Transboundary Management Guidance Committee

Guidance Document 2008/01

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 2009 fishing year. Pertinent reference documents and consultations used in the TMGC deliberations are listed at the end of this document.

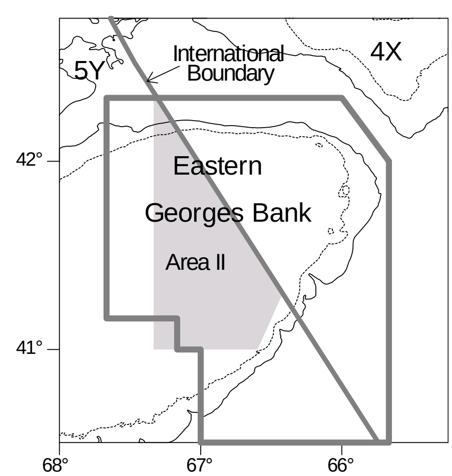
Since inception, the TMGC has successfully coordinated management of three trans-boundary groundfish resources. Annual harvest levels have been established, sensitive to the legal and policy requirements of both countries. The benefits of this approach are worth noting: fishing mortality rates for the three stocks managed by the TMGC have been reduced to low levels, the Eastern Georges Bank haddock stock is presently at record high abundance, the Georges Bank yellowtail flounder stock is growing, and declines in the Eastern Georges Bank cod stock have been arrested. These successes have led to interest in expanding this approach to other transboundary fish resources.

The complexity in Canadian policy and U.S. management system, particularly since the re-authorization of the Magnuson-Stevens Act, may constrain the ability of the TMGC to develop mutually agreeable harvest levels. There is a substantial risk that the process may become ineffective and the benefits of cooperation will be lost. To mitigate the risk, U.S. and Canadian policy should afford the U.S./Canada Resource Sharing Understanding the same consideration as other international fishery agreements.

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 2009 fishing year is 1,700 mt. This corresponds to a low risk (less than 25%) of exceeding the F_{ref} of 0.18 in 2009. However, due to poor recruitment, there is a high risk (greater than 75%) that stock biomass will not increase from 2009 to 2010. The annual allocation shares between countries for 2009 are based on a combination of historical catches (15% weighting) and resource distribution based on trawl surveys (85% weighting). Combining these factors entitles the USA to 31% and Canada to 69%, resulting in a national quota of 527 mt for the USA and 1,173 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)

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Avg[1]	Min[1]	Max[1]
Canada	**Quota**	1.8	1.6	2.1	1.2	1.3	1.0	0.7	1.3	1.4	1.6			
	Landed	1.8	1.6	2.1	1.3	1.3	1.1	0.6	1.1	1.1		6.4	0.6	17.8
	Discard	0.3	0.1	0.1	0.1	0.2	0.1	0.2	0.4	0.1		0.1	0.0	0.5
USA	**Quota[3]**						0.3	0.3	0.4	0.5	0.7			
	Landed	1.2	0.7	1.4	1.4	1.8	1.0	0.1	0.1	0.2		4.0	0.1	10.6
	Discard	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.3		0.1	0.0	0.3
Total	**Quota**						1.3	1.0	1.7	1.9	2.3			
	Catch	3.3	2.3	3.7	2.8	3.4	2.3	1.1	1.6	1.8		10.5	1.1	26.5
	Adult Biomass[4]	15.4	15.9	19.4	18.4	15.4	18.3	13.2	16.1	18.9	19.3	24.6[2]	8.5[2]	43.8[2]
	Age 1 Recruits	4.4	2.6	2.2	2.9	0.9	7.1	0.9	2.6	0.9		6.1	0.9	21.1
	Fishing mortality[5]	0.29	0.18	0.30	0.23	0.33	0.19	0.12	0.18	0.12		0.45	0.12	1.00
	Exploitation Rate	23%	15%	24%	18%	26%	16%	10%	15%	11%		32%	10%	58%

[1]1978 – 2007
[2]1978 – 2008
[3]for fishing year from May 1 – April 30
[4]Jan 1 ages 3+
[5]ages 4-6

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 to 1,161 mt in 2005, the lowest since 1978. Catches then increased in 2007 to 1,796 mt, including 472 mt of discards.

