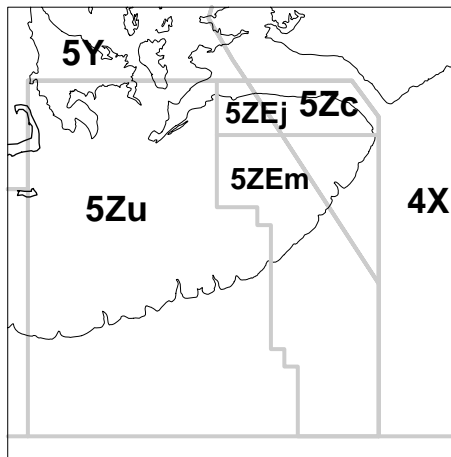




GEORGES BANK COD



Background

The cod fishery on Georges Bank has been in operation since the late 1700s. Since 1977, only Canada and the USA have had directed fisheries and, with the establishment of the Canada/USA boundary in 1985, each country has been limited to their respective sides. Canadian catches of cod are taken primarily between June and October. Management of the Canadian fishery has been by seasonal closures and by ITQ for <65' mobile gear since June 1992, EAs for offshore boats since 1984 and by competitive quota for fixed gear. In 1994, there was a substantial decrease in the TAC. The USA fishery has been greatly constrained by establishment of a closed area between January and June in 1994 and by expansion of the area and yearround closure 1995.

In recent years most of the biomass has been found on the Canadian side of the international boundary, although substantial seasonal movements relative to the boundary occur.

Georges Bank cod prey heavily on fish followed by crustaceans and molluscs. Cod in this area have a very fast growth rate, reach 50 cm (20 in) and begin to spawn for the first time by age 2 and by age 3 almost all are sexually mature.

All data relating to USA catches and research vessel surveys were provided by the National Marine Fisheries Service (NMFS) at the Woods Hole, Mass., Laboratory.

The Fishery

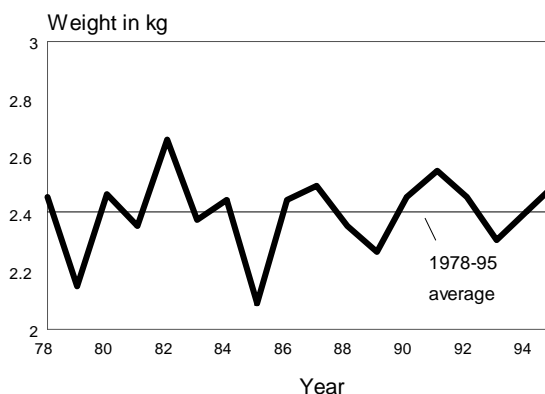
| Landings (thousands of tonnes) | | | | | |
|--------------------------------|---------------|------|------|------|------|
| Year | 79-91 Avg. | 1992 | 1993 | 1994 | 1995 |
| TAC | - | 15 | 15 | 6 | 1.0 |
| Canada | 10.5 | 12 | 8 | 5 | 1.1 |
| USA | 7.0 | 5 | 4 | 2 | 1.0 |
| TOTAL | 17.5 | 17 | 13 | 7 | 2.1 |

Combined Canada/USA catches peaked at 26,000t in 1982, averaged about 17,500t between 1978-91, and declined to 7,277t in 1994. Due to the Canadian bycatch limitations and a USA closed area, the 1995 catches were the lowest observed at 2,100t. Since 1985, Canada has taken about 65% of the total catch but this was reduced to about 50% in 1995.

Canadian landings have been dominated by otter trawlers, except in 1984 and 1989, but the proportion of total landings taken by fixed gears (longline and gillnet) has increased in recent years. In 1994 and 1995, the Georges Bank fishery became more of a mixed species fishery with little targeting for cod. Canadian

landings in 1994 were 5,300t, well below the long-term average. In 1995, Canadian landings of Georges Bank cod were 1,100t and were restricted to bycatch only. In addition, Canada imposed requirements for a catch history as a license condition and a high proportion of trips included Observers. Landings were subject to 100% dockside monitoring and Industry also imposed self-regulation to avoid overrunning allocations. The Canadian groundfish fishery was closed to all vessels from 1 January to June 18, 1995

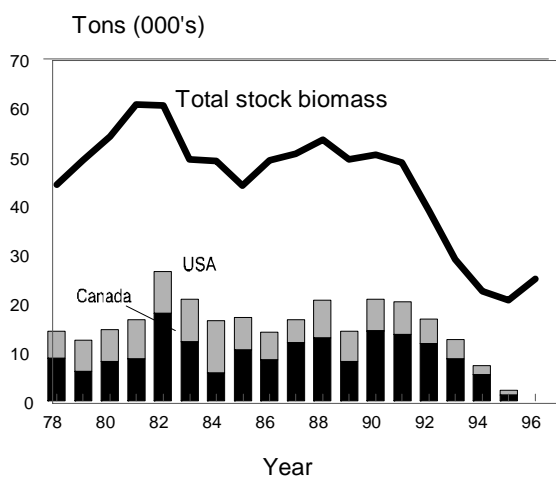
USA landings in 1995 continue to be below the long-term average and are estimated (due to incomplete landing statistics) to be 1,000t. The USA imposed a closed area in 1994 and expanded the area with year round duration in 1995.



