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Proceedings of the Third Meeting of the Transboundary Resources Assessment Committee (TRAC), Woods Hole, Massachusetts, April 26-28, 2000

Steve Clark[1] and Wayne Stobo[2], TRAC Co-Chairmen

[1]National Marine Fisheries Serv., 166 Water St., Woods Hole, MA 02543
[2]Dept. of Fisheries & Oceans, P.O. Box 1006, Dartmouth, NS B2Y 4A2

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Abstract

The third Transboundary Resources Assessment Committee (TRAC) meeting was held in Woods Hole, MA, USA during 26-28 April 2000 and provided a forum for joint Canada/USA peer review of assessments for Georges Bank cod, haddock and yellowtail flounder resources. For Canada, these discussions produced Stock Status Reports for use in management for the 2000 fishing year. For the USA, the meeting produced advisory reports, which will be considered for developing harvest advice for the 2001 fishing year. Technical issues related to the assessments were also raised, including alternate assessment approaches, bias correction, and the need for joint work on stock assessment methodology. Recommendations were made to improve future assessments.

Executive Summary

The third meeting of the Transboundary Resources Assessment Committee (TRAC) was held in Woods Hole, MA from April 26-28, 2000 to review assessments for the Georges Bank and South and Eastern Georges Bank cod, Georges Bank and Eastern Georges Bank haddock, and Georges Bank yellowtail flounder management units. The TRAC was established by Canada and the USA for joint peer review of assessments for transboundary resources. The process includes a Transboundary Assessment Working Group (TAWG) which produces the assessments, and the TRAC itself, which peer reviews these assessments and produces documentation on resource status required by the managers of both countries. The TAWG had met 3 - 5 April in St. Andrews, N.B. and had completed draft assessments for the above management units, and had also developed guidelines for short-term projections as needed for preparation of management advice for the 2001 fishing year.

The two cod assessments were consistent, indicating sharp reductions in exploitation since the mid-1990s, and a slight increase in biomass, primarily due to growth of individual fish. However, biomass is still considerably below levels that would be expected to produce strong recruitment required to sustain a healthy fishery, and year classes since the early 1990s have been significantly below average. Assessments for the two haddock management units and Georges Bank yellowtail also indicate substantial reductions in exploitation since the early 1990s, with significant increases in stock biomass and recruitment levels. These resources are clearly rebuilding, although stock biomass and year-class size for haddock remain well below historical averages.

There was general consensus as to the current status and outlook for these transboundary management units. However, concerns were raised about data availability and analytical approaches which could affect the reliability of future assessments if not addressed. These and other substantive issues include the following:

1. There was considerable concern relative to levels of USA commercial port sampling for all three species, and resultant impacts on our ability to characterize the length and age compositions of USA landings. In recent years and particularly in 1999, sampling of USA landings was judged to be both insufficient in quantity and poorly distributed across gears and market categories. Immediate measures are necessary to increase USA port sampling coverage.

2. The need for improved information on discard through additional sea sampling was reiterated at several points. Sea sampling in the USA groundfish fishery has been chronically inadequate, e.g. precluding use of such data in the Georges Bank and South cod assessment. On the other hand the USA sea scallop fishery in Closed Area II was adequately covered, documenting a bycatch of yellowtail which was limited by TAC.

Increased observer sampling in the USA groundfish fishery and coverage of Canadian sea scallop fisheries is needed to enhance our assessment capabilities.

3. The desirability of an ageing workshop was reiterated again this year. Cod has been a primary focus in previous meetings although such a workshop could provide benefits for haddock and yellowtail as well. The USA co-chair agreed to pursue options for an ageing workshop in Woods Hole in summer or autumn of 2000.

4. Bycatch of cod in the haddock fishery has become an important issue to Canadian industry because the low cod quota is now limiting the ability of the fleet to harvest haddock TACs. This has led to changes in historical fishing patterns. Effort has been redirected to areas of lower cod abundance but it is anticipated that this problem will persist and become more severe as the haddock stock continues to rebuild.

5. Canadian and USA research vessel surveys provide generally consistent indices of year class strength and stock abundance. A number of aspects related to research vessel surveys were discussed, including effects of unusually large (outlier) tows, sampling intensity, and catchability influences on indices for young fish (retrospective patterns indicate that numbers tend to be underestimated). Recommendations to address the outlier problem included use of transformations on survey catch-per-tow data and use of weighted least squares in ADAPT runs, e.g. weighting by the inverse of the variance of the tuning indices. Participants also suggested use of temperature and substrate data overlays to examine catchability at size/age. It was also noted that USA survey coverage on eastern Georges Bank was less intensive than that for Canadian surveys, with an increased possibility for missing important concentration areas.

6. Participants noted the desirability for further development of stock condition factors and other relevant biological and environmental information for use in future assessments.

Introduction

The third meeting of the Transboundary Resources Assessment Committee (TRAC) was held in Woods Hole, MA USA April 26-28, 2000. The meeting was attended by 32 Canadian and USA scientists, managers and industry representatives, and was co-chaired by Drs. Wayne Stobo (DFO, Canada) and Steve Clark (NMFS, USA). The purpose of the meeting was to review assessments for Georges Bank cod, haddock and yellowtail flounder management units and to prepare documentation required for management of these resources in the upcoming fishing year. A listing of participants, Terms of Reference and an agenda for the meeting are given in Appendices I, II, and III, respectively.

