



Transboundary Management Guidance Committee

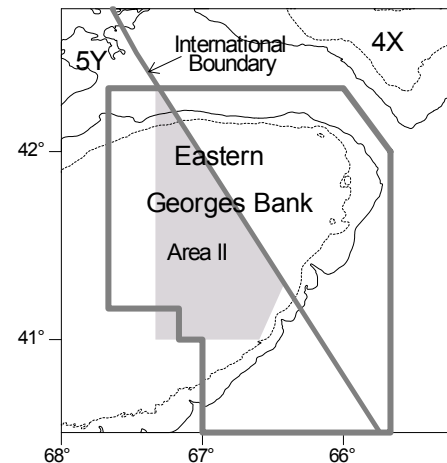
Guidance Document 2005/01

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 2006 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 2006 fishing year is 1,700 mt. This corresponds to an F less than 0.18 in 2006 and represents a very low risk, less than 25% probability, of exceeding the F_{ref} of 0.18. At this level of harvest there is also a greater than 75% probability that stock biomass will increase by at least 10% from 2006 to 2007. The annual allocation shares for 2006 between countries are based on a combination of historical catches (30% weighting) and resource distribution based on trawl surveys (70% weighting). Combining these factors entitles the USA to 22% and Canada to 78%, resulting in a national quota of 374 mt for the USA and 1,326 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)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg ¹	Min ¹	Max ¹
Canada	Quota	2.0	3.0	1.9	1.8	1.6	2.1	1.2	1.3	1.0	0.7			
	Landed	1.9	2.9	1.9	1.8	1.6	2.1	1.3	1.3	1.1		7.0	1.1	17.8
	Discard	0.1	0.5	0.4	0.4	0.1	0.1	0.1	0.2	0.1		0.1	<0.1	0.5
USA	Quota ⁵									0.3	0.3			
	Landed	0.8	0.6	0.8	1.2	0.7	1.4	1.4	1.8	1.0		4.4	0.6	10.6
	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
Total	Quota									1.3	1.0			
	Catch	2.8	4.0	3.1	3.3	2.3	3.7	2.8	3.4	2.3		11.5	1.8	26.5
	Adult Biomass ²	12.7	13.5	12.1	16.3	15.7	18.8	17.1	15.3	16.5	14.3	25.2 ⁴	8.7 ⁴	45.4 ⁴
	Age 1 Recruits	2.9	4.6	1.7	4.5	3.1	2.5	1.8	0.6	9.3		6.6	0.6	21.1



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg ¹	Min ¹	Max ¹
Fishing mortality³	0.25	0.42	0.32	0.30	0.20	0.30	0.23	0.29	0.16		0.47	0.16	0.95
Exploitation Rate³	20%	31%	25%	23%	16%	24%	19%	23%	13%		33%	13%	57%

¹1978 – 2004

²ages 3+

³ages 4-6

⁴1978-2005

⁵for fishing year from May 1 – April 30

Combined Canada and USA catches averaged about 17,900 mt between 1978 and 1992, peaked at 26,000 mt in 1982 and declined to a low of 1,800 mt in 1995. Catches since 1999 have been about 3,000 mt. Catches in 2004 (2,300 mt) decreased by about 1,100 mt from 2003.

Fishing mortality rate for fully recruited ages (4-6) increased rapidly between 1989 and 1993 to over $F = 0.9$, well above the fishing mortality reference, $F_{ref} = 0.18$. Since 1995, fishing mortality has gradually declined to below F_{ref} in 2004 ($F_{2004}=0.16$).

State of Resource:

There was a substantial decline in adult (3+) stock biomass from about 45,000 mt in 1990 to about 8,500 mt in 1995, the lowest observed. The biomass subsequently increased to 18,800 mt in 2001 as a result of growth, increased survival of the 1992, 1995 and 1996 year-classes, and lowered exploitation. Biomass has since declined to 14,300 mt at the beginning of 2005 due to poor recruitment (with the exception of the 2003 year class) and lower weights-at-age in the population.

Productivity:

Apart from the 2003 year class, all year classes since 1990 have been below the average of 6.5 million at age 1. The 2002 year class, at less than 1 million, is the lowest on record. The 2003 year class, presently estimated at 9.3 million, is substantially stronger than recent recruitment, however the estimate has considerable uncertainty. Age structure continues to expand, but overall productivity for this stock is currently poor, largely due to low recruits per spawner, with the exception of the 2003 year class, and declines in weight at age.