Fishing mortality for ages 4-6 increased sharply between 1989 and 1993 from 0.46 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 0.12, the lowest since 1978, and has subsequently been at or below F_{ref}=0.18. Fishing mortality was 0.13 in 2007.

State of Resource

Adult population biomass (ages 3+) declined substantially from 43,800 mt in 1990 to 8,500 mt in 1995, the lowest since 1978. The biomass subsequently increased to 19,400 mt in 2001, declined to 13,200 mt in 2005 but increased again to 19,300 mt at the beginning of 2008. Much of the increase in the late 1990's was the result of growth and survival of the 1992, 1995 and 1996 year classes. The increases in 2006, 2007 and 2008 were due largely to recruitment and growth of the above average 2003 year class. Generally poor recruitment since 1990, apart from the 2003 year class, and lower weights-at-age in recent years have constrained rebuilding.

Productivity

The 2003 year class, estimated at 7.1 million, is the first above average cohort since the 1990 year class. The 2002, 2004 and 2006 year classes, at less than 1 million each, are the lowest on record. Although the 2005 year class, at 2.6 million, is stronger, it too is below average. Resource productivity is currently poor due to low weight at age and low recruitment.

2009 Catch Risk Assessment

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2009 Catch (mt)	1,800 mt	2,100 mt	2,400 mt

Risk of biomass decrease	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2009 Catch (mt)	800 mt	1,300 mt	1,700 mt

As indicated in the above table a combined Canada/USA catch of about 2,100 mt in 2009 would result in a neutral risk (50%) that the fishing mortality rate in 2009 will exceed F_{ref}, whereas a catch of 1,300 mt would result in a neutral risk (50%) that the 2010 adult biomass will be lower than the 2009 adult biomass. Given the poor productivity, a 10% biomass increase is unlikely even with no catch. A combined Canada/USA catch in 2009 of 1,700 mt results in a low risk that the 2009 fishing mortality would exceed F_{ref}=0.18. However, due to poor recruitment, there is a high risk (greater than 75%) that adult biomass will not increase from 2009 to 2010.

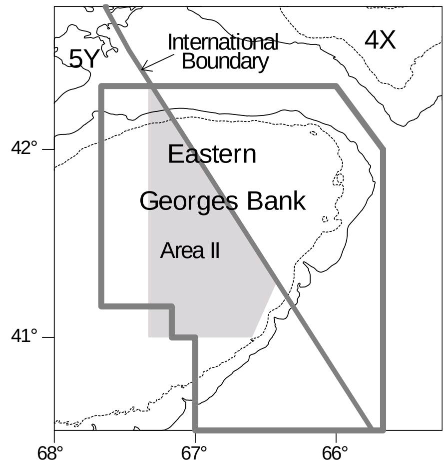
Special Considerations

With below average 2004, 2005 and 2006 year classes, exploitation below F_{ref} will curtail biomass declines in the near future.

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 occur. 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 2009 fishing year is 30,000 mt. This represents a low to neutral risk (greater than 25% but less than 50%) of exceeding the F_{ref} of 0.26. Adult biomass is projected to peak at 158,000 mt in 2008, reflecting the recruitment and growth of the exceptional 2003 year class, and decline to 131,000 mt in 2010. The annual allocation shares between countries for 2009 are based on a combination of historical catches (15% weighting) and resource distribution based on trawl surveys (85% weighting). Combining these factors entitles the USA to 37% and Canada to 63%, resulting in a national quota of 11,100 mt for the USA and 18,900 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)