The USA co-chair opened the meeting by greeting the participants and asking them to introduce themselves. He then briefly reviewed the TRAC process, noting that it included the Transboundary Assessment Working Group or TAWG, consisting of Canadian and USA scientists and industry members, which produces the assessments and other analyses and research recommendations; and the TRAC itself, which reviews the assessments and generates final documentation on stock status. For Canada, products are the stock status reports, for immediate use by the Fisheries Resource Conservation Council (FRCC), while for the USA, products are advisory reports for use by the New England Fishery Management Council's Multispecies Monitoring Committee (MMC). He stressed that the meeting would consider resource status only and would not be concerned with management issues, such as allocation questions or differences in management systems. For more detailed information participants were referred to a "Description of the TRAC Process" given in the Proceedings of the 1998 meeting, an updated version of which is included herein as Appendix IV.

The co-chair then outlined how the meeting would be conducted. Five assessment working papers had been tabled for the five management units; these are listed in Appendix V. An external reviewer/rapporteur had been assigned to each management unit; he/she had been responsible for reviewing the working paper prior to the meeting. The senior author was responsible for presenting the assessment, during which time only questions of clarification would be allowed. Following the presentation the reviewer/rapporteur would be responsible for initiating discussion and questions and for preparing a summary of major points and issues. External reviewers/rapporteurs by stock were as follows:

5Zjm cod	-	Dan Lane
5Z cod	-	Jon Brodziak
5Zjm haddock	-	Heath Stone
5Z haddock	-	Mike Fogarty
5Zjmnh yellowtail	-	Lou Van Eeckhaute

The co-chair concluded by expressing his appreciation to the members of the TAWG for their efforts in completing the assessments and working papers in time for the meeting in spite of numerous other pressures and commitments.

During the meeting the TRAC took note of the "Science and Industry Meeting on Georges Bank Groundfish" held in Yarmouth, N.S. March 27. This meeting involved Canadian Department of Fisheries and Oceans staff and Canadian industry members, and constituted a forum for exchange of information on resource status for Eastern Georges Bank (5Zjm) cod and haddock and 5Zjmnh yellowtail flounder. The TRAC did not have the opportunity to discuss results of this meeting due to time constraints; but minutes of the meeting are attached as Appendix VII.

Report of the Transboundary Assessment Working Group

Rapporteur: Ralph Mayo

A brief summary of the Report of the Transboundary Assessment Working Group meeting was presented to the TRAC. The full report is attached as Appendix VI. Three major points were emphasized.

First, there has been a deterioration in the quantity and the intensity of commercial port samples used to characterize the size and age composition of USA landings of cod, haddock and yellowtail flounder. The TAWG emphasized that, despite lower levels of landings in recent years, a minimum number of samples must be taken regardless of the magnitude of the landings.

Second, the TAWG developed guidelines for conducting short-term projections of stock size and catch. Derivation of input parameters such as mean weights, maturity, and partial recruitment at age should follow standard procedures which ensure that projections reflect the most recent biological conditions of the stock. Short-term recruitment can usually be estimated by re-sampling recent observed values at SSB levels expected in the near-term. Medium and long term projections are more problematic with respect to estimation of future recruitment. In these cases, many parametric models may be used to derive likely recruitment in the out years.

Thirdly, the TAWG addressed the issue of the delay which occurs between the review of stock status at the TRAC and the time at which projections for use by USA managers are conducted. Delaying the projections until autumn allows the use of current year landings estimates to derive current year fishing mortality. However, during the intervening period, additional survey data may become available for potential use in assessing stock status or for calibrating recruitment. The TAWG recommends against the use of additional survey data to re-evaluate stock status during the interim period. However, information from recent surveys may be used in a qualitative sense to calibrate recent recruitment.

TRAC Comments

Members of the TRAC expressed concern over the deterioration of recent commercial port sampling of USA landings of cod, haddock and yellowtail flounder and resultant impacts on ability to properly characterize the length and age composition of these landings. In the Canadian fishery, a minimum of 4 samples per targeted species per month for each gear sector is the desired goal. In contrast, some gears in the USA fishery have not been sampled at all in recent years, and the sampling that has been done has been poorly distributed among market categories and months. Although USA biological sampling is stratified by market category, it is still desirable to have each major gear represented in the samples. A member of the New England Fishery Management Council indicated that he will inform the Council of the inadequacies of the USA biological sampling program.

The TRAC discussed the recommendation of the TAWG regarding use of information which may become available for the 5Z stocks between the time of the TRAC assessment review and the time when the USA Multispecies Monitoring Committee performs projections for the 2001 fishing year. The TRAC concluded that additional survey data may be used in a qualitative sense to aid in evaluating near-term recruitment, but there should be no attempt to re-calibrate VPAs with additional survey indices, given the fact that the TRAC has endorsed the assessments presented herein and has reached consensus based on these assessments. However, the TRAC recommends that all available fishery catch data should be used as a basis for determining current year fishing mortality rates.

Stock Assessments

Eastern Georges Bank (5Zjm) Cod

Working Paper: Hunt, J.J. and B. Hatt. Population status of eastern Georges Bank cod (Unit Areas 5Zj,m) for 1978-2000. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/A, 39 p.

External Reviewer/Rapporteur: Dan Lane

Terms of Reference:

- Report on the status of the stocks, updating results for the latest information from fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 2000, evaluate the consequences on exploitation rate in 2000 and on spawning stock biomass (or its proxy) in 2001.
- Estimate the risk that the 2000 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2001 would not achieve a 0%, 10% and 20% increase compared to 2000, for a range of yield quotas in 2000.
- Evaluate additional measures of stock status, and consider their interpretation.
- Report on progress against research recommendations made at the 1999 TRAC.

