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CERT

Comité d'évaluation des ressources transfrontalières

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TRAC

Transboundary Resources Assessment Committee

Proceedings 2009/01

Proceedings of the Transboundary Resources Assessment Committee (TRAC): Gulf of Maine/Georges Bank Herring, Eastern Georges Bank Cod and Haddock, Georges Bank Yellowtail Flounder

Report of Meeting held
8 - 11 June 2009

Hachey Boardroom
St. Andrews Biological Station
St. Andrews, New Brunswick, Canada

Meeting Chairpersons

L. O'Brien
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts, USA

T. Worcester
Fisheries and Oceans Canada
Bedford Institute of Oceanography
Dartmouth, Nova Scotia, Canada

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FOREWARD

The purpose of these proceedings is to archive the activities and discussions of the meeting, including research recommendations, uncertainties, and to provide a place to formally archive official minority opinions. As such, interpretations and opinions presented in this report may be factually incorrect or misleading, but are included to record as faithfully as possible what transpired at the meeting. No statements are to be taken as reflecting the consensus of the meeting unless they are clearly identified as such. Moreover, additional information and further review may result in a change of decision where tentative agreement had been reached.

AVANT-PROPOS

Le présent compte rendu fait état des activités et des discussions qui ont eu lieu à la réunion, notamment en ce qui concerne les recommandations de recherche et les incertitudes; il sert aussi à consigner en bonne et due forme les opinions minoritaires officielles. Les interprétations et opinions qui y sont présentées peuvent être incorrectes sur le plan des faits ou trompeuses, mais elles sont intégrées au document pour que celui-ci reflète le plus fidèlement possible ce qui s'est dit à la réunion. Aucune déclaration ne doit être considérée comme une expression du consensus des participants, sauf s'il est clairement indiqué qu'elle l'est effectivement. En outre, des renseignements supplémentaires et un plus ample examen peuvent avoir pour effet de modifier une décision qui avait fait l'objet d'un accord préliminaire.

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ABSTRACT

The Transboundary Resources Assessment Committee (TRAC) met during 8-11 June 2009 in St. Andrews, New Brunswick, Canada, to review updated assessments (through 2008) of Gulf of Maine / Georges Bank herring, Eastern Georges Bank cod, Eastern Georges Bank haddock, and Georges Bank yellowtail flounder, and to consider a number of related scientific issues. Results of the cod, haddock and yellowtail flounder assessments will be used by the Transboundary Management Guidance Committee (TMGC) in developing management guidance for the 2010 fishing year for these Transboundary resources. Results of the herring assessment will be used by fisheries managers in Canada and the USA.

RÉSUMÉ

Le Comité d'évaluation des ressources transfrontalières (CERT) s'est réuni du 8 au 11 juin 2009, à St. Andrews (Nouveau Brunswick) au Canada, pour examiner les évaluations (actualisées jusqu'à la fin de 2008) du hareng du golfe du Maine et du banc Georges, de la morue et de l'aiglefin de l'est du banc Georges ainsi que de la limande à queue jaune du banc Georges, et pour étudier diverses questions scientifiques connexes. Les résultats des évaluations de la morue, de l'aiglefin et de la limande à queue jaune serviront au Comité d'orientation de la gestion des stocks transfrontaliers (COGST) à élaborer des avis d'orientation de la gestion de ces ressources transfrontalières pour l'année de pêche 2010. Quant aux résultats de l'évaluation sur le hareng, ils serviront aux gestionnaires de la pêche de ce poisson au Canada et aux États Unis.

INTRODUCTION

The Transboundary Resources Assessment Committee (TRAC) co-chairs, T. Worcester and L. O'Brien, welcomed participants (Appendix 1) to the June 2009 TRAC assessment of Gulf of Maine / Georges Bank herring, Eastern Georges Bank cod, Eastern Georges Bank haddock, and Georges Bank yellowtail flounder. They noted that participation would likely change throughout the week as different species were assessed. The TRAC was established in 1998 to undertake joint USA / Canada assessments of resources in the Georges Bank transboundary region. Cod, haddock and yellowtail flounder were the first species to be assessed by TRAC, followed by herring. TRAC assessments of spiny dogfish and mackerel are being conducted for the first time in 2009. The TRAC has received approval for all Terms of Reference (ToR) that will be addressed this week from the Canada / USA Steering Committee, the Northeast Regional Coordinating Council (NRCC) and the Gulf of Maine Advisory Committee (GOMAC). The ToR related to cod, haddock and yellowtail flounder were also approved by the Transboundary Management Guidance Committee (TMGC).

Participants were reminded that the TRAC review process is two tiered, with assessment updates typically undertaken between more intensive benchmark reviews. The benchmark for Gulf of Maine / Georges Bank herring was established in May 2006, which was also the last time this species was assessed by TRAC. A new benchmark for Eastern Georges Bank cod was recently established in April 2009, and this meeting will be the first time that the new benchmark is applied. The benchmarks for Eastern Georges Bank haddock and yellowtail flounder were established in 1998 and 2005 respectively, with assessments conducted annually since then.

The ToR and Agenda for the meeting are provided in Appendices 2 and 3, respectively. During the meeting, each working paper was presented by one of the authors and then followed by a plenary discussion of that paper. Rapporteurs documented these presentations and discussions for the Proceedings.

In preparation for this meeting, Canadian scientists met with fishermen in Yarmouth, Nova Scotia, Canada, on 27 May 2009. The minutes from this meeting are included in Appendix 4. The USA scientists were unable to meet with fishermen prior to the meeting this year.

HERRING ASSESSMENT

The TRAC assessment of Gulf of Maine / Georges Bank herring commenced on 8 June 2009 and was completed on 9 June 2009. Participants in this part of the meeting are listed in Appendix 1a. The ToR for this assessment are provided in Appendix 2.

TRAC Presentation: Ageing Issues
Presenter: G. Melvin
Rapporteur: L. Brooks

Presentation Highlights

Herring ageing inconsistencies were identified as a potential issue at the 2003 herring TRAC meeting. In an attempt to address this issue, otolith exchanges between Canada and the USA, ageing workshops, bomb radiocarbon (BRC) analysis, and a dominant year-class tracking study were conducted. A summary of the exchanges and studies was presented. Comparison between 7 readers (3 Fisheries and Oceans Canada (DFO), 2 National Marine Fisheries

Service (NMFS), and 2 from the Maine Department of Marine Resources) involved in multiple exchanges has demonstrated a consistent and persistent pattern in their ageing, and it has also indicated that all readers have been on average under-ageing herring otoliths relative to the DFO database ages. Simulation studies indicate that the observed differences can affect the VPA output and the interpretation of stock status. Results from BRC analysis showed that the ages in the database may be under-estimates, especially for older fishes. The original database ages appear to shift approximately 1 to 2 years from the true age at about Age 6. There are no hypotheses as to what could produce this pattern. A dominant year-class tracking study was conducted to explore the individual agers ability to track a known dominant year-class through time as it progressed through the fishery/samples. This study has shown that the dominant year-class is not well tracked by any ager, except perhaps by the most experienced DFO ager. Sensitivity analysis indicates that under ageing can lead to an over-estimate of fishing mortality and an under-estimate of biomass. It was suggested that new protocols and quality controls need to be established for ageing herring, a reference collection must be established complete with annotation, and inter-lab comparisons should become a regular event to detect divergence.

Discussion

For the BRC, otoliths were taken from the 1962 year class. A question was asked about where in the chart with the change in carbon decay did the 1962 age class fall? It was noted that the 1962 age class occurs in the steepest part of that decay. The question was extended to ask if the oldest ages from that year class occur at the flat part of the peak (where there is little change in carbon), and if so, then how well determined are the older ages? It was clarified that for the BRC analysis, only the core of the otolith is extracted, so regardless of fish age, the material extracted from the otolith always corresponded to the same part of the carbon decay function where the slope was steepest. In other words, the time of formation that the carbon is fixed should be the same for all otoliths as these were all selected from the same year-class (1962). Hence, age determination should be clear. In addition, the year class chosen should have been easy to track as it was a dominant cohort. It was noted, however, that due to the small size of herring otoliths, several otoliths had to be ground at a given age to produce enough material for analysis.

A question was asked about slide 11 with the histogram plot comparing black bars of database ages to the ages determined by each of the age readers. None of the color bars sum to the same number as the black bars. The presenter was not certain but suggested that what may be shown in the plot is the ages read (per reader) that agreed with the database. No comparison was done to see if the difference was due to the reader or due to the mounting medium. Although it was found that the original media made the otoliths difficult to read, none of the otoliths were remounted to compare the current with the original media.

For the otoliths that were severely under-aged, there was no attempt made to look at the ages after it had been determined that they were misread. One problem identified was that people were reading “checks” after Age 7, but the existing protocol had been not to read any checks after Age 7. It is not possible to ‘bias correct’ the read ages because the otolith reader has changed at various points in time.

It was noted that there are about 1,100 otoliths, with otolith weights, that might be analyzed to see if there is an otolith weight relationship to help with the ageing.

Regarding growth at age, it was noted that the von Bertalanffy growth equation was estimated from the database assigned ages.

Given the known problems with ageing, it was suggested that reading up to 8+ would be acceptable for the USA readers based on their agreement with the bomb radiocarbon analysis. However, the current plus group in the assessment is 6, so the current USA ageing is expected to be within acceptable error bounds.

Moving forward, new protocols have been implemented. Within DFO, a primary otolith reader will age 1000 otoliths and a secondary reader will look at 100 of these otoliths and annotate images of them. Finally, these images will be sent to a third DFO reader, who has been the most consistent herring age reader through time. One analyst suggested that it may be a bit too premature to move to these new protocols. In his opinion, there seems to be massive smearing in the age classes, so there may be several issues. In that regard, the analyst felt that it was questionable to use a model that tries to extract age information from something that has a lot of blending. Protocols are being revised, but that does not correct the existing database. The current Gulf of Maine/Georges Bank herring assessment uses a 6+ group, but there is still some concern about ages 4-6.

An older ageing study was mentioned for comparison with the recent analysis. George Winters, of DFO, Newfoundland did a massive herring study in the mid-80s, and he concluded that at about Age 5 the ageing became guesswork. In his study, there was some inconsistency within a reader who was asked to re-read the same otolith. The established international standard for agreement is 80% agreement with a coefficients of variation (CV) of less than 5%.

TRAC Presentation:	**Gulf of Maine/Georges Bank Herring Stock Assessment Update**
Working Paper:	Gulf of Maine / Georges Bank Atlantic Herring Stock Assessment Update. TRAC Working Paper 2009/09.
Presenter:	G. Shepherd
Rapporteur:	L. Brooks

Presentation Highlights

Atlantic herring for the Gulf of Maine/Georges Bank area were last assessed in a benchmark assessment in May 2006 (O'Boyle and Overholtz 2006). The following serves as an update of the assessment through 2008.

Since the last assessment through 2005, commercial landings of Atlantic herring in the Gulf of Maine/Georges Bank stock complex increased slightly in 2006 and 2007 to 116,000 mt and 112,600 mt, respectively. Landings in 2008 declined to 90,000 mt.

