



Transboundary Management Guidance Committee

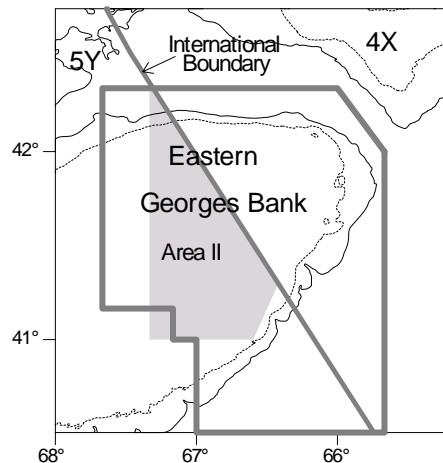
Guidance Document 2006/01

The Transboundary Management Guidance Committee (TMGC), established in 2000, is a government – industry committee comprised of representatives from Canada and the United States. The Committee’s purpose is to develop guidance in the form of harvest strategies, resource sharing and management processes for Canadian and US management authorities for the cod, haddock and yellowtail flounder transboundary resources on Georges Bank. This document is a summary of the basis of the TMGC’s guidance to both countries for the 2007 fishing year. Pertinent reference documents and consultations used in the TMGC deliberations are listed at the end of this document.

Eastern Georges Bank Cod [5Zjm; 551, 552, 561, 562]

Guidance:

The TMGC concluded that the most appropriate combined Canada/USA TAC for Eastern Georges Bank cod for the 2007 fishing year is 1,900 mt. This corresponds to a very low risk, less than 25% probability, of exceeding the F_{ref} of 0.18 in 2007. At this level of harvest there is greater than neutral risk (60%) that stock biomass will decrease from 2007 to 2008, however the decline is nominal. The annual allocation shares for 2007 between countries are based on a combination of historical catches (25% weighting) and resource distribution based on trawl surveys (75% weighting). Combining these factors entitles the USA to 26% and Canada to 74%, resulting in a national quota of 494 mt for the USA and 1,406 mt for Canada.



Harvest Strategy & Reference Points:

The strategy is 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.

Fishery Exploitation:

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

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg ¹	Min ¹	Max ¹
Canada	Quota	3.0	1.9	1.8	1.6	2.1	1.2	1.3	1.0	0.7	1.3			
	Landed	2.9	1.9	1.8	1.6	2.1	1.3	1.3	1.1	0.6		6.8	0.6	17.8
	Discard	0.5	0.4	0.4	0.1	0.1	0.1	0.2	0.1	0.3		0.1	0.0	0.5
USA	Quota ³								0.3	0.3	0.4			
	Landed	0.6	0.8	1.2	0.7	1.4	1.4	1.8	1.0	0.1		4.2	0.1	10.6
	Discard	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2		0.0	0.0	0.2
Total	Quota								1.3	1.0	1.7			
	Catch	4.0	3.1	3.3	2.3	3.7	2.8	3.4	2.3	1.2		11.1	1.2	26.5



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg ¹	Min ¹	Max ¹
Adult Biomass⁴	13.7	11.8	14.6	15.2	18.1	17.4	15.3	17.1	11.5	16.3	24.6 ²	8.5 ²	43.5 ²
Age 1 Recruits	4.7	1.7	4.4	2.8	2.5	2.6	0.9	7.9	0.6		6.4	0.6	21.1
Fishing mortality⁵	0.51	0.34	0.30	0.19	0.32	0.23	0.33	0.17	0.10		0.47	0.10	1.03
Exploitation Rate	37%	26%	24%	16%	25%	19%	25%	15%	8%		33%	8%	59%

¹1978 – 2005

²1978 – 2006

³for fishing year from May 1 – April 30

⁴Jan 1 ages 3+

⁵ages 4-6

Combined Canada/USA catches, which averaged about 17,900 mt between 1978 and 1992, peaked at 26,500 mt in 1982, declined to 1,800 mt in 1995, fluctuated around 3,000 mt until 2003 and subsequently declined again. Catches in 2005 were 1,200 mt.

Fishing mortality for ages 4-6 increased sharply between 1989 and 1993 from 0.5 to 1.0. In 1995, fishing mortality declined to $F_{ref} = 0.18$, due to restrictive management measures, but subsequently fluctuated above F_{ref} until 2004 when it declined to 0.17 and declined further in 2005 to 0.10.