The 5Zjm stock assessment was presented by Joe Hunt. The comments below summarize the ensuing discussions.

The Fishery

Members of the fixed gear fleet noted again this year that due to restrictive management measures on cod in the mixed cod-haddock fishery, historical fishing patterns on Georges Bank

have changed. In particular, longline fishermen have adapted their fishing practices to avoid cod by not fishing in traditional areas where cod continue to be found. Longliners tend to seek haddock first in order to build up catches of this species in proportion with recent allocations before fishing cod available in the traditional areas. The mobile gear fleet appears to be more adept at directing fishing to catch their haddock allocations with cod as by-catch.

The distribution of observed versus predicted 5Zjm cod landings at age revealed a predominance of age 3 cod (the 1996 year class). The predicted proportion of older fish (ages 6+, including the strong 92 year class), thought to be fully recruited to the fishery, was overestimated compared to the observed proportion landed for the second year running. However, it was also noted that landings of cod over 5 years of age in 1999 were not much different than the longer term average proportions for these same ages. Discussion on this point also focused on the possibility that older cod, e.g., through fish behavioral changes or as a consequence of changes in fishing practices, may not be fully available to fishing gear as is presently assumed in the existing flat-topped partial recruitment vector at age. Similar to the 1999 TRAC recommendation, further study on the partial recruitment of the 5Zjm cod stock is warranted.

It was reported that landings of cod by the USA otter trawl fleet in 5Zjm were the highest since 1994 and represented nearly 40% of total 5Zjm cod landings (the highest proportion since 1989). It was noted that no analyses had been undertaken of the potential impact of cod discard by either the Canadian or the American fleets. Here it was noted that recent US management regulations (i.e., 2000 lb trip limits implemented in August, 1999) may aggravate the potential severity of the discard problem. However, recent USA mesh regulation changes, which corrected earlier discrepancies between minimum fish size and mesh size, would be expected to reduce cod discarding.

The presentation included information on the spatial distributions of landings by Canadian longline and otter trawls for 1998 and 1999. This information was presented in response to the research recommendation made at the 1999 TRAC. The availability of spatial landings data by gear for the period 1994 to 1997 is being investigated.

Resource Status

As recommended in the previous two TRACs (1998 and 1999), the necessity for an aging workshop was again restated this year. It is anticipated that the workshop, originally scheduled for 1999, will take place in Woods Hole in the second or third quarter of 2000.

The assessment noted the need for more length and age samples from the USA commercial fishery for 5Zjm cod. This need was also reported for other stocks on Georges Bank and was presented as a serious concern for developing quality stock assessments. TRAC was unanimous in recommending that the dearth of US samples from the commercial landings be addressed; specifically, *that measures be taken immediately to augment sampling information from the US commercial fishery to be more commensurate with the level of sampling from the Canadian*

commercial fishery.

In the presentation, it was reported that a single tow from the Canadian DFO Spring survey in 2000 accounted for over 50% of the observed increase in mean survey cod numbers per tow. However, removal of this tow did not appreciably change the estimates of stock abundance from the ensuing VPAs; and it was decided not to discount the 2000 survey estimate and to leave it in the assessment data set. (A similar approach was used in the handling of an anomalous 1982 NMFS Spring survey data point and this data point has also been retained in subsequent analyses despite the high residuals it produces.) It was also noted that year effects seemed evident for survey indices, although residuals were reasonably well balanced. Different methodologies have been used in the past to treat specific outliers (including removing the suspicious data point). Standard statistical methodologies for identifying and dealing with outliers, e.g., re-weighting by inverse variance measures, were mentioned; and the TRAC suggested that alternative methods be explored to identify and examine the influence of outliers and to take appropriate action for re-weighting influential points.

Analysis of maturity data from the Canadian 2000 spring survey revealed that 90% of the 2 year old cod sampled in 5Zjm were mature, continuing a trend of increasing proportions of mature 2 year olds in this stock during the late 1990s. Evidence from more limited USA data did not seem to corroborate this trend. It was uncertain as to what this information might be conveying about stock status, and further investigation was recommended to determine (1) the validity of the observation, and (2) implications relative to stock status.

The catchability of young fish in the research vessel surveys was discussed in light of retrospective patterns that showed that these cohorts tended to be underestimated as young of the year (0 Group) and age 1 cod. It was suggested that further investigation of the spatial-temporal dynamics of juvenile cod together with a review of research vessel survey methods may provide insight into why catchability appears to be low and how this may be addressed in future surveys. It was suggested that the annual information collected on fish distribution from spatial fishing locations by gear be augmented with overlays from spatial data on habitat and other existing ecosystem data for the 5Zjm area, including data on sediment bottom maps, and temperature profiles (as, for example, presented in the USA 5Z cod assessment). It was understood that this kind of information may provide insight into potential stock behavior.

The TRAC noted that the Canadian longline research survey would be in its fifth year of operation in 2000. It was suggested that 5 years of data should be the minimum time series available for reliable use as an index of abundance. Preparation and review for the inclusion of this survey in the 2001 assessment is anticipated. It was also suggested that an at-age condition factor (e.g., comparative annual fish "plumpness" or distribution of length and weight for selected ages) be provided for this stock.