Annual age data were applied to the revised USA landings data, as recommended by the benchmark review, to produce a landings at age series from 1967 to 2008. Landings at age data from the New Brunswick weir fisheries were provided by DFO. As per the recommendations of the 2006 TRAC, the combined total landings at age matrix was truncated at an Age 6+ category. The proportion in the 6+ category has increased since 2006 from 7% to 23% in 2008.

Overall indices of abundance were updated through 2008 surveys. Indices included the NMFS winter, spring and fall bottom trawl surveys, as well as the NMFS fall acoustic survey. The NMFS winter survey series was terminated after 2007. Estimates from the winter 2003 survey were updated resulting in new values. General trends in the total (all ages included) indices show stable number and weight per tow in the winter surveys through 2007, but a general declining trend in spring number and weight per tow values since 1999. Fall survey indices show a decline between 2003 and 2005, but have been stable thereafter. The NMFS herring acoustic time series was updated from the previous assessment. In the 2006 assessment, the

acoustic survey data were converted to absolute biomass. In the most recent iteration, the acoustic data were converted to relative indices of abundance.

The base ASAP model was a simple update of the TRAC 2006 model formulation (O'Boyle and Overholtz 2006, page 22). An initial update involved adding 2006 through 2008 landings at age data to the original 1967 through 2005 series, as well as using the new acoustic series of indices (and the revised 2003 winter index). The updated model, with the revised landings at age, estimated a 2008 fishing mortality of 0.18, a total biomass in 2008 of 523,000 mt and a 2008 SSB of 400,000 mt. Additionally the model estimated 2005 F equal to 0.18 (compared to the original estimate of 0.11) and the 2005 total biomass as 626,000 mt (compared to the original 2005 value of 1.121 million mt). Variations on the base model included: (a) including Age 1 catches with the NMFS Age 1 fall index; (b) including Age 1 catches and removing or down weighting the acoustic survey index series; (c) using a base run without the acoustic survey index; (d) using a base model with increased natural mortality estimates based on Overholtz and Link (2007) estimates; and (e) partitioning the landings at age into USA and Canadian fleets.

Results and comparisons of the various models are provided in Table 1. Significant retrospective patterns persisted in most all the model variations examined, particularly with regards to the biomass estimates.

Discussion

Landings revisions were made in the 2006 assessment, and the landings at age were again updated for this assessment. While the total quantity of landings did not significantly change, the age composition did. The landings in numbers changed substantially, particularly in the late 1960s and 1970s. The shift is due to the length frequencies by area that were used to estimate landings at age. For example, many of the Soviet Union landings were reassigned to Jeffrey's Ledge or to southern New England, whereas the commercial fisheries database suggested these harvests were from Georges Bank. The previous landings assignments were re-assigned with documents in the International Commission for the Northwest Atlantic Fisheries (ICNAF) series. No otoliths were re-read, but samples were found for length and age.

After seeing the results based on the new landings at age, some concern was expressed that the changes in total landings were larger than expected based on the previous information. However, the assessment results generated a 50% change in biomass. It was agreed that additional documentation of the methodology would be provided.

It was clarified that the two fleets considered in the model were the weir fleet and the USA mid-water fleet.

As a point of clarification, it was noted that some of the model configurations included the NMFS acoustic survey series. There appeared to be an inconsistent statement in the ToR as to whether or not the acoustic survey had been included in the benchmark formulation. The acoustic survey was included in the 2006 assessment model, and it was not down-weighted.

Although this was an update assessment, several new model configurations were explored. One alternative model included landings at Age 1, and included the Age 1 NMFS Fall survey index. Several in the group noted that no diagnostics for the index were shown to evaluate fit, and it was therefore not possible to gauge the influence of including this index.

To clarify the suite of results presented, the model run using the old landings at age data and just adding the three new years of data (2006-2008) was labeled 'initial' on plots. The differences between 'initial' and 'final 2005' are only due to the retrospective pattern.

It was asked whether a strong year class moved through the population between 2005 and 2009. The 2005 year class shows up in the catch and the indices and generally in the model fit.

Table 1. Atlantic herring alternative ASAP model runs.

	penalized Likelihood	F 2005	F 2008	2+ Biomass 2005	2+ Biomass 2008	SSB 2005	SSB 2008	Mohn's rho F	Mohn's rho SSB
Final 2005	3196.9	0.11		1,121		781		-2.31	4.19
2009 initial update	3326.3	0.20	0.22	551	436	394	323	-2.65	9.62
Final 2005 - revised LAA	3287.1	0.08		1,439		1,170			
2009 Base	3570.2	0.18	0.18	626	523	457	400	-3.63	9.34
Base w/o AC	2963.3	0.11	0.10	1,117	995	759	734	-3.22	7.21
2009 Base age1 added	3801.6	0.14	0.15	610	653	607	507	-3.56	7.93
2009 Base age1 added no AC	3242.5	0.09	0.09	1,202	1,120	977	908	-2.89	5.23
2009 Base age1, AC downwt'd	3295.3	0.09	0.09	1,167	1,075	944	870	-2.91	5.30
2 fleet, age 1, no AC	3820.7	0.09	0.08	1,455	1,177	997	933	-3.77	8.52
FINAL 2009 TRAC	2501.8	0.16	0.14	684	652	512	516	-2.89	5.92
Base increase M	3595.7	0.08	0.10	1,679	1,013	1,077	699	-2.65	9.62

In comparing the acoustic survey indices from 2001 onwards with the winter, spring, and fall survey number per tow indices, it was evident that the winter survey indices increased while the other three survey indices decreased. This finding, by itself, did not provide support for the idea that the acoustic survey series should be eliminated from the assessment model. However, the first 3 years of the acoustic survey are clearly out of sync with the rest of the survey indices because the acoustic survey results suggest massive decline in herring abundance. For the next benchmark assessment, the winter survey should be flagged as having different trends from the other surveys.

It was noted that an index split was introduced between 1984 and 1985. There had been a door change that seemed to indicate a difference in that period (based on an examination of covariates by Bill Overholtz and Larry Jacobson). The door change actually aliased a number of things. There was also a timing change in the survey -- it took place almost a month later. There was also a change in herring behavior (Overholtz et al. 2004).

The three NMFS bottom trawl surveys use an otter trawl as the sampling gear, and the appropriateness of using this gear to catch herring was discussed. It was noted that bottom otter trawl surveys are used to generate a primary index for North Sea herring, and also for herring stocks elsewhere. Although this gear is not designed to sample pelagic fish, research vessel otter trawl indices, nevertheless, appear to track herring abundance reasonably well. In terms of catch per tow, herring have one of the highest catch per tow indices in the surveys, often in the top 5 or top 10 in every survey. The new trawl gear used on the NOAA Ship *Henry B. Bigelow* is higher in the water column with a wider wing spread, so future surveys should do an even better job at tracking herring. Follow-up comments by the fishing industry suggested that using bottom trawl gear could create a bias in recent years because the herring are staying down on the bottom. In the past (20-30 years ago), it was suggested that the herring were in schools in the water column and would have been missed by trawling the bottom. In response, the fishing industry attendees were asked when they thought this shift to the bottom became more prevalent. They responded that they have noticed it the last ten years, but in general the change has probably been 10-20 years. In the Canadian survey, a shift in distribution was

noticed in the mid-1980s, but that also corresponded to the ship changing to the *CCGS Alfred Needler.*

TRAC Presentation: **Development of Long-term Larval indices for Atlantic Herring (*Clupea harengus*) on the Northeast USA Continental Shelf.**
D.E. Richardson, J.A. Hare, W.J. Overholtz, and D.L. Johnson
Presenter: J. Hare
Rapporteur: S. Gavaris

Presentation Highlights

The incorporation of data from ichthyoplankton programs into the stock assessment process has lagged far behind the use of data from comparable adult monitoring programs. This can in part be attributed to a mismatch between established analytical approaches to larval index development and the inconsistencies in sampling for many long-term ichthyoplankton datasets. Along the northeast United States continental shelf, ichthyoplankton surveys have been undertaken by the Northeast Fisheries Science Center (NMFS/NOAA) multiple times a year since 1971. During this period, the spatial and seasonal allocation of sampling has varied substantially. Here we present a non-linear least-squares approach to larval index development. This approach uses information on the age structure and abundance of larvae on each survey to derive a larval index, and to obtain parameters describing larval mortality and the seasonal cycle of hatching. Application of this approach to the Georges Bank/Nantucket Shoals spawning component of Atlantic herring (*Clupea harengus*) revealed a large drop in the larval index around 1976, an increase in the index through the late 1980s, and another large drop in 2004. A low index of larval abundance was subsequently maintained through the 2007 spawning season. This index was correlated with the 2005 stock assessment estimate of Atlantic herring total stock biomass from 1971-2003, but differed substantially in 2004 and 2005, the most recent years of overlap between the two time-series. A sensitivity analysis revealed that the index was relatively robust to changes in the larval mortality rate and the seasonality of hatching during years of good sampling coverage of the spawning season. Furthermore, this sensitivity analysis indicates that the recent drop in the index reflects a real decline in the abundance on herring larvae on Georges Bank and is not an artifact of the analytical methodology or a shift in the timing of spawning. Potential causes for this decline include a drop in herring spawning stock biomass, a shift in spawning location away from Georges Bank, an increase in egg mortality, or a substantial decrease in egg production.

Discussion

Various larval surveys have been conducted over the years during different seasons. While some deviation in sampling protocols occurred, sampling was basically similar; Bongo nets were lowered to within 5 m of bottom and towed up to the surface again, fishing on the way down and up, thereby sampling the entire water column. Early life history processes were incorporated into a model to integrate information collected from surveys conducted at various times during the year. Growth, mortality, and spawning time were assumed constant over the time series. The derived larval index is intended to correspond to abundance at age 3 days and relates to spawning biomass on October 1. While ageing the larvae may permit improvements by accounting for variation in spawning time, sensitivity analyses indicated that the results were reasonably robust to choice of spawning day. Estimating variable date of spawning was investigated and found to have minimal affect on the calculated index, but this may be confounded with other model parameters. It may be possible to incorporate a mechanistic process for what determines spawning time within the model. Similarly, growth of larvae is expected to be variable, but again, sensitivity analyses showed that the larval indices were

relatively insensitive to alternative assumptions. Changes in fecundity may also influence results, but it was not known if this aspect was being studied.

The results presented were for a herring larval index on Georges Bank. One of the larval surveys has been conducted since 1999 over a broader area including the Gulf of Maine. It was suggested that the trends in adjacent areas be examined to investigate the possibility that spawning may have been re-distributed off Georges Bank during years of low larval index. Efforts to calculate a Gulf of Maine larval index have not been attempted in part because of a potential mis-match between herring spawning areas in the Gulf of Maine and spatial distribution of sampling. However, a larval index can be calculated for the Gulf of Maine and these concerns can be evaluated quantitatively. There was also discussion about whether the index represented the spawning biomass from the assessment, which corresponds to the Gulf of Maine complex, or just the Georges Bank portion of the complex, which could be a variable proportion. The index is calculated for the Georges Bank portion of the complex and correlated to estimates of spawning stock biomass for the stock complex.