State of Resource:

Adult population biomass (ages 3+) declined substantially from 43,500 mt in 1990 to 8,500 mt in 1995, the lowest observed. The biomass subsequently increased to 18,000 mt in 2001, declined to 11,500 mt in 2005 but increased again to 16,300 mt at the beginning of 2006. 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. Lower weights-at-age in the population in recent years and the generally poor recruitment have contributed to the lack of rebuilding.

Productivity:

The 2003 year class, estimated at 7.9 million at age 1, is the first above average (6.4 million) cohort since the 1990 year class. 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 less than 1 million each, are the lowest on record. Resource productivity potential is currently poor due to declines in weight at age and generally low recruit per spawner ratio.

2007 Catch Risk Assessment:

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2007 Catch (mt)	2,550 mt	2,900 mt	3,400 mt
Risk of biomass decrease	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2007 Catch (mt)	600 mt	1,500 mt	2,500 mt

As indicated in the above table a combined Canada/USA catch of about 2,900 mt in 2007 has a neutral risk, about 50%, of exceeding F_{ref} . At a catch of 2,900 mt in 2007, there is a high risk, over 75% chance, of a biomass decrease from the beginning of year 2007 to the beginning of year 2008. At a catch of 1,500 mt in 2007, there is a neutral risk, about 50%,

that biomass would decrease and maintains the fishing mortality near $F_{2005}=0.1$. A combined Canada/USA catch in 2007 of 1,900 mt results in a nominal biomass decline due to the weak 2002 and 2004 year classes but maintains F below the reference and the US rebuilding fishing mortality target.

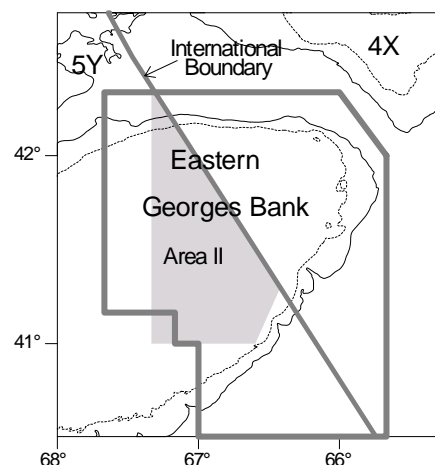
Special Considerations:

Cod and haddock are often caught together in groundfish fisheries, although their catchabilities to the fisheries differ and they are not necessarily caught in proportion to their relative abundance. With current fishing practices and catch ratios, the achievement of rebuilding objectives for cod will likely constrain the harvesting of haddock. Additional efforts are warranted to protect the 2003 cod year class which is the first above average year class since the 1990 year class. Due to the high haddock quota, discarding of the 2003 cod year class may be high and should be monitored. Modifications to fishing gear and practices, with enhanced monitoring, may mitigate these concerns.

Eastern Georges Bank Haddock [5Zjm; 551, 552, 561, 562]

Guidance:

The TMGC concluded that the most appropriate combined Canada/USA TAC for Eastern Georges Bank haddock for the 2007 fishing year is 19,000 mt. This represents a neutral risk (50%) of exceeding the F_{ref} of 0.26. Adult biomass is projected to be 149,000 mt in 2007 and will increase by less than 10% in 2008. The annual allocation shares for 2007 between countries are based on a combination of historical catches (25% weighting) and resource distribution based on trawl surveys (75% weighting). Combining these factors entitles the USA to 33% and Canada to 67%, resulting in a national quota of 6,270 mt for the USA and 12,730 mt for Canada.



Harvest Strategy & Reference Points:

The strategy is to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{ref} = 0.26$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

Fishery Exploitation:

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

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg ¹	Min ¹	Max ¹
Canada	Quota	3.2	3.9	3.9	5.4	7.0	6.7	6.9	9.9	15.4	14.5			
	Landed	2.7	3.4	3.7	5.4	6.8	6.5	6.8	9.7	14.5		4.3	0.5	14.5
	Discard	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1		0.1	<0.1	0.2
USA	Quota ⁶								5.1	7.6	7.5			
	Landed	<0.1	0.3	0.4	0.2	0.6	0.9	1.6	1.8	0.5		2.2	<0.1	9.1
	Discard ²	0.1	<0.1	0	0	<0.1	<0.1	0.1	0.2	0.1		0.4	<0.1	7.6