Outlook

Although the stock remains above the historical low observed in 1995 and F for older age groups is relatively low, the TRAC expressed considerable concern due to the apparent lack of recent recruitment. Growth of the stock is coming primarily from body growth. Since these observations were similar to those made for the US 5Z cod assessment, the outlook for this stock is consistent with events for Georges Bank as a whole. Consequently, *it was recommended that a more complete treatment of this transboundary cod resource on Georges Bank be investigated by Canadian and US stock assessment scientists and managers to ensure the effective conservation and management of this resource for the benefit of both countries.*

The outlook for the 5Zjm cod stock would be enhanced by the development of longer-term thresholds and targets, such as the threshold of 25,000 t spawning stock biomass now commonly referred to above which probability of improved recruitment appears enhanced. The establishment of limit thresholds on stock size is consistent with a precautionary approach to stock management that would help guide management alternatives. Biological rationale should accompany relevant target and limit thresholds.

The presentation of data on the relative proportions of the 5Zjm cod biomass on the Canadian and the American sides of the Hague Line boundary during research vessel surveys was discussed. It was felt that this measure was a valuable statistic that could be important to future joint management considerations for the stock. It was also noted that such statistics were regularly produced for other Georges Bank stocks (e.g., 5Zjm haddock) and that the vetted methodology used there could likewise be applied to the 5Zjm cod stock.

The TRAC accepted the assessment for eastern Georges Bank cod as presented.

Research Recommendations

- It is recommended that an ageing workshop be held at the earliest opportunity, and definitely during the year 2000.
- It is recommended that the PR be examined temporally, by gear to detect any shifts in the relative contribution by fleet sector.
- It is recommended that TAWG investigate the importance of data outliers and consider alternative methodologies for treating influential data.
- It is recommended that further analysis and review of age of first maturity be undertaken to (1) verify the occurrence of a decline in age of first maturity, and (2) hypothesize causes and implications.

- It is recommended that ecosystem and environmental information be provided to supplement spatial data on cod catch areas by gear.

- It is recommended that data on stock condition factors for selected ages be included in the 2001 stock assessment.

- It is recommended that stock biomass long-term targets and lower limit biomass thresholds be established for this stock based on biological rationale.

- It is recommended that statistics on the relative proportions of the 5Zjm cod stock biomass on the Canadian and American sides of the Hague Line be produced as part of future stock assessments.

Georges Bank (5Z) cod

Working Paper: O'Brien, L. Assessment of the Georges Bank cod stock for 1999. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/B, 10 p, Appendices.

External Reviewer/Rapporteur: Jon Brodziak

Term of Reference:

- Update resource status through 1999 and characterize the variability of estimates of stock size and fishing mortality rates.

The 5Z cod stock assessment was presented by Loretta O'Brien. The comments below summarize the ensuing discussions.

External Reviewer's Comments:

Stock structure is a minor source of uncertainty. Spatial definition of the stock corresponds to the Georges Bank gyre system and continental shelf areas north of Cape Hatteras. Tagging studies document some movement of cod between Browns Bank and Georges Bank but the rate of interchange appears to be low. Development of a spatially explicit model of cod population dynamics would be necessary to account for interchange of cod among areas but data are a severely limiting factor. Given the apparent magnitude of interchange, however, the current approach of assessing Georges Bank cod as a single management unit appears sufficient for evaluating fishery impacts.

Commercial landings constitute the vast majority of fishery removals from this stock. The limited sea sampling information available suggests that discard rates are probably low, on the order of 3-5% by weight. Recreational removals have varied, but appear to be on the order of 3-

12% of commercial landings by weight for 1999. Commercial fishery discards and recreational catches are not included in the VPA due to limited data earlier in the time series (1978-1988). Inclusion of fishery removals due to discards and recreational catches in assessment modeling would be expected to increase estimates of stock biomass and alter age-specific estimates of fishing mortality. It is recommended that a Bayesian approach be explored to explicitly account for uncertainties about the magnitude and composition of discards and recreational catches. Biological sampling of USA catches for length and age distributions should be increased to improve the precision of catch at age estimates.

Abundance indices from NMFS and DFO research surveys on Georges Bank are a minor source of uncertainty for assessment modeling. Survey data from areas south of Georges Bank are excluded because small and highly variable catches of cod have been reported within these low-abundance areas. Indices of mean abundance at age were modeled as being proportional to relative abundance at the beginning of the year on a logarithmic scale. Exclusion of a few unusually large survey catches of cod in historic NMFS research survey indices affects calculated values and is a source of uncertainty. Standardized USA commercial trawl landings per unit effort indices were excluded from the assessment model because of changes in methods of reporting catch and effort in 1994. Overall, standardized survey series are believed to provide adequate and sufficient measures of relative abundance at age for tuning the age-structured sequential population model of Georges Bank cod.

Comparison of assessment results to management targets and thresholds are a source of uncertainty for status evaluation. These targets and thresholds are embodied in a harvest control rule developed to meet requirements of the Sustainable Fisheries Act. The model used to develop the SFA control rule is not age-structured, although the assessment is based on an age-structured model. Thus, translation of results from the age-structured assessment model to the harvest control rule represents a potential source of bias. This may be exacerbated by apparent retrospective patterns in the age-structured analyses (assumptions and treatment of partial recruitment patterns in the retrospective analyses may affect interpretations). In addition, the harvest control rule is deterministic and does not account for uncertainty in estimates of fishing mortality and biomass, as well as inherent variability in population dynamics, e.g. recruitment. As a result, the range of uncertainty from assessment model outputs is not effectively conveyed to managers in the harvest control rule. However, this is a minor source of concern in comparison to effects on the resource when management targets have been exceeded.