TRAC Presentation: **An Ecosystem Approach to the Assessment of the Gulf of Maine Herring Complex.** W. Overholtz, J. Link, and L. Jacobson
Presenter: W. Overholtz
Rapporteur: S. Gavaris

Presentation Highlights

A summary of data on herring as a forage species was presented. It was suggested that a more detailed presentation could be provided at the next herring benchmark meeting, but a number of papers have already been published on this topic (Overholtz and Link 2007, Overholtz et al. 2008, Tyrell et al. 2008). The main predator groups on Atlantic herring in the Gulf of Maine region (in addition to the commercial fisheries) are medium demersal fish, large pelagic fish, marine mammals, and seabirds. Total removals during the late 1960s and early 1970s were very large, primarily due to commercial fishery landings. More recently, consumption by predators is estimated to be approximately 3 times the fishery removals. Predation mortality (M2) rates are time variant and are prey, predator and fishery dependent. Current predation mortality is relatively low (<0.2), and it appears that M2 was at its highest when herring biomass was the lowest (i.e., late 1970s and early 1980s). Incorporation of the impacts of predation into stock assessments may alter our understanding of the long-term yield of a population and could influence the establishment of biomass reference points. In general, stock assessments of forage species that do not take into account predation mortality may be overly optimistic with regards to biological reference points. If the fishery and predators utilize the same size spectrum of prey, then tradeoffs between these are probably warranted. It was recommended that consideration of predation mortality (i.e., development and incorporation of a predator catch stream) be included in the stock assessments for Gulf of Maine / Georges Bank herring.

Discussion

It was clarified that the data available are not limited to estimates of herring consumption by predators. Rather, the idea is to use predators as samplers. The fraction of herring in dogfish stomachs in 2007 dropped somewhat, but the information was not available at the meeting to say what might have been substituted in place of herring during that time.

While estimates of the amount of herring consumed from the Gulf of Maine stock complex were summarized into four predator groups (demersal fish, large pelagics, marine mammals and sea birds), details by specific predator can also be extracted. Consumption estimates depend on

diet information. The diets of demersal fish predators were based on stomach content data collected during bottom trawl surveys, while that for marine mammals, large pelagic species and seabirds was derived from information in the scientific literature. Small pelagic predators, such as mackerel, were not considered because the consumption estimates were for ages 2 and older herring. Mackerel are a major predator of herring larvae.

The consumption estimates were used in multi-species models to derive annual predation mortality rates. Age based multi-species models require conversion of stomach content data to numbers of individuals consumed at size/age, while simpler dynamics can be employed for multi-species biomass models. These types of multi-species analyses can expand the horizon of harvest policy considerations that can be explored. It was commented that inappropriate management decisions might be inferred from independent species specific analyses of prey consumption. Models incorporating multi-species interactions among all key predators and prey may be required to inform policy decisions about the implied trade-offs. For illustration, an analogy was drawn with studies that showed benefits from species specific analyses when mesh size was increased but those benefits were eliminated, except for cod, when predation from multi-species interactions was considered. The role of herring as a predator suppressing other species was questioned. While some work has been done on this, it is more difficult to address because of quick digestion in herring and because a time series of such information is not readily available.

COD, HADDOCK, AND YELLOWTAIL FLOUNDER ASSESSMENTS

The 2009 TRAC assessments of Eastern Georges Bank cod, Eastern Georges Bank haddock and Georges Bank yellowtail flounder commenced on 9 June 2009 and were completed on 11 June 2009. Participants in this part of the meeting are listed in Appendix 1b. The Terms of Reference (ToR) for these assessments are provided in Appendix 2. The Report of the DFO / Industry pre-assessment meeting held in Yarmouth, Nova Scotia on 27 May 2009 is provided as Appendix 4.

TRAC Presentation:	**Discards from Canadian Scallop Fishery**
Working Paper:	Discards of Atlantic Cod, Haddock, and Yellowtail Flounder from the 2008 Canadian Scallop Fishery on Georges Bank. TRAC Working Paper 2009/07.
Presenter:	S. Gavaris
Rapporteur:	T. Worcester

Presentation Highlights

Discards of Atlantic cod, haddock, and yellowtail flounder from the 2008 Canadian scallop fishery on Georges Bank were estimated from 23 observed trips. Data were insufficient to determine spatial differences in discard rates per hour but temporal trends were accounted using a 3-month moving window calculation. Discards were estimated by applying the monthly discard rate per hour obtained by the 3-month moving window calculation to the total monthly effort in hours of the scallop fleet. Total annual estimated discards in 2008 were highest for yellowtail flounder, at 117 mt, while those for Atlantic cod and haddock were 36 mt and 33 mt, respectively.

Discussion

It was noted that there are limited observations from the southern portion of Georges Bank (only 2 observed trips per month). While scallop fishing effort in this area is low compared to elsewhere, it can be an area with higher yellowtail bycatch. It was suggested that discussions with the observer company be initiated to improve coverage in the southern portion of Georges Bank.

Given that there has been increased observer coverage over the past couple of years, it was asked whether there has been a corresponding increase in the precision of bycatch estimates. It was agreed that this analysis could be presented at the next assessment. However, it was noted that industry has also been attempting to reduce bycatch during this period, so a large improvement in bycatch estimates may not be apparent.

It was suggested that the reasons for variations in bycatch rates, e.g., location, could be investigated.

There was some discussion of the use of vessel monitoring systems (VMS) to investigate the location and effort of fishing activity. It was noted that some preliminary work has been done to investigate the use of vessel speed to eliminate vessels that are transiting through an area from estimations of effort based on VMS counts. However, this type of estimate still only provides a rough measure of effort.

The definition of a set was clarified (i.e., a set can represent multiple dredges).

TRAC Presentation:	**Temporal Effects on Discard Estimation of Cod in the USA Eastern Georges Bank Cod Fishery**
Working Paper:	Temporal Effects on Discard Estimation of Cod in the USA Eastern Georges Bank Cod Fishery. TRAC Working Paper 2009/11
Presenter:	L. O'Brien
Rapporteur:	T. Worcester / L. Brooks

Presentation Highlights

Atlantic cod discards were estimated for the USA large mesh otter trawl fleet in the eastern Georges Bank area during 2006-2008, using a discarded cod: kept-all-catch ratio based on 'alternative' quarters that corresponded to changes in management. These results were compared to the 2009 assessment of USA discards estimated based on calendar quarter. Comparisons of annual discards showed minimal difference between calendar and 'alternative' quarter estimates, with confidence intervals overlapping for all 3 estimates. The number of years examined and number of trips in some cells is relatively small; however, estimating assessment discards by calendar quarter appears to adequately account for management measures implemented during these years.

Discussion

Clarification was sought on the method used, i.e., what was meant by weighting by number of trips.

Given that the number of trips within each quarter did not change much, the stability of the ratio is just for these years. There was no intention to imply that it will always be stable or that timing of measures does not have to be a consideration in the future.

It was confirmed that USA discard estimates would continue to be done by quarter in the assessment, but a comparison with 'alternative' quarters would also be done to ensure they continue to be similar. However, it was noted that this may be more problematic if there is limited sampling and lots of imputation is required.

TRAC Presentation: Eastern Georges Bank Cod Assessment
Working Paper: Assessment of Eastern Georges Bank Atlantic Cod for 2009. TRAC Working Paper 2009/12
Presenter: Y. Wang
Rapporteur: L. Brooks

Presentation Highlights

Commercial Fishery

Catches in 2008 were 1,782 mt, including 161 mt of discards. Canadian catches increased to 1,529 mt in 2008 from 1,222 mt in 2007. Discards were estimated at 6 mt from mobile gear fleet and 97 mt from the fixed gear fleet. Estimated discards of cod by the Canadian scallop fishery were 36 mt in 2008.

USA catches decreased to 253 mt in 2008 from 557 mt in 2007. USA landings are usually taken in the first and second quarter; however, given seasonal restrictions on eastern Georges Bank in 2008, the majority of cod was harvested in the fourth quarter. Estimated discards of cod for 2008 were 22 mt, predominantly from the groundfish fishery.

Size and Age Composition

The size and age compositions of the 2008 landings by the Canadian groundfish fishery were derived from port and at-sea samples from all principal gears. Samples were represented evenly over the months for all the fishing gears. Comparison of port and at-sea length frequencies did not indicate any discrepancies for otter trawlers. However, fixed gear observer samples tended to have more small fish than the port samples. The size composition of cod discards from the 2008 Canadian scallop fishery was derived from at-sea sampling. The discards from otter trawlers were assumed to have the same size composition as their landings. At-sea observer length samples were used for discards from longliners because of the difference between port and observer samples. Combined landings peaked at 61-67 cm (24-26 in), and discards peaked at 64 cm (25 in).

There were sufficient samples from the 2008 USA fishery on eastern Georges Bank to characterize the size composition of the landings. Landings peaked at 72 cm (28 in) and discards peaked at 53 cm (21in).

Catch has declined substantially for all the ages since 1995, and only ages 3 to 6 have contributed significantly to the catch. Contribution of older ages has not improved. The combined Canada/USA 2008 fishery age composition was dominated by the 2003 year class at Age 5 (47% by number), followed by the 2005 year classes at Age 3 (23% by number) and the 2004 year class at Age 4 (11% by number). The 2001 year class at Age 7 still contributes to the catch (6% by number).

Since the early 1990s, fishery weights at age show a downward trend. Except Age 7, all the weights at age increased in 2008.

Abundance Indices

Survey results were not available from the 2009 NMFS spring survey. The 2003 year class was dominant in the 2009 DFO and 2008 NMFS spring surveys. The 2005 year class was also prominent in the 2008 fishery but variable in surveys. Initial indications for the 2006 year class are promising from the 2009 DFO survey, but not consistently at all ages/years. Survey biomass indices fluctuated without clear trend in recent years. The DFO survey shows some increase but is quite variable while the NMFS fall survey is still low. The numbers of Age 7+ fish in the surveys remained low. There was some improvement in size at age in 2009 DFO survey, but it is still low compared to the 1980s.

VPA Calibration

The "split M 0.2" and "split M 0.5" VPA model formulations established at the 2009 benchmark meeting were used in this assessment. The survey time series are split in 1993-1994. For the "split M 0.2" model formulation, the annual natural mortality rate, M, was assumed constant and equal to 0.2 for all ages in all years. For the "split M 0.5" model, M is fixed at 0.5 for ages 6+ during 1994-2008. Fishing mortality on Age 9 for 1978 to 2008 was assumed to be weighted average fishing mortality on ages 7 and 8. Population abundance in terminal year 2009 was fixed at 2.5 million for Age 1 and estimated by ADAPT for ages 2-9+.

Results

The biomass for ages 3+ was estimated at 8,737 mt from the "split M 0.2" model, 11,994 mt from the "split M 0.5" model in 2009, more than a 20% increase from 2008 and close to the post-1994 average. However, it is still low compared to the 1980s. The estimated 2008 fishing mortality, 0.25 ("split M 0.2") and 0.17 ("split M 0.5") were the lowest in the assessment time series. The 2003 year class was still dominant in the 2009 population and the 2008 catch, and made a very important contribution to surplus production. The 2002 and 2004 year classes are the weakest on record. The 2005 and 2006 year classes were close to the post-1994 average.