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg ¹	Min ¹	Max ¹
Total Quota								15.0	23.0	22.0			
Catch	2.9	3.8	4.1	5.6	7.5	7.5	8.5	11.8	15.1		7.0	2.2	23.3
Adult Biomass⁴	22.0	24.3	29.7	34.4	46.5	40.5	73.8	68.7	50.6	122.7	41.8 ³	6.8 ³	122.7 ³
Age 1 Recruits	17.0	7.2	26.0	10.9	72.2	4.3	1.8	338.4	8.6	27.9	28.3 ³	0.5 ³	338.4 ³
Fishing mortality⁵	0.12	0.15	0.14	0.16	0.19	0.19	0.18	0.17	0.29		0.29	0.08	0.59
Exploitation Rate⁵	11%	13%	12%	14%	16%	16%	15%	14%	23%		22%	7%	41%

¹1969 - 2005

² discards not estimated in 1999-2000 but assumed negligible

³1931 - 1955, 1969 – 2005

⁴Jan 1 ages 3+

⁵ages 4+

⁶for fishing year from May 1 – April 30

Combined Canada/USA catches declined from over 6,400 mt in 1991 to a low of 2,100 mt in 1995, fluctuated between 3,000 mt and 4,000 mt until 1999 and have since increased to 15,100 mt. Greater catches were recorded in the late 1970s and early 1980s, ranging up to 23,000 mt, but catches subsequently declined and fluctuated around 5,000 mt during the mid to late 1980s.

Fishing mortality for ages 4+ fluctuated between 0.2 and 0.4 during the 1980s and showed a marked increase between 1989 and 1993 to about 0.6, the highest observed. Since 1995, fishing mortality has been below the reference, $F_{ref} = 0.26$, but increased in 2005 to slightly above F_{ref} .

State of Resource:

Adult biomass (ages 3+) increased from a low of 8,600 mt in 1993 to 73,800 mt in 2003 and subsequently decreased to 51,000 mt in 2005 but increased to 123,000 mt in 2006, higher than the 1931-1955 maximum biomass of 90,000 mt, as a result of the exceptional 2003 year class.

Productivity:

Recruitment improved in the 1990s, and the 2003 year class, estimated at 338 million is the largest in the assessment time series (1931-1955 and 1969-2004). In contrast, the 2001, 2002 and 2004 year classes are weak (< 9 million age-1 fish). Initial estimates of the 2005 year class (28 million age-1 fish) suggest that it is about average. Productivity increased since the 1980s due to improved production of recruits per spawner and increases in the number of older fish in the population. Resource productivity has severely diminished in recent years due to reductions in fish size at age.

2007 Catch Risk Assessment:

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2007 Catch (mt)	16,000 mt	19,000 mt	22,000 mt

A combined Canada/USA catch of 19,000 mt in 2007 is risk neutral with respect to exceeding $F_{ref} = 0.26$. The risk of biomass decline is not pertinent because biomass is currently the highest in the assessment series.

Special Considerations:

The outstanding 2003 year class was expected to contribute substantially (32%) to the 2005 catch. However, the contribution was negligible (1%) due to a failure to recruit to the fishery because of slow growth. The failure of this year class to contribute as expected to the fishery resulted in fishing mortality above F_{ref} on the older ages in 2005. This has been exacerbated by the two weak year classes preceding the 2003 year class. Slow growth of the 2003 cohort will continue to impact the fishery. Although the TAC in 2006 is not likely to be caught, fishing mortality on the fully recruited ages (5+) is again expected to be higher than F_{ref} . Due to the high abundance of the 2003 cohort and its slow growth, discards of this year class may be high and should be monitored.