TRAC Discussion

The TRAC noted that changes in the composition of commercial landings by fishing gear sector and closures of several productive fishing areas had affected partial recruitment patterns in recent years. Adequacy of sampling intensity of USA fishery catches by area and gear was also discussed and there was a consensus that current biological sampling was limited and minimally adequate. *It is strongly recommended that biological sampling of USA catches, both dockside and at sea, be increased to improve estimates of length and age distribution of fishery removals.*

The TRAC also reviewed survey abundance indices in relation to reliability and variability of assessment results. Some sensitivity of the baseline assessment model to the exclusion of an age-1 abundance parameter in 1999 was noted. The TRAC recommended evaluations of the effects of excluding data south of Georges Bank on NMFS indices and evaluations of the effects of removing outliers.

The TRAC noted a retrospective pattern in the VPA in which spawning biomass was overestimated and fishing mortality was underestimated during a five-year retrospective analysis. The TRAC discussed potential causes of the pattern and also whether it should be accounted for in management advice. It was resolved that the source of the retrospective pattern was unknown and that the pattern was variable but consistent in directionality. Poor catch sampling, underestimates of removals, changes in spatial distribution of the stock, model mis-specification, and changes in stock availability due to closed areas were discussed as potential factors. The TRAC accepted the baseline model and concluded that assessment results were credible, although there was concern about potential bias in management advice due to the retrospective pattern. The TRAC recommended exploring whether the retrospective pattern was due to changes in partial recruitment (e.g. closed fishery areas have altered the spatial pattern of fishing effort, and may have served as refugia for older Georges Bank cod, thereby compromising assumptions being made about the partial recruitment vector).

The TRAC noted that maturity ogives for the 5Z and 5Zjm cod stocks had changed through time and asked whether trends for age-1 through age-3 cod were consistent between the 5Z and 5Zjm management units. It was unknown whether differences in maturation of 5Z and 5Zjm cod observed over time were due to density-dependent effects, measurement errors, or environmental factors. The TRAC recommended further review of maturity ogives and baseline studies of reproductive potential.

Research Recommendations

- It is recommended that effects of the following on NMFS survey indices be determined:
  (1) exclusion of survey data from areas south of Georges Bank; and
  (2) removal of unusually large catches.

- It is recommended that the appropriateness of assuming a flat-topped partial recruitment pattern be re-examined for recent years.

- It is recommended that maturity ogives for 5Z and 5Zjm cod be reviewed and that differences be reconciled, if possible.

Eastern Georges Bank (5Zjm) Haddock

Working Paper: Gavaris, S. and L. Van Eeckhaute. Assessment of haddock on eastern Georges Bank. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/C, 64 p.

External Reviewer/Rapporteur: Heath Stone

Terms of Reference:

- Report on the status of the stocks, updating results for the latest information from fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 2000, evaluate the consequences on exploitation rate in 2000 and on spawning stock biomass (or its proxy) in 2001.
- Estimate the risk that the 2000 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2001 would not achieve a 0%, 10% and 20% increase compared to 2000, for a range of yield quotas in 2000.
- Evaluate additional measures of stock status, and consider their interpretation.
- Report on progress against research recommendations made at the 1999 TRAC.

The assessment was presented by Stratis Gavaris. All recommendations cited in the remit were reported on by the authors.

External Reviewer's Comments:

Generally it was felt that this was a thorough assessment. There has been a very positive response in this stock due to reduced exploitation in response to management actions. The increasing trend in stock biomass has been consistent over the past three years, as confirmed by previous assessments, and the stock appears to be rebuilding fairly quickly with several year classes contributing to the fishery. There are positive signs for the future with a strong 1998 year class (and possibly 1999 year class).

The issue of cod bycatch in this fishery is a major concern because the low cod quota already has the effect of limiting Canadian haddock catches (recently, below the TAC). As the haddock stock continues to rebuild, future TAC's may never be realized because of early closure due to cod bycatch. Although industry has attempted to reduce cod bycatch by fishing in deeper waters along the northern edge of the Bank, cod bycatch continues to be a major issue.

It was pointed out that there has been no observer sampling of groundfish discards from the Canadian offshore scallop fishery on Georges Bank in recent years. Canadian scallop vessels are no longer required to carry observers because they now carry monitoring gear that continuously records their position for use by DFO Enforcement. Although haddock discards in the scallop fishery are likely small, this may not be the case for other species like yellowtail flounder. The TRAC recommended that there be some observer coverage of the Canadian scallop fleet to re-evaluate the groundfish discard issue.

It was noted that population abundance estimates show large relative error and substantial bias at ages 1 and 2, while relative error for older ages is 30% and bias is small. It was asked if this might be a result of survey catch rates not tracking relative abundance of ages 1 and 2 correctly. The author indicated that the large bias for these younger age groups occurs because of the low number of survey indices available to represent trends in relative abundance for these ages.

It was suggested that there might be some merit in use of a 10+ group in future assessments for this stock (i.e. for CAA and indices of abundance) since there is a good chance that more fish will survive to older ages under reduced exploitation rates.