Projections

Catch in 2009 was assumed to be equal to the 1,700 mt quota in 2009. From the "split M 0.2" model, a combined Canada/USA catch of about 1,300 mt in 2010 will result in a neutral risk (50%) that the fishing mortality rate in 2010 will exceed Fref whereas a catch of 1,800 mt will result in a neutral risk (50%) that the 2011 adult biomass (4+) will be lower than the 2010 adult biomass. A catch of about 1,000 mt will result in a neutral risk (50%) that 2011 adult biomass will not increase by 10%. From the "split M 0.5" model, a combined Canada/USA catch of about 1,700 mt in 2010 will result in a neutral risk (50%) that the fishing mortality rate in 2010 will exceed Fref whereas a catch of 900 mt will result in a neutral risk (50%) that the 2011 adult biomass will be lower than the 2010 adult biomass. A catch of about 500 mt will have a high risk (75%) that 2011 adult biomass will not increase by 10%.

The 2003 year class made a substantial contribution to the fishery and population biomass, and it is projected to continue to be an important component in the fishery catch biomass in 2009-2010 (around one third of the catch) and population biomass in 2010-2011.

Discussion

There was interest in the NMFS 2009 spring survey. In particular, someone inquired whether the spring catch was as low as the fall survey? Some meeting attendees mentioned that there are rumors that no cod were caught this spring. It was clarified that the rumors are baseless, cod were caught in the 2009 NMFS spring survey. The 2009 data are not available yet because the calibration study is pending.

There was a question about the initial sign that the 2006 year class was strong in the DFO survey. There was no corroborative evidence in either of the NMFS surveys, so one cannot say yet if it is a strong year class or a year effect. It was further discussed whether there could be excessive discarding of the 2006 year class by scallopers. The catch at age (CAA) from the scallop discards can be examined to see what ages are discarded. Sometimes the scallop fishery gives a good indication of recruitment. It was noted that even in the groundfish catch, the 2006 year class was evident, but the 2003 year class was dominant.

On the partial recruitment (PR) slides, the presentation stated flat PR in older age groups. This is true up to Age 9, but PR drops at Age 10. Furthermore, it looks like there may be some accumulation in the 10+ group, which could influence projections if those fish continue to accumulate. It was discussed whether this pattern is due to the forward solution. It was noted that the accumulation at 10+ is not as much of a problem in the M=0.5 model. As far as the data suggests, the fishery catch does not have any of those 10+ fish. If we believe the catch at age (i.e. use the forward solution rather than the backwards), then you have to have M higher at those ages in order to not see those fish stacking up. It was also noted that those 10+ fish have not been seen in the survey. It was agreed that it will be important to continue tracking the large 2003 year class to see if they do show up in the survey at older ages.

It was pointed out that a third of the 2010 catch biomass is coming from one year class. This is not a good sign and should be noted in special considerations.

It was noted that USA scallopers do not catch cod as discards but Canadian scallopers do. It was explained that the gear had differed between the two countries until very recently and that the Canadian fleet recently switched to a larger ring size and a larger rope size, whereas that gear had already been used for some time in the USA. An advisory report and a research document were produced in the past to review this issue. In addition, it was noted that the temporal distribution of USA scallopers (predominantly in summer) would not be expected to cause them to encounter cod at that time of year.

The VPA assumed a fixed number at Age 1 in 2009. The assumption to fix N1 at 2.5 million fish was derived by taking an average of several previous years. The assumption had no impact on biomass (4+) or in the projections. When Age 1 was estimated at the benchmark model meeting, it had high variance and the Age 2 estimate degraded; not estimating Age 1 numbers led to an improvement in the Age 2 estimate. A technical point was made in agreeing that in the calculation of model sums of squares, the terminal year Age 1 index should not be included.

A statement was made that the “split M=0.5” model tracked effort better. This statement was clarified by explaining that recent management measures and observed catch better matched expectations of model output, but there was no basis other than opinion for this statement.

The presence/absence of retrospective patterns was discussed. It was clarified that a retrospective pattern generally has most of the tips in one direction relative to the terminal year. That is not the case here -- there is flipping back and forth. In addition, there are only 2 surveys

rather than 3 in the terminal year due to the NMFS survey not being available. This will not be an issue in the future once the calibration at Northeast Fisheries Science Center (NEFSC) is complete.

TRAC Presentation: Eastern Georges Bank Haddock Assessment
Working Paper: Assessment of Eastern Georges Bank Haddock for 2009. TRAC Working Paper 2009/14.
Presenter: L. Van Eeckhaute
Rapporteur: H. Stone

Presentation highlights

Fishery

The total catch of eastern Georges Bank (EGB) haddock in 2008 was 15,995 mt under a combined Canada/USA quota of 23,000 mt. The 2008 Canadian catch increased from 11,946 mt in 2007 to 14,814 mt while the USA catch increased from 541 mt in 2007 to 1,181 mt. The total catch is well below the quota due to yellowtail flounder and cod restrictions on the USA fishery. Estimated discards from the Canadian scallop fishery were 33 mt and were revised for 2005 to 2007 to correct for a freezer trawler to wet trawler conversion calculation error. USA groundfish fishery regulated discards were 44 mt in 2008. USA landings from 1994 to 2007 were allocated to area by the methodology used for the Groundfish Assessment Review Meeting (GARM) III and discards from 1989-2007 were then re-estimated using a discard ratio = discarded haddock / kept of all species (Wigley et al. 2008a, Wigley et al. 2008b).

The majority of the Canadian catch was made in July, August, and September. The Canadian exploratory winter fishery took place in January and February and ended in 2008 on February 8 with landings of 3,471 mt. Most of the Canadian landings were made by otter trawlers with long liners landing a significant portion of the Canadian total. Catch from gillnet gear was very low. The Canadian landings were well sampled and included port and observer sampling. Length frequencies peaked at 48.5 cm for quarters 1-3 but peaked at 52.5 cm in quarter 4.

The USA fishery is almost exclusively executed by otter trawlers. The majority of the USA catch occurred in Q4. Sampling was low and lengths were augmented from adjacent areas. Landings peaked at 54.5 cm and discards peaked at 46.5 cm.

Catch at Age

Age testing between labs and intra-reader testing at the NMFS lab produced very high agreement. The 2003 year class dominated the landings. Older ages are contributing more to the catch than during the 1990s. The observed catch in percent was very similar to what was predicted in 2007.

Indices

The 2009 NMFS spring survey was conducted with their new vessel, the *Henry B. Bigelow*, and a new net (4 seam, 3 bridle). No conversion factors have been calculated so the 2009 results were not used in this assessment. The recent DFO and NMFS fall surveys had high catches of adult fish on the Canadian side with a distribution that was similar to the last 10-year pattern. Catches of ages 0, 1 and 2 fish were low, although there was a good catch of Age 0 fish on the USA side on the southern flank near the boundary line. As has been observed for other large year classes, the 2003 year class, as the major component of the 3+ group, were widely

distributed in the spring on the Canadian side but none were caught on the USA side. The 2003 year class index for both surveys decreased noticeably. For the past few years, the indices have been fluctuating without trend. The 2 new index points for the 2007 year class were lower than the previous 3 and the 2008 year class recruitment indices were better than those for the 2001 and similar to the below average (10-year excluding 2003 year class) 2004, 2006 and 2007 year classes.

Size at Age

The 2008 fishery weights at age increased somewhat for ages 2 to 5 and 8 but decreased for ages 6 (2002 year class) and 7. The DFO survey weights in 2009 increased for almost all ages (1 to 6 and 8) but decreased for Age 7. Increases in size at age for the younger ages from the survey were substantial. Except for Age 1, the increase in survey weights did not offset the recent downward trend in weights at age observed since about 2000. Weights at length (condition) were at or near the average for the selected lengths. Growth rates for the 2003 year class, which is smaller at age than earlier year classes, were similar to 2000 year class growth rates at the same length. The 2005 year class started at the same size at Age 1 as the 2003 year class but is now larger than the 2003 year class for the same age.

Results

Improved recruitment in the 1990s and the strong 2000 year class, lower exploitation, and reduced capture of small fish in the fisheries allowed the adult population biomass (ages 3+) to increase from near an historical low of 9,100 mt in 1993 to 81,800 mt in 2003. Adult biomass decreased to 57,800 mt in 2005 but subsequently increased to 155,600 mt (80% Confidence Interval: 124,200 mt – 186,600 mt) in 2009, higher than the 1931-1955 maximum biomass of about 90,000 mt. The tripling of the biomass after 2005 was due to the exceptional 2003 year class, estimated at 291 million Age 1 fish, the largest in the assessment time series (1931-1955 and 1969-2008). In contrast, the 2001, 2002, 2004, 2006 and 2007 year classes are below the 18 million average of the 10 most recent year classes (excluding the 2003 year class). The 2005 year class (24.6 million Age 1 fish) is above the 10 year average. Initial estimates of the 2008 year class (8.8 million Age 1 fish) suggest that it is below the 10 year average.

Fishing mortality for ages 4+ fluctuated between 0.25 and 0.47 during the 1980s and showed a marked increase in 1992 and 1993 to about 0.6, the highest observed. The age at full recruitment to the fishery shifted in 2003 from Age 4 to Age 5 due to the decrease in size at age. Fishing mortality (ages 4+ for pre 2003 and ages 5+ for 2003 to present) was below Fref = 0.26 during 1995 to 2003, increased to or above Fref during 2004 to 2006 but declined to below Fref in 2007 and was 0.09 (80% Confidence Interval: 0.07 – 0.11) in 2008. The determination of Fref was based on analyses that assumed full recruitment to the fishery for ages 4 and older.

Projection

Assuming a 2008 catch equal to the 30,000 mt total quota, a combined Canada/USA catch of 29,600 mt in 2010 results in a neutral risk (50%) that the 2010 fishing mortality rate would exceed F_{ref} = 0.26 and 3+ biomass is projected to be 94,700 mt at the beginning of 2011. The 2003 year class is expected to comprise 80% of the 2010 catch biomass. A catch of 25,900 mt in 2010 would result in a low risk (25%) that the 2010 fishing mortality rate will exceed F_{ref}.

Discussion

It was noted that smaller haddock are captured in the US longline fishery compared to the US otter trawl sector. The smaller size of longline fish may reflect differences in seasonal growth since this fishery occurs primarily in quarter 2, while the otter trawl fishery occurs later in the year. Spatial differences in these fisheries may also account for differences in size composition. Use of a larger mesh cod end has reduced catch of younger fish substantially for bottom trawl gear.

The recent trend in lower fishery weight at age (WAA) could be a year class effect (caused by the exceptional 2003 year class) and may have occurred in the past as well. It may be possible to validate this by looking at trends in WAA from the 1930s and 1940s (Clark's paper) to compare with the recent period. Industry commented on the long term trends in fishery WAA, which appear to be low early in the time series, high in the middle and low again in recent years. Industry expressed concern over what is normal for haddock fishery WAA.