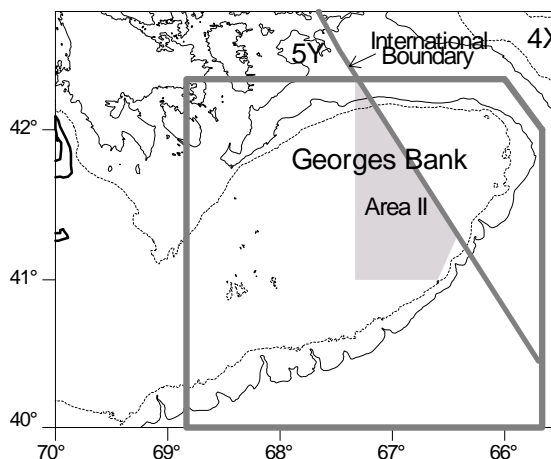
Reduction in recommended TAC for 2007 appears incongruent with the highest biomass in the time series and recent shortfalls in catch relative to the TAC. In contrast to the 2006 catch projections, the projections for 2007 better account for the effect of the very slow growth of the 2003 year class, both in weight at age and recruitment to the fishery.

Cod and haddock are often caught together in groundfish fisheries, although their catchabilities to the fisheries differ and they are not necessarily caught in proportion to their relative abundance. With current fishing practices and catch ratios, the achievement of rebuilding objectives for cod will likely constrain the harvesting of haddock. Due to the high 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.

Georges Bank Yellowtail Flounder [5Zhjmn; 522,525, 551, 552, 561, 562]

Guidance:

The TMGC concluded that the most appropriate combined Canada/USA TAC for the 2007 fishing year is 1,500 mt. This corresponds to an F of 0.31 and represents a risk greater than 50%, of exceeding the F_{ref} of 0.25. However, with a catch of 1,500 mt in 2007, the age 4+ biomass is expected to increase by 43%. The annual allocation shares for 2007 between countries are based on a combination of historical catches (25% weighting) and resource distribution based on trawl surveys (75% weighting). Combining these factors entitles the USA to 72% and Canada to 28%, resulting in a national quota of 1,080 mt for the USA and 420 mt for Canada.



Harvest Strategy & Reference Points:

The strategy is to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{ref} = 0.25$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

Fishery Exploitation:

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

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg ¹	Min ¹	Max ¹
Canada	Quota	0.8	1.2	2.0	3.0	3.4	2.9	2.3	1.9	1.7	0.9			
	Landed	0.8	1.2	2.0	2.9	2.9	2.6	2.1	0.1	<0.1		0.6	<0.1	2.9
	Discard	0.4	0.7	0.6	0.4	0.8	0.5	0.8	0.4	0.3		0.5	0.3	0.8
USA	Quota ⁵								6	4.3	2.1			
	Landed	1.0	1.8	2.0	3.7	3.8	2.5	3.3	6.2	3.3		5.0	0.4	15.9
	Discard	<0.1	0.1	0.5	0.4	0.3	0.2	0.4	0.5	0.5		0.6	<0.1	3.0
Total	Quota								7.9	6.0	3.0			
	Catch	2.3	3.8	5.0	7.4	7.9	5.9	6.6	7.3	4.2		6.8	1.2	17.2
Adult Biomass ³		5.1	6.4	7.9	10.3	10.7	9.2	11.3	9.1	5.7	5.4	7.5 ²	2.0 ²	26.4 ²
SSB		5.7	7.0	9.5	10.4	9.4	10.5	10.4	6.4	5.4		7.7	2.6	21.9
Age 1 Recruits		18.4	23.9	25.5	21	23.7	15.9	17.1	11.9	9.2		22.3	6.6	70.1
Fishing mortality ⁴		0.71	0.78	0.70	0.89	0.95	0.62	0.58	1.92	1.37		1.07	0.58	1.92
Exploitation Rate ⁴		47%	50%	46%	54%	56%	42%	40%	80%	69%		59%	40%	80%

¹1973 – 2005

²1973 - 2006

³Jan-1 ages 3+

⁴ages 4+

⁵for fishing year May 1 – April 30

Combined Canada/USA catches of Georges Bank yellowtail flounder peaked at 20,000 mt during the mid 1960s and early 1970s. The catch increased from 1995 through 2001, averaged 6,600 mt per year during 2002-2004, but declined from 7,275 mt in 2004 to 4,150 mt in 2005. In 2004 and 2005, the total catch was less than the TAC.

Fishing mortality for fully recruited ages 4+ was close to or above 1.0 between 1973 and 1994, fluctuated between 0.6 and 0.9 from 1995-2003, increased in 2004 to 1.92, and then declined in 2005 to 1.37. Fishing mortality has been well above $F_{ref} = 0.25$ for the entire time series, in contrast to the pre-2005 assessments which concluded that F was below F_{ref} since 1995.