TRAC Discussion

The TRAC *recommended increased observer sampling of the Canadian scallop fishery on Georges Bank and also recommended increased observer coverage in the USA bottom trawl and offshore scallop fisheries.*

It was suggested that "condition" or "plumpness at age" for haddock be evaluated for trends that might indicate changes in the health of the stock. Although changes in the "age specific condition" of eastern Georges Bank haddock have not recently been evaluated, there has been no cause for concern over the past few years. Variability in haddock weight at age in the landings appears to be small and is likely influenced by gear selectivity, although in the past there have been some year classes which have grown more quickly than adjacent ones. In response to a research recommendation, the author agreed to examine individual condition factors at age to see if there have been any changes in plumpness over time.

The TRAC discussed using bottom temperature data and information on substrate composition (surficial geology) to characterize haddock distribution on Georges Bank and indicated the potential utility of a "snapshot" of haddock distribution based on survey data overlaid by information on substrate type and bottom temperature. Changes in distribution over time would be informative, but may be difficult to evaluate because of data limitations. It was pointed out that recent GLOBEC research might shed some light on the current situation of haddock survival being higher than cod.

The issue of discards in the haddock fishery was discussed and several comments were made on how to deal with this problem in future assessments. It was pointed out that there have been

several episodes of haddock discarding in the past and that estimates of discards were incorporated into the catch at age in such cases. Episodic discarding is more important than small scale continuous discarding because of its influence on the estimated catches of some age classes. Sensitivity analyses have shown that incorporating a "constant" level of discards simply produces a "scaling" effect.

An inquiry was made about the age specific fecundity of haddock and how important it might be when there is an expanded number of age groups. The author reported that past research has shown that haddock fecundity is proportional to weight and that the expanded age structure of the current period could have something to do with the good recruitment we are seeing at present.

The TRAC accepted the eastern Georges Bank haddock assessment as presented.

Research Recommendations

- It is recommended that "condition" or "plumpness at age" for haddock be evaluated for trends that might indicate changes in the health of the stock.

- It is recommended that a framework for addressing discard estimation (i.e. methods to examine discard problems) be discussed by the TAWG.

Georges Bank (5Z) Haddock

Working Paper: Brown, R. U.S. stock assessment of 5Z Georges Bank haddock, 1931-1999. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/D, 66 p, Appendices.

External Reviewer/Rapporteur: Mike Fogarty

Term of Reference:

- Update resource status through 1999 and characterize the variability of estimates of stock size and fishing mortality rates.

The Georges Bank haddock assessment was presented by Russell Brown. The ensuing discussion is summarized below.

TRAC Discussion

The assessment indicates an increase in spawning stock biomass and recruitment since 1995. The 1998 and 1999 year classes are estimated to be the largest since the 1975 and 1978 cohorts but are still substantially lower than these earlier year classes. Estimated fishing mortality rates

have declined since 1995 when restrictive management measures were enacted, including year-round closed areas and sharp reductions in days at sea for the U.S. fishery and reductions in TACs for the Canadian fishery. In 1999, liberalized trip limits were implemented in the U.S. (from 2,000 to 5,000 lbs per day; 20-50,000 lbs maximum per trip) and mesh size was increased from 6.0 to 6.5 inches.

The need for increased biological sampling to characterize the size and age composition of the U.S. catch was emphasized. Generally low catch levels of haddock have contributed to poor sampling. It was further noted that the availability of at-sea samples to determine discard rates is limited.

Canadian and USA survey indices provide consistent estimates of year class strength and stock abundance although recent Canadian survey data indicate higher levels of abundance for the 1998 and 1999 year classes than do USA survey indices. Estimates of relative abundance for these year classes from the Spring 2000 Canadian survey are affected by a large tow. Alternative methods of dealing with this tow in deriving abundance estimates were discussed.

Examination of the VPA runs for haddock revealed no residual patterns. An evaluation of potential retrospective patterns in estimates of fishing mortality and population size did not reveal any consistent biases.

Clarification of several key points in the assessment was requested. Further information on the basis for the harvest control rule was requested; and it was explained that it was a proxy control rule based on a subjective evaluation of the level of spawning stock biomass required to provide increased probability of larger year classes. Fishing mortality constraints were based on the $F_{0.1}$ reference point. TRAC also asked whether any attempt had been made to develop a production model for haddock and whether the possibility of a regime shift in haddock production had been considered. The presenter responded that no recent attempt has been made to apply surplus production models to this stock; although earlier work employing an age-structured production model (Shepherd's model) is available.

A question was also raised as to which (recent) years had been adjusted for discards. It was reported that adjustments in 1998 were found to be necessary and incorporated into the catch at age matrix. In 1999, however, no adjustment for discards was deemed necessary. Liberalized trip limits in 1999 were thought to underlie an apparent lack of discarding in that year.

It was noted that most of the recent USA landings from this stock have come from the western part of the bank. Discussion ensued concerning the possible substock structure of Georges Bank haddock and the possibility of western (Great South Channel) and eastern (Northeast Peak) components. It was indicated that there are distinct spawning groups and that the eastern spawning contingent may be as much as 4-5 years further advanced in the recovery process. However, it was also noted that the larval dispersal patterns are such that the mixing of progeny from the different spawning groups is likely.

Dramatic changes in the mean weights at age for haddock have been observed coincident with the sharp declines in population size in the late 1960s. The potential role of changes in gear selectivity in this observed pattern cannot be ignored, however. In the early years of the mobile gear fishery, relatively small mesh sizes were employed; and mesh size has been increased by regulation in the later part of the time series. It was concluded, however, that an actual change in growth can be observed from changes in mean weights for ages 6 and older which would be expected to be relatively unaffected by gear selectivity.

