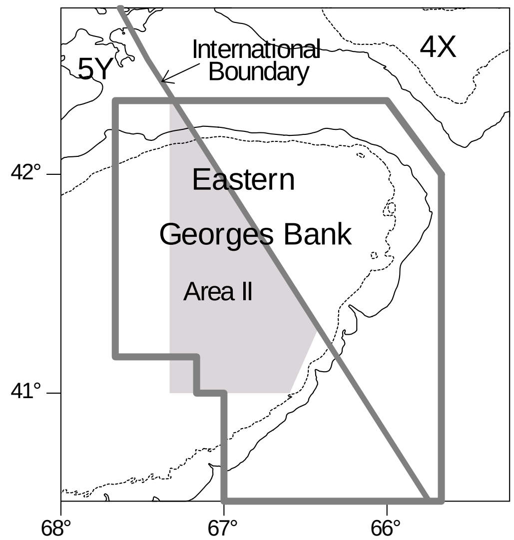
Fisheries and Oceans Canada | Pêches et Océans Canada | NOAA FISHERIES NATIONAL MARINE FISHERIES SERVICE

Transboundary Resource Assessment Committee

Status Report 2007/01

EASTERN GEORGES BANK COD

[5Zjm; 551,552,561,562]



Summary

- Combined Canada/USA catches in 2006 were 1,615 mt, including 441 mt of discards.
- Adult population biomass (ages 3+) declined from 43,800 mt in 1990 to 8,500mt in 1995, subsequently increased to 19,600mt in 2001 and was 20,200mt at the beginning of 2007.
- Recruitment at age 1 of the 2003 year class, at 7.7 million, is the first above average cohort since the 1990 year class. The 2002 and 2004 year classes, at 1 million each, are the lowest on record. The initial estimate of the 2005 year class is below average, at 2.1 million.
- Fishing mortality for ages 4-6 increased sharply between 1989 and 1993 from 0.5 to 1.0. In 1995, fishing mortality declined substantially to F=0.19, due to restrictive management measures. Fishing mortality subsequently fluctuated between 0.18 and 0.50 until 2005 when it declined to 0.10 and was 0.15 in 2006, below F_{ref}=0.18.
- Resource productivity is currently poor due to low weight at age and generally low recruit per spawner ratio.
- Assuming a 2007 catch equal to the 1,900 mt total quota, a combined Canada/USA catch of about 2,700 mt in 2008 would result in a neutral risk (50%) that the fishing mortality rate in 2008 will exceed F_{ref} and a neutral risk (50%) that the 2009 adult biomass will be lower than the 2008 adult biomass. A 20% biomass increase is unlikely even with no catch, but a catch of 700 mt results in a neutral risk that biomass would fail to increase by 10%.
- The 2003 year class is projected to contribute over 50% of the fishery catch biomass in 2007 and 2008. With below average 2004 and 2005 year classes, exploitation below F_{ref} would maintain biomass at higher levels in the near future, increasing chances of better recruitment.

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http://www.mar.dfo-mpo.gc.ca/science/TRAC/trac.html

Canada

June 2007

Catches, Biomass (thousands mt); Recruits (millions)

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Avg[1]	Min[1]	Max[1]
Canada	**Quota**	1.9	1.8	1.6	2.1	1.2	1.3	1.0	0.7	1.3	1.4			
	Landed	1.9	1.8	1.6	2.1	1.3	1.3	1.1	0.6	1.1		6.6	0.6	17.8
	Discard	0.4	0.3	0.1	0.1	0.1	0.2	0.1	0.2	0.4		0.1	0.0	0.5
USA	**Quota[3]**							0.3	0.3	0.4	0.5			
	Landed	0.8	1.2	0.7	1.4	1.4	1.8	1.0	0.1	0.1		4.1	0.1	10.6
	Discard	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1		0.1	0.0	0.2
Total	**Quota**							1.3	1.0	1.7	1.9			
	Catch	3.1	3.3	2.3	3.7	2.8	3.4	2.3	1.1	1.6		10.8	1.1	26.5
	Adult Biomass[4]	12.1	15.5	16.1	19.6	18.5	16.6	18.5	13.4	17.0	20.2	24.9[2]	8.5[2]	43.8[2]
	Age 1 Recruits	1.8	4.4	2.6	2.2	3.0	1.0	7.7	1.0	2.1		6.3	1.0	21.1
	Fishing mortality[5]	0.33	0.29	0.18	0.31	0.23	0.33	0.19	0.10	0.15		0.46	0.10	1.00
	Exploitation Rate	25%	23%	15%	24%	18%	26%	16%	9%	13%		32%	9%	58%