The group had a lengthy discussion on the choice of partial recruitment values to use for projections. It was pointed out that the PR values show a dip between ages 5 and 7 in 2009, and ages 6 and 8 in 2010. This scenario was not considered to be realistic, therefore it was recommended that the PR for Age 5 in 2009 should be changed from 0.9 to 0.7, and from 0.95 to 1 for Age 7 in 2010. It was also recommended that the PR value of 0.4 for Age 9+ (average for 2004-2008) should be retained, otherwise, the model will be generating a lot of projected catch that has not been seen in recent years.

Future assessments of this stock will need to consider extending the CAA out beyond Age 9 because fish are accumulating in the plus group (in 2012 the exceptional 2003 year class will be Age 9).

With regard to haddock survivorship, the period from the 1930s to the 1950s may have had higher survivorship compared to the recent period when biomass is high (recruit/spawning biomass). However, in the early period they were harvested at a smaller size due to small mesh gear.

There was discussion about the weights at age used for projections and the methods used to calculate them, particularly for the exceptional 2003 year class. This year class has exhibited lower WAA values than adjacent year classes and is attributed to density dependent effects, however, the 2003 year class now appears to be reaching the asymptotic size of other year classes that were larger at age.

TRAC Presentation: Reconstructing Eastern Georges Bank Catch History
Working Paper: Reconstructing the Eastern Georges Bank Catch History of Haddock (1989-2007) and a Comparison of the Methods to Derive the Catch Components. TRAC Working Paper 2009/06.
Presenter: E. Brooks
Rapporteur: H. Stone

Presentation Highlights

Standardized methodology for determining landings allocation and for estimating discards have recently been developed at the Northeast Fisheries Science Center and were accepted by peer review panels during the Groundfish Assessment Review Meeting (GARM III). Current values for US landings and discards from the most recent Eastern Georges Bank haddock assessment

were compared to values derived by applying the new algorithms for the years 1989-2007. These years correspond to the period of available data from the Northeast Fisheries Observer Program. The comparison was made in several steps to allow examination of differences due to each component of the catch. In general, differences from the landings allocation were minimal. Re-deriving the discard time series using the existing methodology (discarded to kept of haddock on observer trips) and then raising the d:k ratios by the new estimated haddock landings (using allocation method) also produced very similar estimates. Discards calculated with a ratio of discarded haddock to kept of all species generally produced estimates similar to the d:k haddock method. Finally, comparing total catch (US+Canada) for the new estimates with the existing TRAC values, the differences were found to be negligible. The methods developed by Palmer (2008) and Wigley et al. (2008a, 2008b) have been adopted as best available science at the NEFSC and will continue to be used in developing catch for US stock assessments. For consistency, it is recommended that the assessment of Eastern Georges Bank haddock use the landings and discard estimates produced by applying the new standardized methodology.

Discussion

The revised landings and discard:kept ratio using this new methodology has resulted in very little difference compared to previous landings and discard estimates. The minor changes which did occur are due to a better resolution of landings to statistical area. There were no concerns expressed by the group, and it was recommended that TRAC use the estimates calculated using the new methodology.

TRAC Presentation: Georges Bank Yellowtail Flounder Assessment

Working Paper:	Stock Assessment of Georges Bank Yellowtail Flounder for 2009. TRAC Working Paper 2009/13.
Presenter:	C. Legault
Rapporteur:	K. Clark

Presentation Highlights

The combined Canada/US yellowtail flounder (*Limanda ferruginea*) catch decreased from 2007 (1,686 mt) to 2008 (1,275 mt) due mainly to a decrease in quota. There is more uncertainty in this assessment than previous assessments due to the survey data. Specifically, the US Spring 2009 survey was conducted with a new vessel and net which does not have conversion coefficients available yet to allow its inclusion in the time series. Additionally, the 2008 and 2009 Canadian surveys encountered individual tows that were much larger than any seen previously in the time series and have a strong influence on the time series. The US scallop survey was explored as a means of tuning all ages, instead of just as a recruitment index as has been done in the past. The 18 combinations of survey data were used in both the Base Case and Major Change (splitting the survey time series between 1994 and 1995) VPA formulations, for a total of 36 VPA runs. While all combinations of survey values showed generally similar trends in VPA results, the point estimates differed and led to different advice.

During the TRAC meeting, three decisions were made which reduced the number of runs: 1) the Base Case formulation was abandoned, 2) only two combinations of treating the DFO 2008 and 2009 survey were considered (exclude both values or include both values), and 3) only the Age 1 values from the US scallop survey were used as a tuning index. It was realized during the meeting that in three years the US scallop survey did not conduct tows in Canadian waters so these years were dropped from the series (1986, 2000, and 2008). Dropping the 2008 value of the US scallop survey reduced the need to include the older ages in the survey. Since the US

scallop survey is expected to conduct tows in Canadian waters in 2009 and future years, this survey series will be explored as an option for including all ages in the assessment next year. It was recommended that instead of excluding or including the 2008 and 2009 DFO survey values, these values could be down-weighted in the fitting process due to their much higher uncertainty than other years in the time series. This down-weighting approach will be explored in the assessment next year.

The two final runs were similar in trend and differed only in magnitude of the final years' stock size and fishing mortality rates. Both runs indicate recent increases in spawning stock biomass and Age 3+ biomass due to the strong 2005 year class. However, both runs indicate that the 2007 year class is one of the lowest on record, although this estimate is uncertain. Both runs estimate 2008 fully recruited fishing mortality (ages 4+) to be well below F_{ref}=0.25.

Assuming a catch in 2009 equal to the 2,100 mt total quota, a combined Canada/USA catch of about 5,000 mt (Excluding the 2008/2009 DFO surveys) or 7,000 mt (Including the 2008/2009 DFO surveys) in 2010 would result in a neutral risk (~50%) that the fishing mortality rate in 2010 will exceed F_{ref}. In the USA, there is a requirement to provide rebuilding projections when stocks are overfished (F_{reb75}). Solving for F_{reb75} results in a median 2010 catch of 450 mt (Excluding) or 2,600 mt (Including) while projecting the F_{reb75} from last year results in a median catch of 2,300 mt (Excluding) or 3,300 mt (Including) in 2010. Guidance is needed from US managers regarding which F_{reb75} approach is appropriate to meet US rebuilding requirements.

Discussion

Canadian Landings and Discards

Concern was expressed that, in recent years, there might be a greater amount of unspecified flounder in the Canadian landings since there is no directed yellowtail fishery. Although this issue has not been specifically examined, there is no reason to expect an increase. The flounders are still being sorted and there is still a specific place for yellowtail landings to be recorded on the logs.

US Landings and Discards

The USA discards are a weight based cull, with the cull point at about 1 pound. Three separate fleets are used in the estimation of USA discards: large mesh otter trawl, small mesh otter trawl and scallop dredge. Mostly small fish are discarded, but later in the year large fish are also discarded because of restrictive trip limits. Small mesh otter trawlers are prohibited from landing any groundfish. The large mesh otter trawl catches peaked at a lower size than the scallop dredge because of the minimum size cull for the scallop fleet. A lot of the fish that must be discarded by the scallop dredge can be kept by the otter trawlers.

There were several questions to clarify the type of gear used in the USA fisheries. It was asked if the whiting fishery uses a separator or has a lot of bycatch. This fishery tries to avoid bycatch because it cannot be landed. The fleet is not required to use a grate but does use a specialized trawl with raised footrope and the fleet is also allowed to fish only in certain areas in order to decrease bycatch. The large mesh otter trawl fishery uses a 6.5" diamond mesh but still catches yellowtail because the bottom part of the net has ropes that hang down to protect the twine from the bottom. As well as protecting the net, these ropes also prevent escapement.

It was observed that when there was a directed Canadian fishery, the Canadian landings had a higher mean length than the USA. This is no longer the case, likely due to differences in mesh

size, the timing of the fishery and whether males or females are being caught. In tagging experiments, it was noted that a single tow would be predominantly one sex or the other, and since females are generally larger than males, this can make the length data much harder to interpret.

Survey Indices

The 2005 and 2006 year classes appear to be dominant in both the 2008 and 2009 DFO winter surveys. It was asked if this was also the case in the NEFSC fall survey or if it was possible that there was bleeding between the 2005 and 2006 year classes. The NEFSC 2008 fall survey results (Table 9 of the working paper) indicate that the 2005 and 2006 year classes are roughly equal in size, and together account for 93% of the survey catch in numbers, similar to the results from the 2009 DFO winter survey (86%).

There was discussion about the persistence of the aggregations of yellowtail in the past two years. Aggregations have shown up in the DFO winter survey for two years and also in the NEFSC fall survey near Corsair Canyon. The largest tows in the 2008 NEFSC fall survey were from two stations in this area. The big tows in the 2008 and 2009 DFO winter survey were on the Canadian side.

There was considerable discussion about the two large tows in the 2008 and 2009 DFO winter surveys, and their impact on the assessment. Ages 2, 3, 4, 5, and 6 from the DFO winter survey are used for tuning the VPA. In 2009 the largest tow occurred in a deep stratum, but the tow depth of 55 fm was in the shallower depth range of the stratum. The 2009 DFO winter survey still shows a large increase even when the large single tow is excluded.

Additional information from the 2009 DFO winter survey was presented showing the age length key (ALK) with and without the largest tow. There are very few fish at ages 6 and 7 in the 2009 DFO winter survey ALK and these are being bumped up to a large number by the large weight of the big set. There is no other evidence of a large number of Age 6+ fish in other tows or other surveys. The age composition with or without the large tow is largely comparable. The main difference occurs for ages 5 and 6+ which are based on a very small number of fish in the ALK. In the future, once the ages from the 2009 NEFSC spring survey are available, the DFO ALK could be augmented to see what effect this would have; however, how appropriate this would be was debated since the majority of the fish from the DFO survey came from a single location.

The method of sampling large sets was discussed. Maturity data have not been requested for yellowtail flounder on this survey, but length and weight samples are collected (1 individual per cm per sex). A suggestion was made that when a large dominant set is encountered, it might be important to take more scale samples. It was noted that a sampling protocol already exists for the surveys and also that DFO relies on NMFS to age the scales, so there would have to be agreement with NMFS to conduct the additional ageing.

Canadian industry members present at the meeting were asked if they had seen yellowtail in the areas where the survey caught large numbers of yellowtail, but since there is no quota, no-one is looking in this area.

Other Considerations

There was a brief discussion of the use of consumption analysis for yellowtail. To date there are not a lot of observations of yellowtail in the stomachs of other predators, so there are not a lot of

data. The group working on this type of analysis at NMFS have not done any detailed work on yellowtail at this point.

Model Inputs and Runs

In the 2008 TSR, there were compelling arguments regarding why the base case model formulation should not be used. It was agreed that these arguments still held, particularly in regard to the retrospective and fit to survey trends, and thus only the major change formulation would be used for this assessment.

The split time series allows for a q change to solve the discrepancy that occurs in the early 1990s. Another way to solve this would be to say that there is a lot more catch than can be accounted for in the recent time period or that there has been a sudden, large increase in M. There are problems with all of these explanations.