2006 Catch Risk Assessment:

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2006 Catch (mt)	1,950 mt	2,200 mt	2,600 mt
Risk of not achieving 10% Biomass increase	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2006 Catch (mt)	2,200 mt	3,000 mt	3,900 mt

As indicated in the above table a combined Canada/USA catch of about 2,200 mt in 2006 has a neutral risk, about 50%, of exceeding F_{ref} . At a catch of 2,200 mt in 2006, there is a low risk, about a 25% chance, of not achieving a 10% biomass increase from the beginning of year 2006 to the beginning of year 2007. At a catch of 1,950 mt in 2006,

there is a low risk, about 25%, of exceeding F_{ref} . About half of the 2006 catch biomass will be due to the 2003 year class, whose magnitude has high uncertainty. **A combined Canada/USA catch in 2006 of 1,700 mt provides a greater buffer against this uncertainty and improves stock rebuilding prospects.**

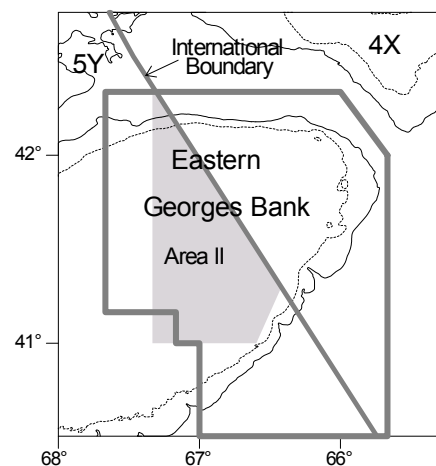
Special Considerations:

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 may constrain the harvesting of haddock. Modifications to fishing gear and practices, with enhanced monitoring, can 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 2006 fishing year is 22,000 mt. This corresponds to an F of 0.26 in 2006 and represents a neutral risk, about 50%, of exceeding the F_{ref} of 0.26. Adult biomass will increase substantially from 2006 to 2007 due to recruitment of the exceptional 2003 year class. The annual allocation shares for 2006 between countries are based on a combination of historical catches (30% weighting) and resource distribution based on trawl surveys (70% weighting). Combining these factors entitles the USA to 34% and Canada to 66%, resulting in a national quota of 7,480 mt for the USA and 14,520 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)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg ¹	Min ¹	Max ¹
Canada	Quota	4.5	3.2	3.9	3.9	5.4	7.0	6.7	6.9	9.9	15.4			
	Landed	3.7	2.7	3.4	3.7	5.4	6.8	6.5	6.8	9.7		4.0	0.5	10.0
	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			
	Landed	<0.1	<0.1	0.3	0.4	0.2	0.6	0.9	1.6	1.8		2.2	<0.1	9.1
	Discard ²	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2		1.0	<0.1	7.6
Total	Quota									15.0	23.0			

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg ¹	Min ¹	Max ¹
Catch	3.8	2.9	3.8	4.1	5.6	7.4	7.4	8.4	11.8		6.8	2.2	23.3
Adult Biomass⁴	24.0	23.1	25.7	30.9	36.9	50.3	44.9	74.3	68.0	49.9	41.0 ³	7.6 ³	90.9 ³
Age 1 Recruits	6.4	16.9	9.2	27.9	12.8	65.6	3.9	1.6	365.5	7.9	28.8 ³	0.6 ³	365.5 ³
Fishing mortality⁵	0.20	0.12	0.14	0.13	0.16	0.17	0.17	0.15	0.17		0.28	0.07	0.58
Exploitation Rate⁵	16%	10%	12%	11%	13%	14%	14%	13%	14%		22%	6%	40%

¹1969 - 2004

² discards not estimated in 1999-2000 but assumed negligible

³1931 - 1955, 1969 – 2005

⁴ages 3+

⁵ages 4+

⁶for fishing year from May 1 – April 30

Combined Canada and USA catches in 2004 were about 11,800 mt, increasing from a low of about 2,100 mt in 1995. Recent catches have been above the 1969-2003 average but are below the level of catches observed during the 1930s to 1950s.

Fishing mortality for ages 4+ fluctuated between 0.2 and 0.4 during the 1980s followed by a marked increase between 1989 and 1993 to its maximum of about 0.6. Since 1995, fishing mortality has been below the reference, $F_{ref} = 0.26$, ($F_{2004}=0.17$).