[1]1978 – 2006
[2]1978 – 2007
[3]for fishing year from May 1 – April 30
[4]Jan 1 ages 3+
[5]ages 4-6

Fishery

Combined Canada/USA catches, which averaged 17,500 mt between 1978 and 1992, peaked at 26,460 mt in 1982, declined to 1,804 mt in 1995, fluctuated around 3,000 mt until 2003 and subsequently declined again. Catches in 2006 were 1,615 mt, including 441 mt of discards (Figure 1).

Canadian catches increased to 1,450 mt in 2006 from 861 mt in 2005. Since 1995, with reduction in cod quotas, the fishery has reduced targeting for cod through changes in fishing practices. All 2006 landings were subject to dockside monitoring. As well, at sea observers monitored about 25% (by weight) of 2006 landings. Estimated discards of cod by the Canadian groundfish fishery were 237 mt in 2006. Since 1996 the Canadian scallop fishery has not been permitted to land cod. Estimated discards of cod by the Canadian scallop fishery were 117 mt in 2006.

USA catches declined to 166 mt in 2006 from 277 mt in 2005. Since December 1994, a year-round closure of Area II has been in effect, with the exception of a Special Access Program in 2004. Minimum mesh size limits were increased in 1994, 1999 and in 2002. Limits on sea days, as well as trip limits, have also been implemented. Quotas were introduced in May 2004. Estimated discards of cod in the groundfish fishery for 1989-2004 were generally less than 100 mt annually, increased to 153 mt in 2005, and declined to 87 mt in 2006.

The combined Canada/USA 2006 **fishery age composition** was dominated by the 2003 year class at age 3 (40% by number) but the 2001 year class at age 5 continued to make an important contribution (30% by number). The USA groundfish fishery cod discard catch at age for 1989-2006 and the Canadian groundfish fishery and scallop fishery cod discard catch at age for 1978-2006 were included in the assessment.

Harvest Strategy and Reference Points

The Transboundary Management Guidance Committee has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{ref} = 0.18$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

State of Resource

The state of the resource was based on results from an age structured analytical assessment (VPA) that used fishery catch statistics and sampling for size and age composition of the catch for 1978 to 2006 (including discards). The VPA was calibrated to trends in abundance from three bottom trawl survey series; NMFS spring, NMFS fall and DFO. Retrospective analyses were used to detect any patterns to consistently overestimate or underestimate fishing mortality, biomass and recruitment relative to the terminal year estimates. The extent of the pattern for this assessment was similar to that seen in the past and was not of concern.

Adult population biomass (ages 3+) declined substantially from 43,800 mt in 1990 to 8,500 mt in 1995, the lowest observed (Figure 2). The biomass subsequently increased to 19,600 mt in 2001, declined to 13,400 mt in 2005 but increased again to 20,200 mt at the beginning of 2007 (80% Confidence Interval: 16,000 mt – 24,000 mt). Much of the increase in the late 1990’s was the result of growth and survival to ages 5+ of the 1992, 1995 and 1996 year classes. The increase in 2006 was due largely to recruitment of the 2003 year class and the increase in 2007 was due to growth of the 2003 year class. Lower weights-at-age in the population in recent years and the generally poor recruitment have contributed to the lack of sustained rebuilding.

Recruitment at age 1 of the 2003 year class, at 7.7 million, is the first above average (6.3 million for 1978-2006) cohort since the 1990 year class (Figure 2). Prior to the 2003 year class, the 1996 and 1998 year classes, at over 4 million, were the strongest since the 1990 year class. The 2002 and 2004 year classes, at about 1 million each, are the lowest on record. The initial estimate of the 2005 year class is below average, at 2.1 million.

Fishing mortality for ages 4-6 increased sharply between 1989 and 1993 from 0.5 to 1.0 (Figure 1). In 1995, fishing mortality declined substantially to F=0.19, due to restrictive management measures. Fishing mortality subsequently fluctuated between 0.18 and 0.50 until 2005 when it declined to 0.10 and was 0.15 (80% Confidence Interval: 0.13 – 0.20) in 2006, below $F_{ref}=0.18$.