All the model runs show that F has gone down and that biomass is going up, but they differed in how much F has decreased and how great the biomass increase will be. The 2009 value from the DFO winter survey has a big influence on the 2008 recruitment values because it is the only value that we have so far from 2009.

The model runs using all ages from the scallop survey push the F up, although in the base case model, the scallop survey does not have a huge effect on the F. Surprise was expressed at the sensitivity of the results when using the scallop survey for all ages versus Age 1 only. If the DFO 2008 and 2009 surveys were excluded, then the only age specific information would come from the scallop survey and that would give it much more weight. By 2010 there will be more age specific data – another year of DFO winter survey data and the NEFSC 2009 and 2010 survey data.

The distribution of the scallop survey tows relative to the other surveys was discussed. There have been changes made in the stratification scheme and number of tows per stratum as the distribution and amounts of scallops has changed over time but the inter-annual comparisons should still be valid. Also, sometimes some strata are missed and the gaps are filled in with estimates calculated by using a general linear model (GLM). On further examination it was noted that in 2008, when the survey was at a low point, there were no tows on the Canadian side, where the large yellowtail catches were recorded in the 2009 DFO winter survey. It was decided that the 2008 scallop survey point should, therefore, not be included and that if the purpose for changing to using the all ages scallop index was to provide additional information for the most recent years when we have a paucity of data, then eliminating the 2008 data point means there is little reason to include this new index at this point. It was decided to continue to use the scallop Age 1 index and to drop the 2008 point.

There was considerable discussion about how the 2008 and 2009 DFO winter surveys should be treated in the assessment. Suggestions ranged from leaving both surveys out, to including the surveys but estimating the coefficients of variation (CV) on the individual ages from previous years and using these estimates to down weight the older ages that have high CVs. It was pointed out that if the 2009 DFO survey is excluded then there is no tuning index for 2009.

Four model runs were requested for the following day:
1. 2008 and 2009 DFO winter survey included (referred to as the High version).
2. 2008 and 2009 DFO winter survey removed (referred to as the Missing version).
3. 2008 and 2009 DFO winter survey included, but with the largest tow from each survey removed (referred to as the Low version).

4. 2008 and 2009 DFO winter survey included and down weighted by the CVs calculated from the 2007 DFO winter survey.

The fourth option was not possible with the current version of the software, so only the first three runs were presented.

The residuals and the retrospectives were examined for the three versions. It was noted that the problem in this situation was not deciding between two model formulations but was a data issue. It was agreed that the High and Missing versions seemed to show the best fit, and it was noted that if the down weighting option had been possible, the results would likely have fallen between those of the Missing and the High versions. The Low version was ruled out because of *a priori* assumptions. The DFO survey fit better in the past, but not in the most recent years. The decision was to present the results of both the High and the Missing versions. Next year, with the inclusion of the 2010 data points and the 2009 NEFSC spring survey, the choice of model formulation should be clearer. Also, by next year it might be possible to modify the software to allow the down weighting using the calculated CVs.

Recommendation

In the 2010 assessment, apply the down-weighting if appropriate.

Providing the two versions (High and Missing) as bounds was considered useful from a USA management perspective. Based on the information presented, there is high uncertainty, but the discussion demonstrated that the likely scenario lies between the High and the Missing versions. Both versions show that the stock is overfished according to the USA (below 43,200 mt B_{MSY}), although fishing is occurring below F_{ref}.

There was a question of whether the USA regulations require the recalculation of F rebuilding (F_{reb}) each year, and this will need to be clarified. The recalculation will be included in the TSR.

TRAC Presentation: Allocation Shares

Working Paper: 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 2010. TRAC Working Paper 2009/08.

Presenter: S. Gavaris

Presentation Highlights

Development of consistent management by Canada and the US for the transboundary resources of Atlantic cod, haddock and yellowtail flounder on Georges Bank led to a sharing allocation proposal. The proposal was founded on agreement about management units, the principles upon which allocation shares would be determined, and computational formulae. For the purpose of developing a sharing proposal, agreement was reached that the transboundary management unit for Atlantic cod and haddock would be limited to the eastern portion of Georges Bank (DFO Statistical Unit Areas 5Zj and 5Zm; USA Statistical Areas 551, 552, 561 and 562). The management unit for yellowtail flounder would comprise the entire Georges Bank east of the Great South Channel (DFO Statistical Unit Areas 5Zh, 5Zj, 5Zm and 5Zn; USA Statistical Areas 522, 525, 551, 552, 561 and 562). Two principles were incorporated in the computational formulae of the sharing proposal to account for both historical utilization, based on reported landings during 1967 through 1994, and temporal changes in resource distributions, determined from NMFS and DFO survey results that are updated annually.

The resource distributions in 2008, integrated over the NMFS and DFO surveys, were, for Atlantic cod: 77% Canada, 23% USA, for haddock: 60% Canada, 40% US and for yellowtail flounder: 40% Canada, 60% US. The allocations for the 2010 fishing year, updated with these resource distributions, resulted in shares for Atlantic cod of 75% Canada, 25% US, for haddock of 59.5% Canada, 40.5% US, and for yellowtail flounder of 36% Canada, 64% US.

Discussion

There was minimal discussion on this topic.

CONCLUSIONS AND NEXT STEPS

The chairs of the meeting thanked participants for coming to this year's TRAC assessment of Gulf of Maine / Georges Bank Herring, Eastern Georges Bank cod, Eastern Georges Bank haddock, and Georges Bank yellowtail flounder. The TRAC Status reports for each of these species would be finalized in the coming weeks, based on the discussion of the meeting, and they would be made available to participants in French and English on the TRAC website. The TRAC Status reports for Eastern Georges Bank cod, Eastern Georges Bank haddock, and Georges Bank yellowtail flounder would be presented to the Transboundary Management Guidance Committee. The TRAC Status Report for herring would be provided to fisheries managers in Canada and the US. The following working papers were expected to be modified as recommended by this meeting, and published as TRAC Reference Documents in the coming months:

- Reconstructing the Eastern Georges Bank catch history of haddock (1989-2007) and a comparison of the methods to derive the catch components. TRAC Working Paper 2009/06.
- Discards of Atlantic cod, haddock and yellowtail flounder from the 2008 Canadian scallop fishery on Georges Bank. TRAC Working Paper 2009/07.
- 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 2010. TRAC Working Paper 2009/08.
- Gulf of Maine / Georges Bank Atlantic herring stock assessment update. TRAC Working Paper 2009/09.
- Assessment of Eastern Georges Bank Atlantic cod for 2009. TRAC Working Paper 2009/12.
- Stock assessment of Georges Bank yellowtail flounder for 2009. TRAC Working Paper 2009/13.
- Assessment of Eastern Georges Bank haddock for 2009. TRAC Working Paper 2009/14.

Draft ToR for the 2010 TRAC assessments of Eastern Georges Bank cod, Eastern Georges Bank haddock and Georges Bank yellowtail flounder were prepared and are included in Appendix 5.

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APPENDICES

Appendix 1. List of Participants

Appendix 1a. Herring Assessment (8-9 June 2009)

Name	Affiliation	Phone	Fax	Email
Loretta O'Brien (Co-Chair)	NMFS, NEFSC	(508) 495-2273	(508) 495-2393	Loretta.O'Brien@noaa.gov
Tana Worcester (Co-Chair)	DFO, BIO	(902) 426-9920	(902) 426-5435	WorcesterT@mar.dfo-mpo.gc.ca
Aldous, Don	Herring Science Council	(902) 757-3447		don.aldous@gmail.com
Boudreau, Cyril	NS Fisheries and Aquaculture	(902) 424-2677	(902) 424-1766	boudrecy@gov.ns.ca
Brooks, Liz	NMFS, NEFSC	(508) 495-2238	(508) 495-2258	liz.brooks@noaa.gov
Cieri, Matthew	Maine DMR	(207) 633-9520	(207) 633-9579	matthew.cieri@maine.gov
Clark, Kirsten	DFO, SABS	(506) 529-5891	(506) 529-5862	clarkk@mar.dfo-mpo.gc.ca
Cronk, Ron	NB Dept of Fisheries	(506) 662-7026	(506) 662-7030	Ronald.CRONK@gnb.ca
d'Eon, Sherman	Cape Breeze Seafoods	(902) 768-2550	(902) 768-2418	capebreeze@ns.aliantzinc.ca
Doucette, Jeremy	Vonndel Fisheries	(506) 471-7956		gambino-inc@hotmail.com
Fife, Jack	DFO, SABS	(506) 529-5902	(506) 529-5862	FifeJ@mar.dfo-mpo.gc.ca
Gavaris, Stratis	DFO, SABS	(506) 529-5912	(506) 529-5862	GavarisS@mar.dfo-mpo.gc.ca
Hare, Jon	NOAA, NEFSC	(401) 782-3295		Jon.Hare@noaa.gov
Hawkins, Brandon	Connors Bros	(506) 456-1517	(506) 456-1568	brandon.hawkins@connors.ca
Hooper, Tony	Connors Bros	(506) 456-1520	(902) 456-1762	tony.hooper@connors.ca
Knox, Derek	DFO, SABS	(506) 529-5959	(506) 529-5862	KnoxD@mar.dfo-mpo.gc.ca
Legault, Chris	NMFS, NEFSC	(508) 495-2025	(508) 495-2258	chris.legault@noaa.gov
Maquire, Jean-Jacques	Pelagic Resource Council	(418) 688-5501	(418) 688-7924	jjmaquire@sympatico.ca
McConkey, Leah	DFO, SABS	(506) 529-5887	(506) 529-5862	McConkeyL@mar.dfo-mpo.gc.ca
Melvin, Gary	DFO, SABS	(506) 529-5874	(506) 529-5862	MelvinG@mar.dfo-mpo.gc.ca
Nordeen, Carrie	NMFS, NERO	(978) 281-9272		carrie.nordeen@noaa.gov
Overholtz, William	NMFS, NEFSC	(508) 495-2256	(508) 495-2393	woverhol@mercury.wh.whoi.edu
Porter, Julie	DFO, SABS	(506) 529-5925	(506) 529-5862	PorterJM@mar.dfo-mpo.gc.ca
Shepherd, Gary	NMFS, NEFSC	(508) 495-2368		gshepher@mercury.wh.whoi.edu
Stewert, Dick	Atlantic Herring Co-op	(902) 742-9101	(902) 742-1287	aherring@eastlink.ca
Stirling, Roger	Seafood Producers Assn of NS	(902) 463-7790	(902)469-8294	spans@ns.sympatico.ca
Stockwell, Jason	Gulf of Maine Research Institute	(207) 228-1658	(207) 772-6855	jstockwell@gmri.org
Stone, Heath	DFO, SABS	(506) 529-5880	(506) 529-5862	StoneH@mar.dfo-mpo.gc.ca