State of Resource:

Two assessment approaches were considered by TRAC. The Base Case VPA continues to display a retrospective pattern, updating population biomass estimates to lower values than previously determined and compromising interpretation of results, although the magnitude of the retrospective pattern is less than in previous years. The Major Change VPA did not exhibit a retrospective pattern; updates were both above and below previously estimated values. The Major Change VPA reflects the recent decreasing trend observed in all three surveys and is adopted as the basis for management advice for 2007, whereas the Base Case VPA does not reflect the decline.

Population biomass (ages 3+), based on the Major Change VPA results, increased from a low of 2,200 mt in 1995 to 11,300 mt in 2003 and then declined to 5,450 mt at the beginning of 2006. Spawning stock biomass in 2005 was estimated to be 5,400 mt.

Productivity:

Recruitment improved from the mid-1990s averaging 23.5 million fish at age 1 during 1998-2001 but has since declined to 9.2 million in 2005. Previous assessments indicated the presence of some high recruitment in the late 1990s and early 2000s, but the size of these cohorts is now estimated to be much lower. Truncated age structure (fewer ages 6+) and the occurrence of yellowtail flounder in fewer areas in the surveys indicate current resource productivity may be limited relative to historical levels.

2007 Catch Risk Assessment:

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2007 Catch (mt)	1,024 mt	1,250 mt	1,448 mt

As indicated in the above table a combined Canada/USA catch of about 1,250 mt in 2007 has a neutral risk, 50% probability, of exceeding F_{ref} . Fishing at F_{ref} in 2007 will generate a 66% increase in median age 3+ biomass from 5,600 mt in 2007 to 9,200 mt in 2008. A considerable portion of this increase is due to the assumed strength of the 2005 year class, which is not yet estimated.

The rationale for selecting a 1,500 mt TAC level is based on the following:

- Although the recommended TAC is associated with a fishing mortality rate slightly above the reference level (0.25), the fishing mortality would be reduced to 0.31 from 1.37 in 2005, and 0.83 in 2006.
- The recommended TAC would not undermine stock rebuilding. With a catch of 1,500 mt in 2007, the ages 4+ biomass is expected to increase by 43%.
- Revisions to stock status (there were not as many fish as previously estimated) and recent declines in survey indices have led to substantial TAC decreases since 2005 (6,000 mt in 2005, 3,000 mt in 2006 and recommended 1,500 mt in 2007). This rapid decline has significant socio-economic effects which were considered in addition to conservation objectives.

Special Considerations:

The Major Change VPA shows unexpected large increases in survey catchability since the mid 1990s. The reason for the large changes in survey catchability could not be determined. Survey catchability represents a ratio between the survey index and estimated population size. The changes in survey catchability are most appropriately thought of as reflecting an unknown process(es) that altered this ratio. The inability to plausibly explain these survey catchability changes causes increased uncertainty in this assessment relative to other assessments. However, the Major Change VPA results reflect the decline in abundance observed in all three surveys and is the preferred model from which to make management decisions.

Assuming a TAC of 3,000 mt is caught in 2006 will result in a fishing mortality rate of 0.83, well above $F_{\text{ref}} = 0.25$. Given the addition of the most recent survey data, the decline in the resource is now much greater than was estimated in last year's assessment. As such, the fishing mortality associated with the 2006 TAC is much higher than estimated in the 2005 assessment.

Source Documents

Gavaris, S., R. Mayo. and L. O'Brien 2006. Update of allocation shares for Canada and the USA of the transboundary resources of Atlantic cod, haddock and yellowtail flounder on Georges Bank through fishing year 2007. TRAC Reference Document 2006/03.

TRAC. 2006. Eastern Georges Bank cod. TRAC Status Report 2005/04.

TRAC. 2006. Eastern Georges Bank haddock. TRAC Status Report 2005/02.

TRAC. 2006. Georges Bank yellowtail flounder. TRAC Status Report 2005/03.

Consultations

Transboundary Resources Assessment Committee (TRAC), Woods Hole, Massachusetts, 13-16 June 2006.

Transboundary Management Guidance Committee public consultation in Canada, Yarmouth, Nova Scotia, 24 July 2006.

New England Fishery Management Council, Groundfish Oversight Committee, Portland, Maine, 24 August 2006.