

DIVISIONS 3L, 3N, 3O AND 3Ps SKATES

Background

There are some 8 to 10 different species of skate in the waters around Newfoundland. Of these, the thorny skate (*Raja radiata*) is by far the most common, comprising greater than 90% of those caught during research surveys. The second most common are the smooth skate (*Raja senia*) and spinytail skate (*Raja spinicauda*). Although data on skate are routinely collected during research surveys, 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 (735 fathoms), in temperatures from -1.4°C to about 14°C, 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.

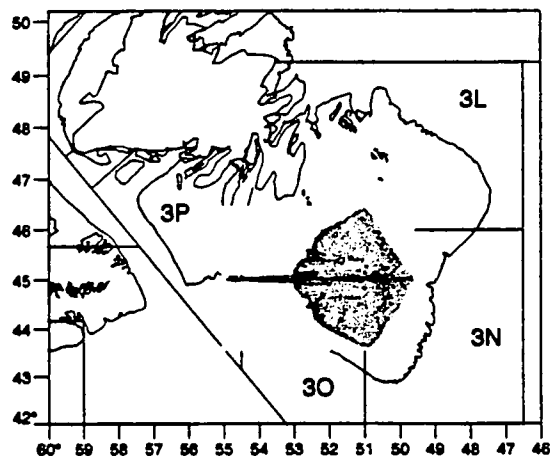
It is not known how long thorny skate live in the waters around Newfoundland. The time between tagging and recapture of some individuals, suggests that they can live at least 20 years. They deposit egg cases, perhaps better known as mermaids' or sailors' purses, inside of which are single embryos. Skates only lay between 6 and 40 of these a year. Males mature at smaller sizes than females, and size of 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.

There has been only limited interest in fishing for skate in the waters around Newfoundland and skates were usually discarded although they constituted the most common non-commercial by-catch in offshore trawler catches. These by-catches were unreported and do not appear in catch statistics information. Most of the reported catches have been by 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 set based on a 20% exploitation rate of the survey biomass estimate for 1993. This resulted in quotas of 5,000 metric tons for the Grand Banks (3LNO), and 1,000 metric tons for St. Pierre Bank (3Ps).

Fishermen 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

Because of little interest in skate when other groundfish stocks were healthy, catches reported to NAFO from the time of extension of jurisdiction averaged less than 5,000 metric tons until 1985 when the reported catches from Division 3N increased significantly.

Reported Landings (thousand metric tons)

Year	77-84 Avg.	85-91 Avg.	1992	1993 ¹	1994 ¹	1995 ¹	1996
TAC						6 ²	2 ²
Can.	.6	.1	.1	.1	3	5	
Others	2	18	5	6	7	3	
Totals	2	18	6	6	10	8	

¹ Provisional

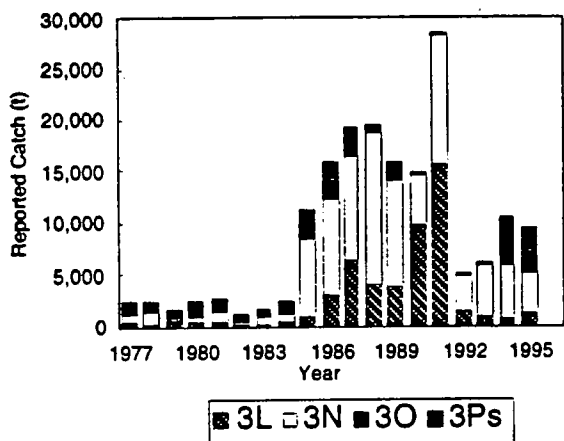
² for Canadian waters only

The increases in that year, which continued during the last half of the 1980s, were due to increased reported catches from outside 200 miles. Canadian surveillance has determined that some of these catches during the 1980s, reported as skates, may have actually been other species such as flatfish or cod. During the 1990s however, Canadian surveillance estimated catches outside 200 miles to be higher than those reported.