Name	Affiliation	Phone	Fax	Email
Tooley, Mary Beth	Small Pelagic Group, USA	(207) 230-7088		mbtooley@roadrunner.com
Van Eeckhaute, Lou	DFO, SABS	(506) 529-5938	(506) 529-5862	Van-EeckhauteL@mar.dfo-mpo.gc.ca
Wang, Yanjun	DFO, SABS	(506) 529-5893	(506) 529-5862	wangy@mar.dfo-mpo.gc.ca
Waters, Christa	DFO, FAM	(902) 426-9854	(902) 426-9683	WatersC@mar.dfo-mpo.gc.ca
West, Al	Bumble Bee Foods LLC	(207) 963-7331	(207) 963-4669	al.west@connors.ca

Appendix 1b. Cod/Haddock/Yellowtail Assessment (9-11 June 2009)

Name	Affiliation	Phone	Fax	Email
Loretta O'Brien (Co-Chair)	NMFS, NEFSC	(508) 495-2273	(508) 495-2393	Loretta.O'Brien@noaa.gov
Tana Worcester (Co-Chair)	DFO, BIO	(902) 426-9920	(902) 426-5435	WorcesterT@mar.dfo-mpo.gc.ca
Boudreau, Cyril	NS Fisheries and Aquaculture	(902) 424-2677	(902) 424-1766	BOUDRECY@gov.ns.ca
Brooks, Liz	NMFS, NEFSC	(508) 495-2238	(508) 495-2258	liz.brooks@noaa.gov
Clark, Kirsten	DFO, SABS	(506) 529-5891	(506) 529-5862	clarkk@mar.dfo-mpo.gc.ca
Comeau, Peter	DFO, BIO	(902) 426-5418	(902) 426-1506	ComeauPA@mar.dfo-mpo.gc.ca
d'Entremont, Alain	Scotia Harvest Seafoods	(902) 648-4075	(902) 762-0167	alain@scotiaharvest.com
d'Entremont, Claude	Inshore Fisheries	(902) 762-2522	(902) 762-3464	inshore@inshore.ca
Emberley, Jamie	DFO, SABS	(506) 529-5887		emberleyj@mar.dfo-mpo.gc.ca
Gavaris, Stratis	DFO, SABS	(506) 529-5912	(506) 529-5862	GavarisS@mar.dfo-mpo.gc.ca
Hansen, Jorgen	DFO, FAM	(902) 426-9046	(902) 426-9683	HansenJ@mar.dfo-mpo.gc.ca
Knox, Derek	DFO, SABS	(506) 529-5959	(506) 529-5862	KnoxD@mar.dfo-mpo.gc.ca
Legault, Chris	NMFS, NEFSC	(508) 495-2025	(508) 495-2258	chris.legault@noaa.gov
Maxwell, Judith	Scotia-Fundy Inshore Fishermen's Assn (SFIFA)	(902) 745-0994	(902) 745-0361	sfifaa20@eastlink.ca
O'Connor, Michael	Icewater Harvesting Inc.	(902) 482-7747	(902) 482-8146	MCOConnor@eastlink.ca
Porter, Julie	DFO, SABS	(506) 529-5925	(506) 529-5862	PorterJM@mar.dfo-mpo.gc.ca
Smedbol, Kent	DFO, SABS	(506) 529-5976	(506) 529-5862	SmedbolK@mar.dfo-mpo.gc.ca
Stone, Heath	DFO, SABS	(506) 529-5880	(506) 529-5862	StoneH@mar.dfo-mpo.gc.ca
Van Eeckhaute, Lou	DFO, SABS	(506) 529-5938	(506) 529-5862	Van-EeckhauteL@mar.dfo-mpo.gc.ca
Wang, Yanjun	DFO, SABS	(506) 529-5893	(506) 529-5862	wangy@mar.dfo-mpo.gc.ca
Warren, Tom	NMFS, Gloucester	(978) 281-9347		Thomas.Warren@noaa.gov

Appendix 2. Terms of References

Transboundary Resources Assessment Committee
Assessment of Georges Bank Cod, Haddock, and Yellowtail

8-12 June 2009
St. Andrews, NB

TERMS OF REFERENCE

Context

The TRAC annually obtains requests for harvest advise on transboundary resources from the Transboundary Management Guidance Committee (TMGC).

For the following resources:
Eastern Georges Bank cod
Eastern Georges Bank haddock
Georges Bank yellowtail flounder

- Apply the benchmark assessments to report on the status of the stocks, updating results for the latest information from fisheries, including discard estimates, and research surveys and characterize the uncertainty of estimates.

- For a range of total catch values in 2010, estimate the risk that the 2010 fishing mortality rate would exceed 0.18 (cod), 0.26 (haddock) and 0.25 (yellowtail flounder) respectively

- If stock condition is poor, for a range of total catch values in 2010, estimate the risk that the biomass at the beginning of 2011 would not achieve a 0%, 10% or 20% increase compared to the beginning of 2010.

- Review the biomass distribution relative to the USA/Canada boundary, updating results with the 2008 survey information, and apply the allocation shares formula.

- Review and determine an appropriate metric for reporting biomass for GB yellowtail flounder.

- Draft terms of reference for 2010 June TRAC

- Other matters.

Outputs

TRAC Transboundary Status Reports the eastern Georges Bank cod and haddock, and Georges Bank yellowtail flounder management units.
TRAC Reference Documents for eastern Georges Bank cod and haddock, and Georges Bank yellowtail flounder management units.
TRAC Proceedings of meeting discussion

Participants

DFO Maritimes scientists and managers
NMFS Northeast Region scientists and managers
Canadian and US fishing industry
US State and Canadian Provincial representatives (NB and NS)
NEFMC representatives

Transboundary Resources Assessment Committee
Gulf of Maine/Georges Bank Herring

8-12 June 2009
St. Andrews, NB

TERMS OF REFERENCE

Context

The TRAC was established in 1998 to peer review assessments of transboundary resources in the Georges Bank area and thus to ensure that the management efforts of both Canada and USA, pursued either independently or cooperatively, are founded on a common understanding of resource status. In 2000, the Northeast Regional Administrator for NMFS and the Regional Director General of DFO Maritimes received a request from the US and Canadian herring fishing industries to undertake a joint peer review of Gulf of Maine/Georges Bank herring. Gulf of Maine/Georges Bank herring was first assessed by TRAC in 2003.

During the 10 – 14 February 2003 meeting, TRAC conducted both an initial benchmark review and an assessment for Gulf of Maine/Georges Bank herring. At that meeting, consensus was reached on how to deal with the stock complex and management units. It was deemed necessary to undertake an evaluation of the entire complex with subsequent consideration of the individual components. Evaluation of the relative proportions of the biomass between the inshore Gulf of Maine and Georges Bank should be considered to give guidance for the individual components. Two approaches were used to evaluate stock status.

The second TRAC review of herring (2 – 5 May 2006) conducted further work on the benchmark and also provided an updated assessment. At this meeting, it was agreed that the Age Structured Assessment Program (ASAP) Base model showed the least retrospective pattern and was considered to be the preferred compromise amongst all the formulations. It was also initially agreed that the NMFS acoustic survey time series would be included in the benchmark formulation; however, after further work it was not used in the 2006 assessment because it did not improve the model fit. However, it was agreed that further examination of acoustic data should be undertaken in future assessments.

While there are still some outstanding issues that will continue to be addressed as new information arises, it was deemed appropriate to provide an assessment of the status of the resource in 2009. The purpose of this meeting is to update any new information from survey indices and the fisheries, and use it in the established benchmark formulation to determine the current status of the resource.

Objectives

- Update results with the latest information from fisheries, including discards, if appropriate, and research surveys.
- Review results of the ageing workshop and implications for this assessment.
- Review applicability of fishery-independent larval index as an indicator of stock reproductive potential
- Consider role of herring as forage for predators and evaluate feasibility of incorporating predatory consumptive removals into assessment models.
- Apply the benchmark formulation to update the status of Gulf of Maine/Georges Bank Atlantic herring through 2008 and characterize the uncertainty of estimates.

- Review the retrospective pattern and consider alternative model formulations to address uncertainty in status determination and harvest forecast
- Using the established harvest strategy biological reference points, review projections to meet the requirements of both countries.
- Review progress made on the recommendations from the 2006 TRAC meeting.

Products

TRAC Proceedings, which will document the details of the review and summarize the consensus results.
TRAC Reference Document, which will provide the supporting technical analyses.
TRAC Status Report, which will communicate conclusions about stock status and the conservation implications of harvest options.

Participation

NEFSC and DFO Stock Assessment teams and other laboratory scientists
Representatives from US and Canadian management
US State and Canadian provincial representatives
US and Canadian fishing industry participants

Appendix 3. Meeting Agenda

Transboundary Resources Assessment Committee
Assessment of Gulf of Maine/Georges Bank Herring, Eastern Georges Bank Cod, Eastern Georges Bank Haddock, and Georges Bank Yellowtail Flounder

St. Andrews Biological Station, NB, Canada
Hachey Boardroom

8-12 June 2008

DRAFT AGENDA

8 June 2009 – Monday

9:00 – 9:15 Welcome and Introduction (Chairs)
9:15 – 9:30 Overview of Progress on Recommendations from Herring 2006 Assessment
- 2008 ageing workshop results and implications for assessment

9:30 – 10:00 Update of Herring Data Inputs, including surveys and fisheries
10:00 – 10:30 Application of Herring Benchmark Formulation
10:30 – 10:45 Break
10:45 – 11:45 Review of Alternative Model Formulations
11:45 – 12:00 Review of Projections

12:00 –1:00 Lunch

1:00 – 1:30 Review Applicability of Larval Index as an Indicator of Reproductive Potential
1:30 – 2:00 Review Role of Herring as Forage, including implications for assessment
2:00 – 3:00 Discussion
3:00 – 3:15 Break
3:15 – 5:00 Report Preparation

9 June 2009 – Tuesday

9:00 – 9:15 Discards from the 2008 Canadian Scallop Fishery
9:15 – 9:30 Results of the EGB Cod Benchmark Review
9:30 – 10:00 Update of EGB Cod Data Inputs – commercial fishery
10:00 – 10:30 Update of EGB Cod Data Inputs – surveys
10:30 – 10:45 Break
10:45 – 11:45 Application of the Benchmark Formulations for EGB Cod
11:45 – 12:30 Projections and Assessment Advice for EGB Cod

12:30 – 1:30 Lunch

1:30 – 2:00 Update of EGB Haddock Data Inputs – commercial fishery
2:00 – 2:15 US Discards of Haddock
2:15 – 3:00 Update of EGB Haddock Data Inputs – surveys
3:00 – 3:15 Break
3:15 – 3:45 Application of the Benchmark Formulation for EGB Haddock
3:45 – 4:00 Projections and Assessment Advice for EGB Haddock
4:00 – 5:00 Discussion

10 June 2009 – Wednesday

9:00 – 9:30 Update of GB Yellowtail Data Inputs – commercial fishery
9:30 – 10:00 Update of GB Yellowtail Data Inputs – surveys
10:00 – 10:30 Application of the Benchmark Formulation for GB Yellowtail
10:30 – 10:45 Break
10:45 – 11:00 Projections and Assessment Advice for GB Yellowtail
11:00 – 12:00 Discussion

12:00 – 1:00 Lunch

1:00 – 3:00 EGB Cod Report Preparation
3:00 – 3:15 Break
3:15 – 5:00 EGB Haddock Report Preparation

11 June 2009 – Thursday

9:00 – 11:00 EGB Yellowtail Report Preparation
11:00 – 11:15 Break
11:15 – 12:00 Herring Report Finalization (as required)

12:00 – 1:00 Lunch

1:00 – 3:00 Report Review
3:00 – 3:15 Break
3:15 – 5:00 Development of 2010 TRAC cod/haddock/yellowtail Terms of Reference

12 June 2009 – Friday

9:00 – 12:00 Other Business (as required)

Appendix 4. Report of DFO / Industry Pre-Assessment Groundfish Meeting

Pre-Assessment Meeting
Georges Bank Cod, Haddock, and Yellowtail Flounder
Rodd Grande Hotel, Yarmouth, NS

7:30 p.m., Wednesday, May 27, 2009.