State of Resource:

Adult biomass (ages 3+) increased from a low of about 9,000 mt in 1993 to about 74,000 mt at the beginning of 2003 and subsequently decreased to about 50,000 mt at the beginning of 2005 due to the poor 2001 and 2002 year classes. Biomass is projected to increase by a factor of 2-3 after 2006, well beyond the 1931-1955 maximum of about 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 365 million is the largest in the assessment time series (1931-1955 and 1969-2004). Initial indications for the 2004 year class suggest it is relatively weak (8 million at age 1). Productivity increased since the 1980s due to improved production of recruits per spawner and increases in the number of older fish in the population. Productivity has diminished in recent years due to reductions in average size at age.

2006 Catch Risk Assessment:

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2006 Catch (mt)	18,000 mt	22,000 mt	26,000 mt

A combined Canada/USA catch of 22,000 mt in 2006 is risk neutral with respect to exceeding $F_{ref} = 0.26$. The risk of biomass decline is not pertinent because stock condition is not considered poor (biomass is currently approaching a record high level) and rebuilding is well underway.

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

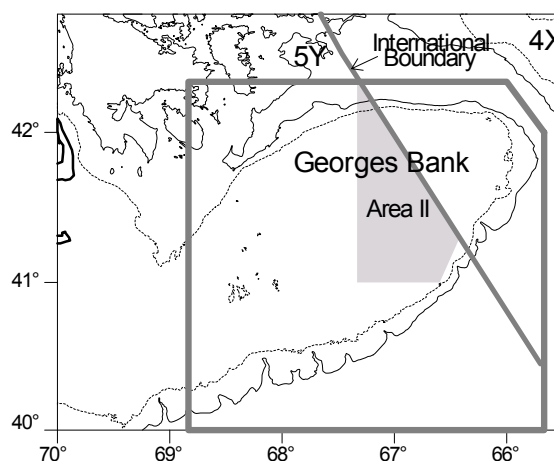
their relative abundance. With current fishing practices and catch ratios, the achievement of rebuilding objectives for cod may constrain the harvesting of haddock. Modifications to fishing gear and practices, with enhanced monitoring, can mitigate these concerns.

The outstanding 2003 year class will dominate the catch in 2006 and subsequent years. These increasing catches are highly dependent on the magnitude of this year class. Measures should be considered to avoid wastage of the 2003 year class due to discarding in all fisheries.

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 2006 fishing year is 3,000 mt. This corresponds to an F of 0.25 and represents a neutral risk, about 50%, of exceeding the F_{ref} of 0.25 and a 75% probability that stock biomass will increase by at least 10% from 2006 to 2007. Two assessment approaches were used to evaluate stock status. Both indicated that biomass has increased since the mid 1990s and recent recruitment has been above average, but fishing mortality remains substantially above F_{ref} . The annual allocation shares for 2006 between countries are based on a combination of historical catches (30% weighting) and resource distribution based on trawl surveys (70% weighting). Combining these factors entitles the USA to 69% and Canada to 31%, resulting in a national quota of 2,070 mt for the USA and 930 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)

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg ¹	Min ¹	Max ¹
Canada	Quota	0.4	0.8	1.2	2.0	3.0	3.4	2.9	2.2	1.9	1.7			
	Landed	0.5	0.8	1.2	2.0	2.9	2.9	2.6	2.1	0.1		0.6	<0.1	2.9
	Discard	0.4	0.4	0.7	0.6	0.4	0.8	0.5	0.8	0.4		0.5	0.3	0.8
USA	Quota ⁵									6.0	4.5			
	Landed	0.8	1.0	1.8	2.0	3.7	3.8	2.5	3.3	6.2		5.1	0.4	15.9
	Discard	<0.1	<0.1	0.1	0.5	0.4	0.3	0.2	0.4	0.5		0.6	<0.1	3.0
Total	Quota									7.9	6.0			
	Catch	1.7	2.3	3.8	5.0	7.4	7.9	5.9	6.6	7.3		5.7	0.5	16.3