Resource Status

Stock status evaluations were based on an assessment using landings statistics, age composition of the commercial catch and trends in abundance from three bottom trawl research surveys.

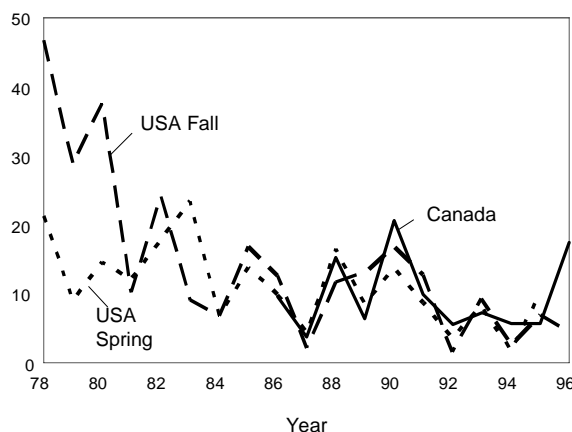
The USA fall survey is lagged by one year for comparison of indices (ie. fall 1977 age one vs spring 1978 age two) with the USA and Canadian spring surveys. In general, **all three surveys** appear to demonstrate similar relative year-class strengths and an overall decline in total numbers since 1990. The 1996 Canadian and 1995 USA spring 3+ indices increased from the previous year while the 1995 USA fall index decreased.



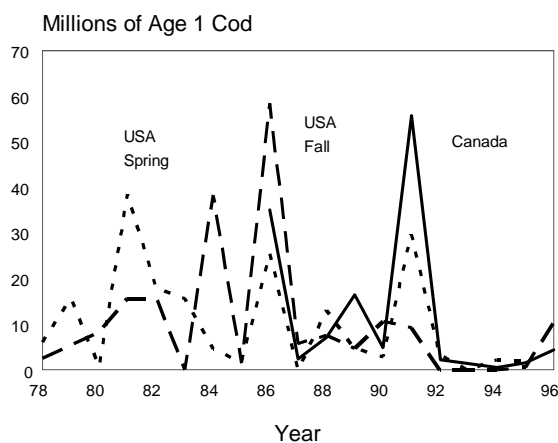
Mean weight at age three has been variable without trend between 1978 and 1995.

Total catch at age in 1995 was estimated from Canadian sampling data. The 1990 year-class accounted for about 20% of the total catch. The 1992 year-class comprised about 45% of the total catch in numbers and in weight, about 15% more than projected in the last assessment.

Millions of 3+ Adults



The 1980, 1983, 1985 and 1990 year-classes were above average while those since 1990 are well below average.



The mobile gear catch rate declined during 1987-94 but estimates of catch rates for 1995 are inappropriate because the fishery was restricted to bycatch only. However, fishermen reported that during the 1995 commercial fishery, abundance of cod was higher than that observed in 1994, although catch rates by EA vessels in the fall of 1995 were low.

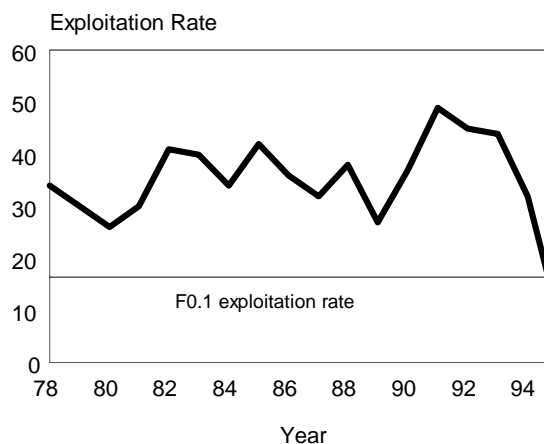
A research longline survey by industry was completed in 1995 and catch rates and size composition were similar to those observed in the fishery. Additional years of data are required before trends can be evaluated.

Although population trends are similar to last year, the estimates for 1994 and 1995 are somewhat higher than reported last year. Reasons for these differences include:

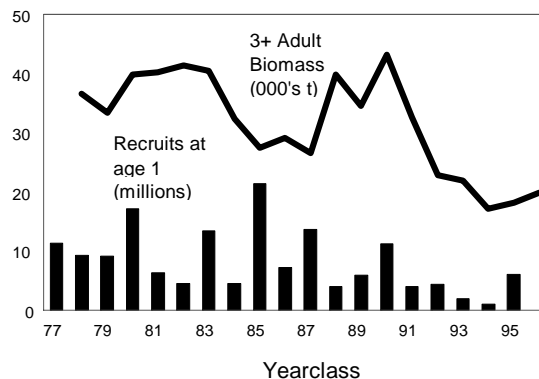
- higher survey indices in 1996
- reduced exploitation in 1995
- reduction in the number of ages used in the USA fall survey

Abundance estimates indicate that there has been a substantial decline in 3+ biomass from 43,000t in 1990 to 17,000t in 1994, the lowest observed, but increased slightly in 1995 and was about 19,000t at the beginning of 1996.