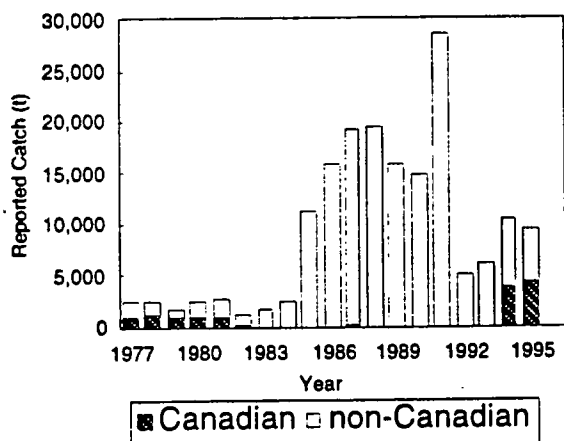
Also, reported Canadian catches are thought to be higher than actual because of the conversion factor between wing weight and round weight used by Statistics Branch. In the past, a

conversion of 4 was used whereas more recent work indicates that a conversion of 3 is more appropriate. Steps are currently being taken to correct this.

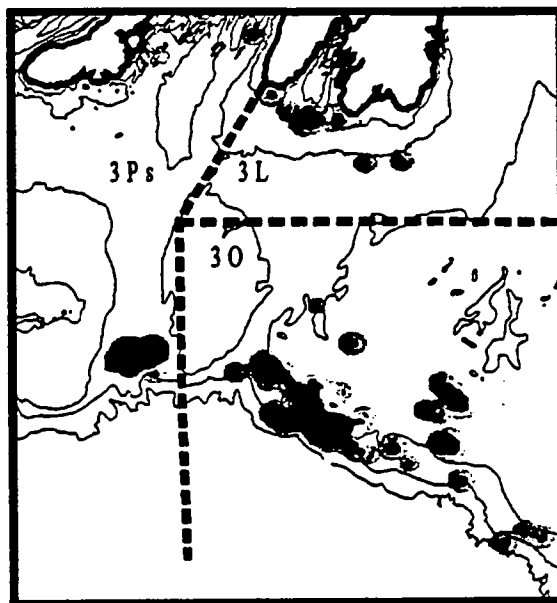
Based on observer data, unreported discards averaged somewhat less than 3,000 metric tons annually during the early- to mid-1980s in the 3LNO area. Estimates from the more recent period are unavailable.



Reported non-Canadian catches declined dramatically after 1991, and were estimated to be only about 2,600 metric tons in 1995.



Reported Canadian catches increased from about 100 metric tons in 1993 to about 2,700 metric tons in 1994 then 4,400 metric tons in 1995. Observer data (see map) indicate that the fishery was concentrated in a small area of western 3O and eastern 3Ps during these years.



The quota for 1996 was lowered to 2,000 metric tons based on the recommendation of the FRCC.

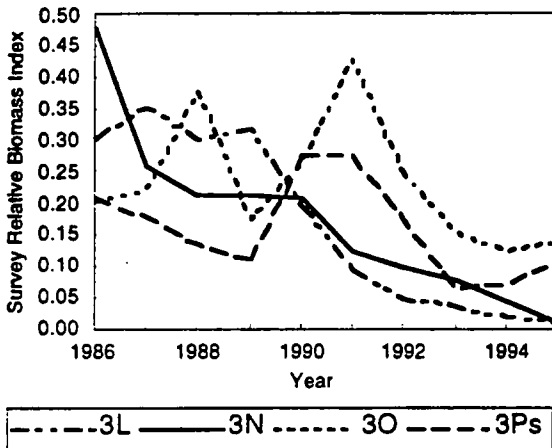
Steps were also taken in 1996 to spread fishing effort throughout the management area so as to minimize negative effects of concentrating it in any one area. This too was based on the recommendation of the FRCC. Separate quotas were put in place as follows: 3L - 200 metric tons, 3N - 400 metric tons, 3O - 900 metric tons, and 3Ps - 500 metric tons. These divisional allocations were based on biomass distribution observed during the 1992 to 1994 research surveys.