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Avg[1]	Min[1]	Max[1]
Canada	**Quota**	3.9	5.4	7.0	6.7	6.9	9.9	15.4	14.5	12.7	15.0			
	Landed	3.7	5.4	6.8	6.5	6.8	9.7	14.5	12.0	11.9		4.7	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	6.3	8.1			
	Landed	0.4	0.2	0.6	0.9	1.6	1.8	0.5	0.4	0.2		2.1	0.0	9.1
	Discard[2]	0	0	<0.1	<0.1	0.1	0.2	0.1	0.1	0.5		0.9	0.0	7.6
Total	**Quota**						15.0	23.0	22.0	19.0	23.0			
	Catch	4.1	5.6	7.5	7.5	8.5	11.8	15.1	12.6	12.7		7.3	2.2	23.3
Adult Biomass[4]		29.2	34.5	47.8	40.8	77.1	71.9	54.0	122.2	152.3	158.1	43.3[3]	4.9[3]	158.1[3]
Age 1 Recruits		27.2	8.9	77.0	3.5	2.6	322.7	6.7	26.9	7.0	13.8	27.5[3]	0.2[3]	322.7[3]
Fishing mortality[5]		0.14	0.16	0.17	0.17	0.20	0.29	0.27	0.28	0.14		0.30	0.13	0.58
Exploitation Rate[5]		12%	13%	15%	14%	16%	23%	22%	22%	12%		23%	11%	40%

[1] 1969 - 2007
[2] discards not estimated in 1999-2000 but assumed negligible
[3] 1931 - 1955, 1969 – 2008
[4] Jan 1 ages 3+
[5] ages 4+ for 1969 - 2007; ages 5+ for 2003 - 2007
[6] for fishing year from May 1 – April 30

Combined Canada/USA catches declined from 6,522 mt in 1991 to a historical low of 2,181 mt in 1995, fluctuated about 3,000 mt to 4,000 mt until 1999 and since increased to 15,112 mt in 2005. Combined catches in 2006 and 2007 were 12,642 mt and 12,680 mt.

Fishing mortality for fully recruited ages 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. During 1995-2003, fishing mortality was below F_{ref}=0.26, slightly exceeded F_{ref} in 2004, 2005 and 2006, but declined to 0.14 in 2007.

State of Resource

Adult population biomass (ages 3+) increased from near a historical low of 9,000 mt in 1993 to 77,100 mt in 2003, subsequently decreased to 54,000 mt in 2005, but increased to 158,100 mt at the beginning of 2008, the highest in the assessment time series (1931-1955 and 1969-2006), as a result of recruitment into the adult stock of the exceptional 2003 year class.

Productivity

Recruitment improved in the 1990s and the 2003 year class, estimated at 323 million, is the largest in the assessment time series. In contrast, the 2001, 2002, 2004 and 2006 year classes, at less than 8 million each, are below the 18 million average of the 10 most recent year classes (excluding the 2003 year class). The 2005 year class (26.9 million) is above the 10 year average. Initial estimates of the 2007 year class suggest that it is below average at 13.8 million. Both length and weight at age have generally declined since about 2000. With expanded age structure, broad spatial distribution and improved recruitment, resource productivity is currently high, hindered only by recent reductions in fish size at age.

2008 Catch Risk Assessment

Risk of exceeding F_{ref}	25% (risk averse)	50% (risk neutral)	75% (risk prone)
2008 Catch (mt)	28,000 mt	33,000 mt	38,000 mt

A combined Canada/USA catch of 30,000 mt results in a low to neutral risk (greater than 25% but less than 50%) of 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

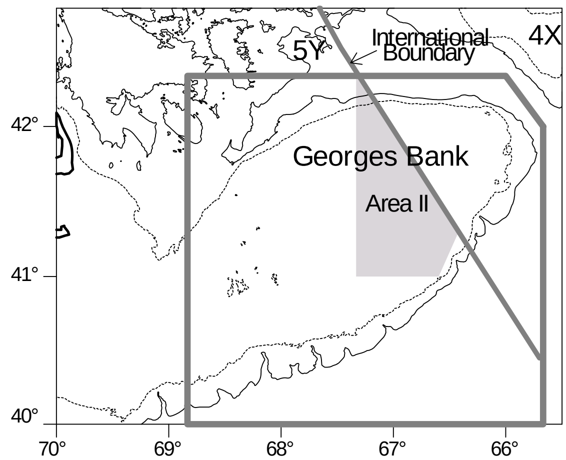
While best judgment was used to determine the fishery partial recruitment for the reduced weight of the 2003 year class, the risk analysis does not capture the extent of uncertainty of the consequences for various catch levels. Using the observed range of partial recruitment at weight during 1995 to 2007, the 2009 projected catch could vary from 29,000 mt to 36,000 mt. If the realized partial recruitment is near the higher end of the observed partial recruitment range, the fishery could forego available yield; if it is lower, the fully recruited fishing mortality could be higher than F_{ref}.