It was suggested that the estimate of B_{MSY} should be re-evaluated because of the accrual of new information since the last estimate was made. The application of age-structured models for this purpose was recommended using the newest information.

Despite the increase in biomass in recent years under more restrictive management, the overall levels of spawning stock size and recruitment remain substantially below those observed during the period 1931-1961 when relatively stable yield and population levels were observed. The question of whether haddock has remained in a lower stable state since the late 1960s was discussed. It was observed that the recent increase in recruitment (1998 and 1999 cohorts) could be critical in moving the stock to a higher production level if properly protected.

The group noted that a strong statement on the need for enhanced biological sampling of the U.S. commercial fishery is critical and that the problem should be brought to the attention of managers and administrators. It was further noted that a consistent method of treating discards in the construction of the catch-at-age matrix should be pursued.

The assessment was accepted by TRAC. The accepted baseline run included the Canadian tuning index with the large tow. It was noted that the estimates of age-specific abundance and fishing mortality for the most recent years are sensitive to inclusion of this index and that population sizes may therefore be overestimated.

Research Recommendations:

- It is recommended that options be examined for transformations for survey data to reduce the influence of large tows.
- It is recommended that use of weighted least squares in the ADAPT runs be examined; e.g. by the inverse of the variance of the tuning indices in each year.
- It is recommended that further studies be made on reproductive biology and on factors affecting changes in maturation schedules.
- It is recommended that efforts be made to develop consistent methods of treating discards in construction of the catch-at-age matrix.

Georges Bank (5Zjmnh/5Z) Yellowtail Flounder

Working Paper: Cadrin, S. X., J. D. Neilson, S. Gavaris, and P. Perley. Stock assessment of Georges Bank yellowtail flounder stock for 2000. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/E, 22 p, Appendices.

External Reviewer/Rapporteur: Lou Van Eeckhaute

Terms of Reference:

- Report on the status of the stocks, updating results for the latest information from fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 2000, evaluate the consequences on exploitation rate in 2000 and on spawning stock biomass (or its proxy) in 2001.
- Estimate the risk that the 2000 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2001 would not achieve a 0%, 10% and 20% increase compared to 2000, for a range of yield quotas in 2000.
- Evaluate additional measures of stock status, and consider their interpretation.
- Report on progress against research recommendations made at the 1999 TRAC.

The assessment was presented by John Neilson and Steve Cadrin. The ensuing discussion is summarized below.

External Reviewer's Comments:

This assessment suffers from some serious problems with the input data. This has been recognized by the authors and they have addressed the problem to some extent by corroborating results of the VPA calibration by using a production model. The fairly similar results are reassuring but there are many unanswered questions that warrant a cautious interpretation.

This seems to be a very resilient stock in that it has experienced very high fishing mortality rates for many years; but it has responded to greatly reduced Fs by rebounding quickly and dramatically. There is little doubt that the stock has increased substantially in recent years.

The most significant problem involves low sampling levels in USA fishery. The effects of this can be seen in the present assessment data in a lack of consistency in the catch at age and survey indices. Cohorts do not seem to be tracked very well, and some very strange patterns can be seen

in these data. The problem is exacerbated by the dimorphic growth of yellowtail between sexes; sexed age-length keys (alks) are not available for recent years which further clouds cohort signals. However it is difficult to assess any possible ageing problems because of the bigger sampling problem. It would be helpful to see results of any ageing tests that were done by the NMFS age reader.

This stock may be composed of sub-populations, indicating that it may not be appropriate to "borrow" sampling data from other areas. Higher levels of sampling would allow investigation of the sub-population question. This is an important aspect to resolve so as not to overexploit individual sub-populations if they do exist. Another significant shortcoming is the lack of a Canadian ageing program.

The possibility for development of a CPUE index from the Canadian fishery which could be used to calibrate VPAs should be considered, together with development of a CPUE index from the USA commercial fishery to enable comparison of Canadian and USA fishery CPUE rates. Comments on other stock attributes should also be included in future assessments. One might also consider using survey weights at age for beginning year population biomass calculations instead of back calculating from mid-year weights. In addition, bycatch from the Canadian scallop fishery may be significant due to the recent increase in yellowtail flounder biomass. Determination of yellowtail bycatch by the Canadian scallop fishery is warranted.

TRAC Discussion

Separate alks for males and females may have been used in the past but not since at least 1973. A sexed commercial time series for the USA fishery is available. Increased presence of older fish may warrant splitting of alks, but this would result in further dilution of samples. It was recommended that USA data be characterized with alks disaggregated by sex if feasible, e.g. by applying aggregated alks to small fish and using disaggregated keys for larger fish. (Note: It was recommended at the 1998 TRAC that the implications of doing sex-aggregated vs. sex-separated SPAs be investigated with simulation.)

The certainty of the drop in F was questioned. It was observed that the retrospective pattern indicated that there was uncertainty and also, that biomass-weighted F has not gone down. Examination of trends in F by age indicate no change for age 3 fish and that most of the decline is accounted for by age 4 estimates.

With respect to survey data, it was questioned whether maturity observations are taken for yellowtail on Canadian surveys, and the response was that because of the timing of the Canadian survey (before the yellowtail spawning season) maturity observations are not done. It was also noted that the USA survey has few sets in the yellowtail area, resulting in very variable abundance estimates.

Statistical problems were encountered in finding a stable solution to the production model

imposing considerable uncertainty in estimates of MSY reference points. Before changing management strategies, a comprehensive re-examination of MSY reference points is advisable. It was recommended that the TAWG and TRAC look at reference points with respect to MSY, including other methods of estimating MSY, and include in the advisory document the potential of having reached MSY and the concerns about it.