Fishing mortality increased rapidly between 1989 and 1991 to almost four times the $F_{0.1} = 0.2$ reference level. The decline seen in 1994, due to reduced effort, still resulted in a fishing mortality of over twice $F_{0.1}$. In 1995, fishing mortality was further reduced to less than $F_{0.1}$ with additional effort reduction. The **exploitation rate** exceeded 40% between 1991 and 1993, was 32% in 1994 and about 10% in 1995.



Recruitment has been well below average since the 1990 year-class, and the 1994 year-class was the lowest observed. Preliminary estimates for the 1995 year-class indicate that it may be of moderate strength.

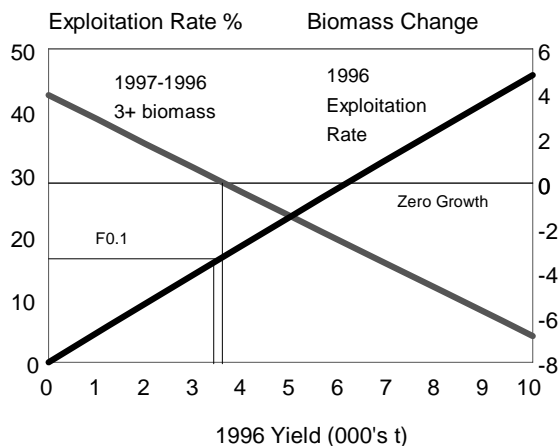
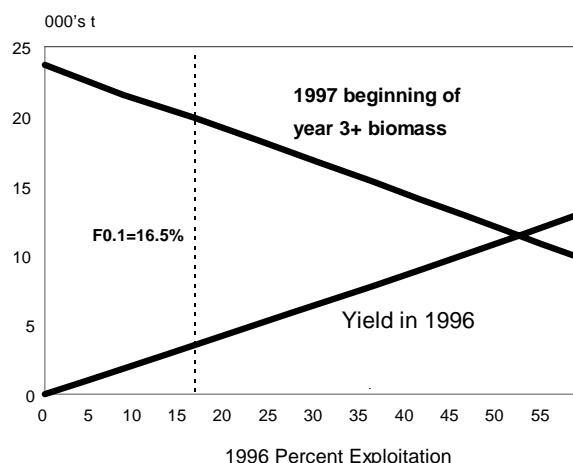


Outlook

Yield projection at $F_{0.1}$ for 1996 indicates a **combined** Canada/USA yield of about 3,500t.

Fishing at that level will result in an increase in 3+ stock biomass between 1996 and 1997 of 1,000t to about 20,000t, but still well below the 30,000 to 40,000t seen between 1978 and 1990.

is also important to note that even small increases in yield above the $F_{0.1}$ level substantially increases the chances that biomass in 1997 will decline.



Yields and projected adult biomass for specific targets are summarized below:

| Target 1996 Exploitation | 1996 Yield | 3+ Biomass in 1997 |
|--------------------------|------------|--------------------|
| $F_{0.1}$ | 3,527t | 19,908t |
| 2,000 t | 2,000t | 21,564t |
| $F_{96}=F_{95}$ | 2,190t | 21,359t |

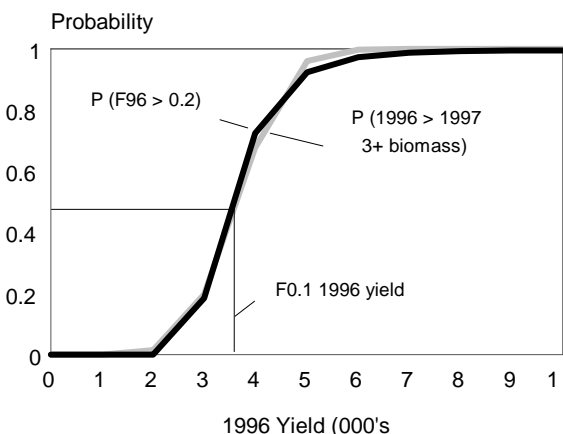
Comparison of **exploitation rates** in 1996 with the net increase in 1997 3+ biomass shows that even at zero yield in 1996, biomass might be expected to increase by about only 5,000t.

For More Information

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Uncertainty associated with the yield projection indicates that even at $F_{0.1}$ there is a 45% probability that the adult biomass will decrease in 1997. A yield of about 3,000t in 1996 reduces this probability to about 20%. It

References

Hunt, J.J., and M-I. Buzeta. 1996. Biological update of Georges Bank cod in Unit Areas 5Zj,m for 1978-95. DFO Atl. Fish. Res. Doc. 96/23: 35p.