Haddock and cod 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. 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, 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 2009 fishing year is 2,100 mt. This corresponds to an F of 0.11, lower than the F_{ref} of 0.25. With a catch of 2,100 mt in 2009, the age 3+ biomass is expected to increase by about 21%. The annual allocation shares between countries for 2008 are based on a combination of historical catches (15% weighting) and resource distribution based on trawl surveys (85% weighting). Combining these factors entitles the USA to 77% and Canada to 23%, resulting in a national quota of 1,617 mt for the USA and 483 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)

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Avg[1]	Min[1]	Max[1]
Canada	**Quota**	2.0	3.0	3.4	2.9	2.3	1.9	1.7	0.9	0.4	0.6			
	Landed	2.0	2.9	2.9	2.6	2.1	0.1	<0.1	<0.1	<0.1		0.6	<0.1	2.9
	Discard	0.6	0.4	0.8	0.5	0.8	0.4	0.3	0.6	0.1		0.5	0.1	0.8
USA	**Quota[5]**						6.0	4.3	2.1	0.9	1.9			
	Catch[5]						5.9	3.8	1.9	1.0				
	Landed	1.8	3.4	3.6	2.5	3.2	5.8	3.2	1.2	1.1		4.9	0.4	15.9
	Discard	0.5	0.4	0.3	0.2	0.4	0.5	0.5	0.4	0.5		0.6	<0.1	3.0
Total	**Quota[6]**						7.9	6.0	3.0	1.3	2.5			
	Catch[6,7]						6.4	4.1	2.5	1.1				
	Catch	4.9	7.1	7.7	5.9	6.5	6.9	3.9	2.2	1.7		6.7	1.1	17.2
	Adult Biomass[3]	8.0	10.2	10.4	9.2	11.0	8.8	4.5	3.9	5.1	15.9	7.6[2]	2.0[2]	26.2[2]
	SSB	9.6	10.3	9.3	10.2	10.2	5.9	4.2	4.4	9.5		7.4	2.2	22.2
	Age 1 Recruits	24.6	19.9	22.3	15.5	11.8	10.5	14.4	49.4	18.4		22.9	6.6	70.6
	Fishing mortality[4]	0.67	0.96	0.97	0.64	0.60	1.82	1.16	0.89	0.29		1.03	0.29	1.83
	Exploitation Rate[4]	45%	57%	57%	43%	41%	78%	63%	54%	23%		57%	23%	78%

[1] 1973 – 2007
[2] 1973 - 2008
[3] Jan-1 age 3+
[4] age 4+ for calendar year
[5] for fishing year May 1 – April 30
[6] for Canadian calendar year and USA fishing year May 1 – April 30
[7] sum of Canadian Landed, Canadian Discard, and USA Catch (includes discards)

Total catches of Georges Bank yellowtail flounder peaked at 21,000 mt in 1969 and 1970. The combined Canada/USA catch increased from 1995 through 2001, averaged 6,400 mt per year during 2002-2004, but declined to 1,686 mt in 2007.

Fishing mortality for fully recruited ages 4+ was close to or above 1.0 between 1973 and 1994, fluctuated between 0.51 and 0.97 during 1996-2003, increased in 2004 to 1.82, and then declined to 0.89 in 2006 and 0.29 in 2007. Fishing mortality was well above F_{ref}=0.25 for the entire time series, except in 2007.

State of Resource

Two assessment approaches were considered by TRAC. The Base Case VPA continued to display a retrospective pattern, updating population biomass estimates to lower values than previously determined and compromising interpretation of results. The Major Change VPA did not exhibit an appreciable retrospective pattern; updates were both above and below previously estimated values. The Major Change VPA results better reflected the recent trends observed in all three trawl surveys and is adopted as the basis for management advice for 2009.

Adult population biomass (ages 3+), based on the Major Change VPA results, increased from a low of 2,100 mt in 1995 to 11,000 mt in 2003, declined to 3,900 mt in 2006 and increased to 15,900 mt at the beginning of 2008, the highest adult biomass since 1983. Spawning stock biomass in 2007 was estimated to be 9,500 mt.