Base VPA													
Adult Biomass³	3.5	5.1	6.4	7.9	10.4	11.0	9.8	12.7	15.6	17.0	8.2 ²	2.0 ²	26.4 ²
Age 1 Recruits	13.2	18.5	24.1	26.1	22.3	25.8	35.2	28.9	11.9		23.8	6.6	70.6
Fishing mortality⁴	0.63	0.71	0.78	0.69	0.87	0.91	0.56	0.49	1.17		1.03	0.49	1.81
Exploitation Rate⁵	43%	47%	50%	46%	54%	55%	39%	36%	64%		58%	36%	78%
Major Change VPA													
Adult Biomass³	3.3	5.0	6.6	8.4	11.2	11.6	9.8	11.4	10.9	9.6	7.8 ²	2.0 ²	26.1 ²
Age 1 Recruits	13.9	18.7	24.8	26.2	20.5	24.0	23.0	20.5	15.4		23.1	6.5	70.1
Fishing mortality⁴	0.78	0.82	0.82	0.60	0.75	0.80	0.52	0.59	1.75		1.12	0.52	2.10
Exploitation Rate⁵	50%	52%	51%	41%	49%	50%	37%	41%	77%		60%	37%	82%

¹1973 - 2004

²1973 - 2005

³ages 3+

⁴ages 4+

⁵for fishing year from May 1 – April 30

The two assessment approaches are referred to as the Base VPA and the Major Change VPA.

Combined Canada and USA catches in 2004 were about 7,275 mt, increasing from a low of 800 mt in 1995.

Fishing mortality for fully recruited ages 4+ was near or above 1.0 between 1973 and 1994, declined to less than 0.6 in 2002 and 2003 (well above the reference point of $F_{ref} = 0.25$) and increased to above 1.0 in 2004.

State of Resource:

Under both assessment approaches, adult biomass (ages 3+) increased from 2,000 mt in the mid 1990s to 11,000 mt in 2001, due to improved recruitment. The Base VPA approach indicates that biomass increased to 17,000 mt in 2005 while the Major Change VPA indicates that biomass in 2005 was about 10,000 mt. Both results however, indicate that biomass remains low relative to a healthy state, and rebuilding is required.

Productivity:

Recruitment has improved compared to the period 1980 to the mid 1990s, averaging 21 to 25 million age-1 fish during the past five years. Truncated age structure in the surveys and change in distribution indicate current productivity may be limited relative to historical levels.

2006 Catch Risk Assessment:

Adjusted results from Base VPA approach assuming a 2005 catch of 4,760 mt

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2006 Catch (mt)	2,535 mt	2,990 mt	3,478 mt
Risk of not achieving 10% Biomass increase	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2006 Catch (mt)	3,023 mt	3,120 mt	3,185 mt

As indicated in the above table a combined Canada/USA catch of about 2,990 mt in 2006 has a neutral risk, 50% probability, of exceeding F_{ref} . At a catch of 3,023 mt in 2006, there is a low risk, 25% probability, of not achieving a 10% biomass increase from the beginning of year 2006 to the beginning of year 2007.

Special Considerations:

Projections are typically done assuming that the TAC in the current year is taken. Due to special considerations (to buffer the significant reduction in the TAC from 6,000 mt in 2005), these projections were done assuming expected realistic catches for 2005 of 4,760 mt, composed of a 4,260 mt catch by USA and a 500 mt catch by Canada.

Both assessment approaches have difficulties with interpretation. The Base VPA exhibits a retrospective pattern whereby biomass in the most recent year of an assessment appears to have been overestimated consistently. The Major Change VPA adds parameters to decrease patterns in residuals and the retrospective, but the mechanism for the changes in survey catchability are not easily explained.

While the Major Change VPA approach appears to have merit and should continue to be applied, TAC recommendations for this year are derived from the Base VPA. Given the retrospective pattern exhibited by the Base VPA, catch quotas calculated directly from this approach for 2006 would be overly optimistic to achieve the F reference level. The TAC guidance for 2006 (3,000 mt) is based on adjusting the Base VPA TAC for 2006 by a factor of 0.65 to account for the past five year average retrospective of approximately 35%. The adjusted TAC from the Base VPA is consistent with what would have been obtained from the Major Change VPA.

Source Documents

Gavaris, S., R. Mayo. and L. O'Brien 2005. 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 2006. TRAC Reference Document 2005/06.

TRAC. 2005. Eastern Georges Bank cod. TRAC Status Report 2005/01.

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

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

Consultations

Transboundary Resources Assessment Committee (TRAC), St. Andrews, New Brunswick, 14-17 June 2005.

Transboundary Management Guidance Committee public consultation in Canada, Yarmouth, Nova Scotia, 7 July 2005.