Purpose:

The purpose of the meeting was to review survey and fishery observations prior to the upcoming TRAC assessment. DFO science staff presented summaries of available information as a starting point for discussion.

Introduction (S. Gavaris):

The assessment process and time table were outlined and management areas, survey strata and the allocation sharing arrangement with the US were explained. Some background was given on the 5Zjm cod benchmark results and the impact that these will have on this year's assessment.

Discussion:
- Mobile gear vessels are using separator panels. Does this impact on relationship between the surveys and fishery?
  Since catch rates are not used, this has no impact.
- If the proportion of fish on the Canadian or USA side changes, how will this affect the allocations?
  Canada and the USA have agreed to an allocation sharing formula.

Haddock (L. Van Eeckhaute)
Presentaton Highlights:
- 2008 catches dominated by 2003 year class at Age 5. The 2000 year class made a higher contribution in the winter fishery (16% by number) than in other quarters.
- The age composition of the 2008 fishery catch was similar to the age composition predicted in last year's assessment.
- Fishery weights at age for the 2003 year class were similar to those predicted in the 2007 assessment.
- The USA haddock catches were well below the quota because the fishery was restricted by the yellowtail and cod quotas.
- The 2009 NMFS spring survey results are not available yet because conversion factors for the new vessel have not been derived.
- Both DFO winter and NMFS fall survey indices have decreased in the most recent years but the adult biomass indices are still at a high level.
- The 2004, 2006, 2007 and 2008 year classes look similar in abundance, but are below the 10-year average (which excludes the 2003 year class).
- There have been some improvements in weights at age, but they are still low compared to historic levels. There has been a marked increase in survey weights at age for younger ages (1 to 3).
- Condition is at or near average.
- The 2003 year class is growing at a faster rate than the 2000 year class at the same age.
- The incoming year classes are similar in size to the pre-2000 year classes.

Discussion:

- The peak length in the catch was higher in quarter 4, reflecting the summer growth of the 2003 year class.
- There were lower weights at age in the 1960s when there was a big year class going through. Then when there were fewer haddock, weights at age increased. Now that there is a large year class passing through the fishery again, the weights at age are down, so perhaps this is not something to be concerned about.
- Until what age was the 1963 year class seen in the fishery?
  Past Age 9. It lasted a long time, although it was fished more heavily from younger ages than the 2003 year class.
- What do you think will happen to the F_{ref} catch for 2010?
  F_{ref} should still be high but the calculation takes into account several processes such as growth, natural mortality, recruitment to the fishery of new year classes, the effect of fishing etc., so it is difficult, without doing the calculation, to predict what the result will be. For example, the fish are growing so even though the numbers of fish may be decreasing, the biomass might not be going down.
- The signals for haddock are generally positive with the only concern being that several recruiting year classes are below the average abundance. The 2003 year class will sustain the biomass for the time being.

Cod (Y. Wang):

Presentation Highlights:

- The 2003 year class was dominant in the 2008 fishery and strong in the 2009 DFO and 2008 NMFS spring surveys.
- The 2005 year class was also prominent in the 2008 fishery, but variable in the surveys.
- The initial indications for the 2006 year class are promising from the 2009 DFO and 2008 NMFS fall surveys but are not consistent for all ages.
- Survey biomass indices fluctuate without clear trend in recent years. The DFO survey shows some increase, but is quite variable.
- Both surveys and fishery show low numbers of 7+ older fish, except Age 7 (2001 year class) in fishery
- There has been some improvement in the size at age in 2008.

Discussion:

- Why are Age 7 cod and haddock not increasing in weight at age?
  This is true for ages 5, 6, and 7 haddock and ages 6 and 7 cod but the reason why is not known. It would be worth checking to see if the cod from those year classes started out at a smaller size, similar to the graph presented for haddock.

ACTION ITEM: Look at growth patterns for ages 6 and 7 cod, and ages 5, 6, and 7 haddock.

- The figure that shows the size range of the cod catches should not include a line for the groundfish discards because discards were not measured.
  The term “estimated” will be put in this figure to refer to the size range of the groundfish discards. We make assumptions about the size of the fish being discarded. If there are no big differences between the lengths of port and observed samples, we assume that there is no reason to assume a difference between the length composition of catch and that of the discards. If there is a difference, then only the length composition of the observer samples is used.

- What do you think will happen to the F_{ref} catch based on what you have so far?
  The situation for cod is more complicated than haddock because the assessment method has changed. The indices look a bit more promising, but the assessment method will bring the numbers down, so it may likely be a bit lower or about the same as the 2009 TAC (which was set below F_{ref}). There is some improvement in recruitment. Rebuilding is slow, but it does not look like the situation is worse than it was last year.
- At what age can you judge the strength of a new year class?
  Ages 0 and 1 are not sampled well. The 2006 year class at Age 3 from the 2009 survey looks promising, even though this year class did not look very strong at Age 2, but this could just be survey variation.
- There is a tendency to underestimate recruiting weak year classes.
  Yes, but the stronger 2003 year class was overestimated.
- The lack of old ages is still a concern. Is the lack of Age 3+ on the US side in the DFO survey a recent trend or is it consistent with previous years?
  It is more extreme this year, but the cod catches from the DFO survey were higher on the Canadian side in previous years when the population was lower.
- Is there an increase in natural mortality in 5Zjm cod like 4X?
  Response: During the benchmark, splitting the survey time series was one way to deal with some of the problems, but this did not address why there are few older fish when we know they are not being caught in the fishery. Natural mortality may have increased, but the reason is not known. When the assessment advice is given this year, the results from two different models will be presented - one with constant mortality and one with increased natural mortality on older ages. Management will have to take the implications from both models into account. The lack of older fish could be a result of a lot of weak year classes, and if so, then following the fate of the 2003 year class, the first above average year class since 1991, should be informative.

Yellowtail Flounder (K. Clark):

- Canadian landings (41t) and discards from the scallop fishery (117t) were well below the Canadian quota for 2008.
- Ages 2 and 3 males and Age 3 females dominated the catch.
- The 2009 NMFS spring survey results are not available yet because conversion factors for the new vessel have not been calculated.
- The 2009 DFO winter survey had one very large tow in 5Z1 of more than 5t. Even when this tow is removed, the index point for 2009 is still the highest in the time series.
- In the 2009 DFO winter survey the majority of yellowtail were caught in 5Z1, on the Canadian side.

Attendees, Pre-Assessment Meeting for Georges Bank Cod, Haddock and Yellowtail Flounder
Rodd Grande Hotel, Yarmouth, NS, Wednesday, May 27, 2009.

Name	Affiliation	Email OR FAX	Telephone
Atwood, Roger	fisherman	902-637-2581	902-637-2764
Belliveau, Ray	Charlesville Fisheries	cvfishld@ns.sympatico.ca	902-762-2405
Boudreau, Cyril	NSFA	boudrecy@gov.ns.ca	902-424-2677
Clark, Kirsten	DFO Science	ClarkK@mar.dfo-mpo.gc.ca	506-529-5891
Cushing, Russ		r.cushing@ns.sympatico.ca	902-742-8888
Dedrick, Gerry	Shelburne Co. Quota Group	gdedrick@xplornet.com	902-875-3948
d'Entremont, Alain	Scotia Harvest/Marro Mgmt.	alain@scotiaharvest.com	902-762-3599
d'Entremont, Claude	Inshore Fisheries Ltd.	inshore@inshore.ca	902-762-2522
d'Eon, Georges	Ocean's Finest Inc	georgesdeon@hotmail.com	902-648-8217
Gavaris, Stratis	DFO Science	GavarisS@mar.dfo-mpo.gc.ca	506-529-5912
Hansen, Jorgen	DFO Fisheries Management	hansenj@mar.dfo-mpo.gc.ca	902-426-9046
Holmes, Allen	NSFA	holmesab@gov.ns.ca	902-637-3796
Leblanc, Daniel	Toffee Trawling	helicopterdaniel@yahoo.ca	902-769-7122
Maxwell, Judith K.	SFIFA	sfifaa20@eastlink.ca	902-745-0994
Van Eeckhaute, Lou	DFO Science	Van-eeckhauteL@mar.dfo-mpo.gc.ca	506-529-5938
Wang, Yanjun	DFO Science	WangY@mar.dfo-mpo.gc.ca	506-529-5893
Waybret, Troy	fisherman	twaybret@eastlink.ca	902-745-1576

Appendix 5. 2010 Draft Terms of Reference for Cod, Haddock, and Yellowtail Flounder

Transboundary Resources Assessment Committee
Assessment of Georges Bank Cod, Haddock, and Yellowtail Flounder

12-16 July 2010

NEFSC Woods Hole Laboratory
Stephen H. Clark Conference Room

DRAFT
TERMS OF REFERENCE

Context

The TRAC annually obtains requests for harvest advise on transboundary resources from the Transboundary Management Guidance Committee (TMGC).

For the following resources:
Eastern Georges Bank cod
Eastern Georges Bank haddock
Georges Bank yellowtail flounder

- Apply the benchmark assessments to report on the status of the stocks, updating results for the latest information from fisheries, including discard estimates, and research surveys and characterize the uncertainty of estimates.

- For a range of total catch values in 2011, estimate the risk that the 2011 fishing mortality rate would exceed 0.18 (cod), 0.26 (haddock) and 0.25 (yellowtail flounder), respectively.

- If stock condition is poor, for a range of total catch values in 2011, estimate the risk that the biomass at the beginning of 2012 would not achieve a 0%, 10% or 20% increase compared to the beginning of 2011.

- Review the biomass distribution relative to the USA/Canada boundary, updating results with the 2009 survey information, and apply the allocation shares formula.

- Draft terms of reference for the 2011 TRAC assessment of cod, haddock, and yellowtail flounder

- Other matters.

Outputs

TRAC Transboundary Status Reports the eastern Georges Bank cod and haddock, and Georges Bank yellowtail flounder management units.
TRAC Reference Documents for eastern Georges Bank cod and haddock, and Georges Bank yellowtail flounder management units.
TRAC Proceedings of meeting discussion

Participants

DFO Maritimes scientists and managers
NMFS Northeast Region scientists and managers
Canadian and US fishing industry
US State and Canadian Provincial representatives (NB and NS)
NEFMC representatives