Preliminary data to mid-August 1996 indicate a catch of about 1,500 metric tons, with about 1,100 metric tons being taken in 3O and most of the remained in 3Ps.

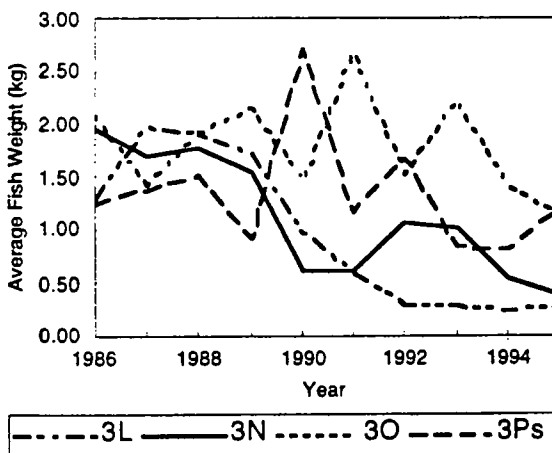
Resource Status

Research survey indices of relative biomass, calculated separately for NAFO divisions 3L, 3N, 3O and 3Ps for the period 1986 to 1995 indicate that the biomass of thorny skate in Division 3O and Subdivision 3Ps remained relatively stable until the early 1990s, but then declined. The survey indices declined steadily in divisions 3L and 3N over the 1986 to 1995 time

period, possibly as a result of the high catches outside 200 miles during the second half of the 1980s. Overall, trends in the survey estimates appear similar for 3L and 3N, and 3O and 3Ps but are different between these two areas.



Related to these overall declines, based on research survey data, the average size of the skate in divisions 3LN has also been declining quite dramatically over the time period examined. There were also some recent declines in Subdivision 3Ps although this was reversed in 1995. The mean size declined in Division 3O between 1993 and 1994 then again somewhat in 1995.



Based on sampling carried out from 1947 to 1972, females are 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, as well as details of the age-or size structure of the population(s).

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.

It is also not possible, with available data, to determine the stock structure of the resource or the most appropriate exploitation rate for a sustainable fishery.

The first TAC (6,000 metric tons), imposed for 1995, was set at 20% of the 1993 survey biomass estimate. For skates, which have a very low reproductive rate, exploitation at 20% is excessive. However, because survey estimates do not represent the true total biomass, but only some portion of it, the actual exploitation would be somewhat lower. Because catchability is unknown, how much lower cannot be determined.

The 1996 recommended TAC of 2,000 metric tons represented approximately 10% of the 1994 survey estimate. This is a more conservative approach but nonetheless, similar uncertainty exists because of the factors noted above.

There are indications that catch information from the area outside 200 miles continues to be

unreliable. Discarding inside 200 miles for the period since 1985 still remains to be quantified.

Outlook

It appears that the relatively high catches (including unestimated discards) of skate, particularly outside 200 miles are continuing to contribute to the decline of the resource in divisions 3LN. Catches of skates outside 200 miles remain unregulated.

Catches, both reported as well as discards, do not seem to have affected the resource in 3O and 3Ps to the same extent during the same period as they were relatively low, although the reasons for the declines in the survey estimates between 1991 and 1993 are unclear.

Analysis of research data suggests that different trends have occurred in divisions 3LN compared to areas further west. In addition, rates of maturity appear to be different in the two areas. Thus, it would be prudent to consider **divisions 3LN as one management area, and Division 3O as another.** Based on recent trends in the biomass index, **Subdivision 3Ps should possibly be managed as yet another.**

Applying a similar exploitation rate as was used in 1994 to the 1995 research survey estimates (10%) gives an estimate of about 2,500 metric tons. Of this, about 15% would be in 3LN, 50% in 3O and 35% in 3Ps.

Information currently available indicates that skates are fairly sedentary; that is, they don't move around much. Because of this, it can be relatively easy to deplete local concentrations. Therefore it is important that management continue to ensure that effort is not concentrated in any one area, but is spread out amongst different concentrations.

Research Document: 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.

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For More Information