Productivity

Age structure, fish growth, recruits per spawner, and spatial distribution reflect changes in the productive potential. In both absolute numbers and percent composition, the **population age structure** displays a higher abundance at older age groups compared to the mid 1990s. However, the abundance for older ages may not be well determined. Average weight at length, used to reflect **condition**, has been stable, but declines in **weight at age** have hampered biomass rebuilding. The **recruit per adult biomass ratio** has been generally lower than that seen prior to 1990, with the exception of occasional year classes like the 2003 year class. **Spatial distribution** patterns observed during the most recent bottom trawl surveys were more widespread than average patterns over the previous decade. Resource productivity is currently poor due to low weight at age and generally low recruit per spawner ratio.

Outlook

This outlook is provided in terms of consequences with respect to the harvest reference points for alternative catch quotas in 2008. Uncertainty about standing stock generates uncertainty in forecast results which is expressed here as the risk of exceeding F_{ref} =0.18. The risk calculations assist in evaluating the consequences of alternative catch quotas by providing a general measure of the uncertainties. However, they are dependent on the data and model assumptions and do not include uncertainty due to variations in weight at age, partial recruitment to the fishery, natural mortality, systematic errors in data reporting or the possibility that the model may not reflect stock dynamics closely enough.

For **projections**, the 2004-2006 average values were assumed for the fishery weight at age and partial recruitment pattern in 2007-2008 and the 2005-2007 survey average values were assumed for beginning of year population weight at age in 2008-2009. Assuming a 2007 catch equal to the 1,900 mt total quota, a combined Canada/USA catch of about 2,700 mt in 2008 would result in a neutral risk (50%) that the fishing mortality rate in 2008 will exceed F_{ref} and a neutral risk (50%) that the 2009 adult biomass will be lower than the 2008 adult biomass (Figure 4). A 20% biomass increase is unlikely even with no catch, but a catch of 700 mt results in a neutral risk that biomass would fail to increase by 10%. A status quo catch of about 1,900 mt in 2008 would result in a low risk (less than 25%) that the adult biomass would decrease from 2008 to 2009 and a high chance of maintaining the fishing mortality below F_{ref}=0.18.

Special Considerations

The 2003 year class is projected to contribute over 50% of the fishery catch biomass in 2007 and 2008. With below average 2004 and 2005 year classes, exploitation below F_{ref} would maintain biomass at higher levels in the near future, increasing chances of better recruitment (Figure 3).

Cod and haddock are often caught together in groundfish fisheries, although they are not necessarily caught in proportion to their relative abundance because their catchabilities to the fisheries differ. Due to the higher haddock quota, discarding of cod may be high and should be monitored. Modifications to fishing gear and practices, with enhanced monitoring, may mitigate these concerns.

Source Documents

Gavaris S, O'Brien L, Clark K, Hatt B. 2007. Assessment of eastern Georges Bank Atlantic cod for 2007. TRAC Reference Document 2007/04.

TRAC. 2007. O'Boyle R, O'Brien L, editors. Proceedings of the Transboundary Resource Assessment Committee (TRAC); 12–15 June 2007. TRAC Proceedings 2007/01.

Correct Citation

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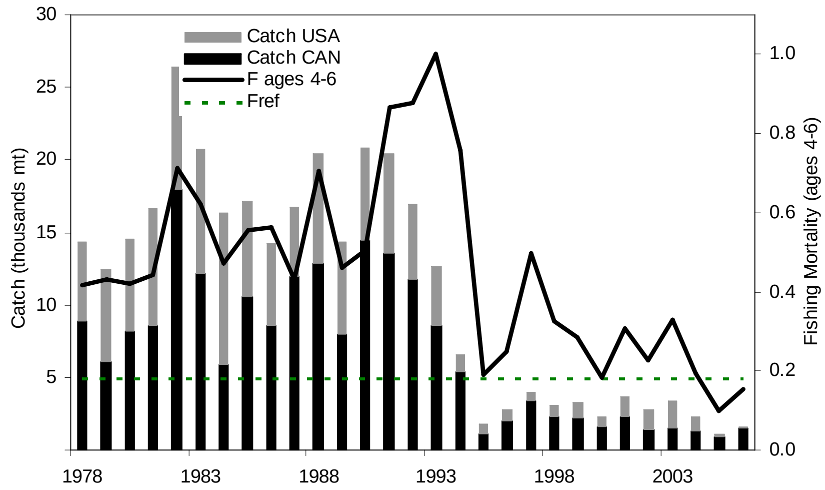

Figure 1. Catches and fishing mortality.