Productivity

During 1998-2001 recruitment averaged 22.3 million fish at age 1, but has since been below 20 million, with the exception of the above average 2005 year class estimated at 49.4 million, the strongest year class since the 1980 cohort. Truncated age structure in the trawl surveys and changes in distribution indicate current resource productivity is lower than historical levels.

2008 Catch Risk Assessment

A combined Canada/USA catch of about 4,600 mt in 2009 would result in a neutral risk (~50%) that the fishing mortality rate in 2009 will exceed F_{ref}. Fishing at F_{ref} in 2009 will generate a 9% increase in median age 3+ biomass from 20,500 mt in 2009 to 22,300 mt in 2010. The 2005 year class accounts for 60% of the 2009 catch, 58% of the 2009 age 3+ biomass, and 45% of the 2010 age 3+ biomass.

In the USA, there is a requirement to furnish rebuilding projections when stocks are overfished. An F of 0.11 would be required to rebuild yellowtail flounder spawning stock biomass to SSB_{msy} (43,200 mt) by 2014 with a probability of 75%. This corresponds to a combined Canada/USA catch of 2,100 mt in 2009. With a catch of 2,100 mt in 2009, the age 3+ biomass is expected to increase by 21%.

Special Considerations

There was a single tow on the 2008 DFO survey which captured over 7.5 mt of yellowtail flounder, well beyond the previous maximum catch of less than one mt. This resulted in substantial increase of abundance for all ages from 2 to 5, inconsistent with stock dynamics and indicative that the tow results were outliers. Management advice was based on an assessment that excluded the 2008 DFO survey results. However, sensitivity analyses were conducted which included the 2008 DFO survey, both with and without the large tow. Not surprisingly, results from these analyses indicated that both biomass and recruitment were higher with the large tow included. However, whether the large tow is included or excluded, the sensitivity analyses generate a higher F for ages 4-5, a somewhat counter-intuitive result, but explainable by the age composition of the fish caught in the large tow. While the 2008 DFO survey results are outliers, their influence on stock status, when included in the sensitivity analysis, was mitigated by the other data. For example, the estimate of the dominant 2005 year class at age 3 in 2008 from the sensitivity analysis with the large tow was 36.1 million compared to 31.7 million used for management advice.

In the past, realized fishing mortality rates have been higher than the target F used to set the annual quotas. For example in 2005, a catch of 2,100 mt in 2006 was projected to produce a fishing mortality well below 0.25 using the Base Case model and 0.25 using the Major Change model; however, the observed catch of 2,200 mt is now estimated to have generated an F in 2006 of 0.49 (Base Case model) and 0.89 (Major Change model). In contrast, when set in 2006 using the Major Change model, the 2007 TAC of 1,250 mt was expected to result in an F of 0.25; the observed catch of 1,686 mt resulted in an F in 2007 of 0.29. Furthermore, the forecast of age 3+ biomass in 2009 from the previous and current assessments, both of which used the Major Change model, are in general agreement.

Although the Major Change VPA is recommended for management decisions, the mechanisms for the large changes in survey catchability are not easily explained. These changes in survey catchability are most appropriately thought of as an aliasing of an unknown mechanism that produces a better fitting model. 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 more closely reflect the recent trend in abundance observed in all three surveys and is the preferred model from which to make management decisions.

Source Documents

Gavaris S, O'Brien L and Mayo R. 2008. 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 2008. TRAC Reference Document 2008/xx (in prep).

TRAC. 2008. Eastern Georges Bank cod. TRAC Status Report 2008/01.

TRAC. 2008. Eastern Georges Bank haddock. TRAC Status Report 2008/02.

TRAC. 2008. Georges Bank yellowtail flounder. TRAC Status Report 2008/03.

Consultations

Transboundary Resources Assessment Committee (TRAC), Woods Hole, Massachusetts, 23-26 June 2008.

Transboundary Resources Assessment Committee (TRAC), by correspondence, 12-14 August 2008.

Transboundary Management Guidance Committee public consultation in Canada, Yarmouth, Nova Scotia, 19 August 2008.

New England Fishery Management Council, Providence, Rhode Island, 3-4 September 2008.