations can be easily depleted. This suggests that management on a scale finer than the Division might be prudent. Still, in the absence of detailed data on stock structure, a first cautious approach would be continued allocation among divisions. Therefore it is important that management continue to ensure that effort is not concentrated in any one area. The biomass proportions in the 1996-97 spring survey were: 22% in Divisions 3LN, 47% in Div. 3O and 31% in Subdiv. 3Ps. The total biomass average over the two years was 73,650 t.

Considering the historical decline in biomass indices, the lack of comparable data on current stock status, and the uncertainty about the stock(s) ability to rebuild, an increase in harvest levels would not be considered prudent.

For More Information

Research Documents:

Kulka, D.W., D.B. Atkinson and E. DeBlois. 1996. Non-traditional groundfish species on the Labrador Shelf and Grand Banks - skate. DFO Atl. Fish. Res. Doc. 96/98.

Kulka, D.W. and F. K. Mowbray. 1998. The status of Thorny skate (*Raja radiata*), a non-traditional species in NAFO Divisions 3L, 3N, 3O and Subdivision 3Ps. DFO Atl. Fish. Res. Doc. 98/131.

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