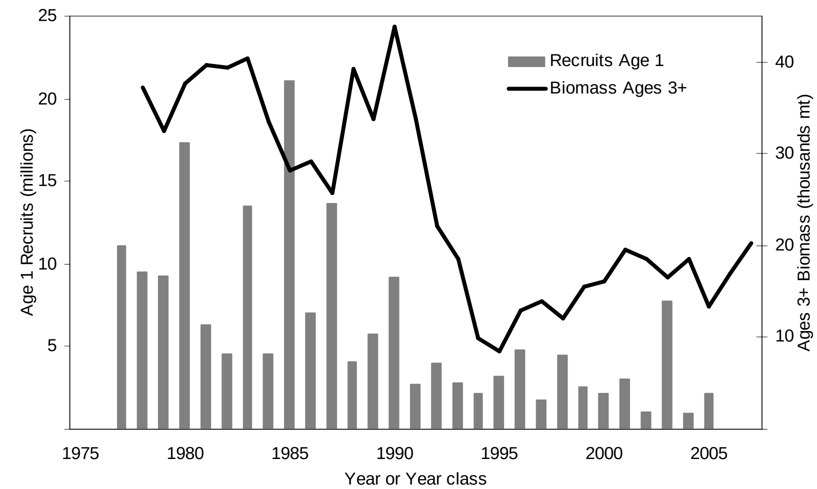

Figure 2. Biomass and recruitment.

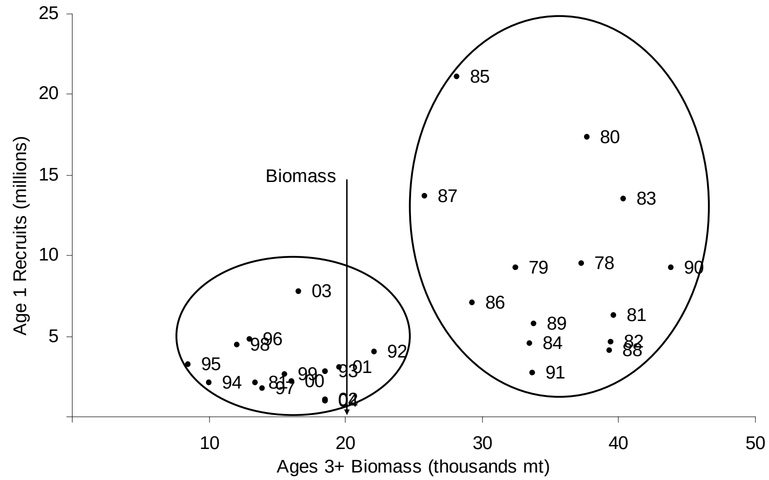

Figure 3. Stock recruitment patterns.

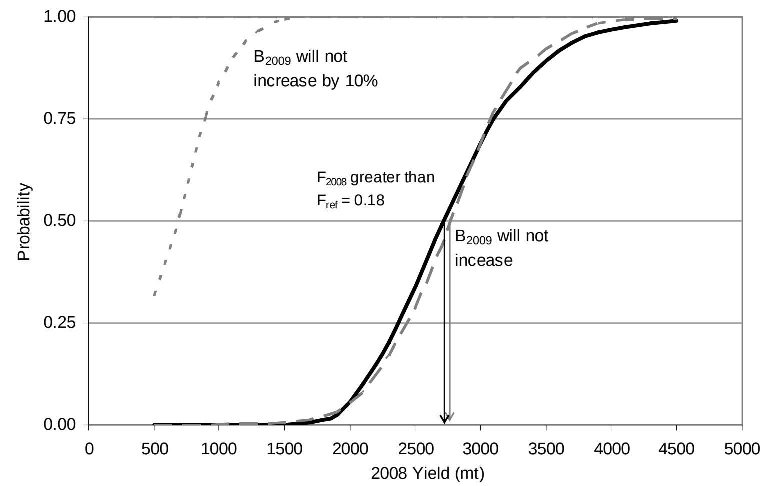

Figure 4. Projection risks.