The TRAC questioned whether the current age structure is reflective of a healthy population. It was pointed out that there is currently no basis for determining what an optimal age distribution for a rebuilt stock should look like. It may be valuable to attempt to determine what an "optimal age structure" for this and other stocks should be.

The TRAC accepted the assessment for Georges Bank yellowtail as presented.

Research recommendations:

- It is recommended that USA data be characterized with alks disaggregated by sex if feasible, e.g. by applying aggregated alks to small fish and using disaggregated keys for larger fish.
- It is recommended that the TAWG and TRAC further evaluate biological reference points with particular reference to MSY, including other methods of estimating MSY.
- It is recommended that other biological attributes of the stock be included in future assessments, to help characterize stock status.

Appendix I. List of Participants

PARTICIPANT	*AFFILIATION/ADDRESS*	*TELEPHONE/FAX*	*E-MAIL*
William Amaru	NEFMC South Orleans, MA USA	508-255-0619 508-255-0188	amaru@massed.net
Andrew Applegate	NEFMC Newburyport, MA USA	978-465-0492 978-465-3116	applegate@nefmc.org
Jon Brodziak	NMFS, NEFSC Woods Hole, MA USA	508-495-2365 508-495-2393	Jon.Brodziak@noaa.gov
Russell Brown	NMFS, NEFSC Woods Hole, MA USA	508-495-2380 508-495-2393	Russell.Brown@noaa.gov
Steve Cadrin	NMFS, NEFSC Woods Hole, MA USA	508-495-2335 508-495-2393	Steven.Cadrin@noaa.gov
Steve Clark	NMFS, NEFSC Woods Hole, MA USA	508-495-2312 508-495-2258	Steve.H.Clark@noaa.gov
Claude d'Entremont	Industry Representative (Mobile Gear) Canada	902-762-2522 902-762-3464	inshore@auracom.com
Jean Guy d'Entremont	FRCC Canada	902-762-2522 902-762-3464	jean.guy@ns.sympatico.ca
Michael Fogarty	NMFS, NEFSC Woods Hole, MA USA	508-495-2386 508-495-2258	Michael.Fogarty@noaa.gov
Stratis Gavaris	DFO, MFD St. Andrews, N.B. Canada	506-529-5912 506-529-5862	GavarisS@mar.dfo-mpo.gc.ca
Jon Hansen	DFO, MFD Dartmouth, N.S. Canada	902-426-9046 902-426-9683	HansenJ@dfo-mpo-ca
Bette Hatt	DFO, MFD St. Andrews, N.B. Canada	506-529-5920 506-529-5862	hattB@mar.dfo-mpo.gc.ca
Joe Hunt	DFO, MFD St. Andrews, N.B. Canada	506-529-5893 506-529-5862	HuntJJ@mar.dfo-mpo.gc.ca
Dan Lane	University of Ottawa Ottawa, Ontario Canada	613-998-4070	laneDA@dfo-mpo.gc.ca/ Dlane@uottawa.ca
David Lincoln	Mass Fishermen's Partnership Gloucester, MA USA	508-771-7544	dlincoln@cbwl.org
Ralph Mayo	NMFS, NEFSC Woods Hole, MA USA	508-495-2310 508-495-2393	Ralph.Mayo@noaa.gov
Steven Murawski	NMFS, NEFSC Woods Hole, MA USA	508-495-2303 508-495-2393	Steve.Murawski@noaa.gov

PARTICIPANT	*AFFILIATION/ADDRESS*	*TELEPHONE/FAX*	*E-MAIL*
John Neilson	DFO, MFD St. Andrews, N.B. Canada	506-529-5913 506-529-5862	neilsonj@mar.dfo-mpo.gc.ca
Tim Nickerson	Industry Representative (Fixed Gear) Canada	902-768-2535 902-768-2265	
Loretta O'Brien	NMFS, NEFSC Woods Hole, MA USA	508-495-2273 508-495-2393	Loretta.O'Brien@noaa.gov
David Pierce	MA DMF Boston, MA USA	617-626-1532 617-626-1509	David.Pierce@state.ma.us
Travis Shepherd	University of New Brunswick/DFO St. Andrews, N.B. Canada	506-648-5794	ShepherdT@mar.dfo-mpo.gc.ca
Russell Sherman	Gulf of Maine Fishermen's Alliance Gloucester, MA USA	978-281-4651	Captain@gis.net
Terry Smith	NMFS, NEFSC Woods Hole, MA USA	508-495-2230 508-495-2258	Terry.Smith@noaa.gov
Matt Stommel	Stommel Fisheries Woods Hole, MA USA	508-540-8310	
Katherine Sosebee	NMFS, NEFSC Woods Hole, MA USA	508-495-2372 508-495-2393	Katherine.Sosebee@noaa.gov
Wayne Stobo	DFO, MFD Dartmouth, N.S. Canada	902-426-3316 902-426-1506	StoboW@mar.dfo-mpo.gc.ca
Heath Stone	DFO, MFD St. Andrews, N.B. Canada	506-529-5880 506-529-5862	StoneH@mar.dfo-mpo.gc.ca
Mark Terceiro	NMFS, NEFSC Woods Hole, MA USA	508-495-2203 508-495-2393	Mark.Terceiro@noaa.gov
Lou Van Eeckhaute	DFO, MFD St. Andrews, N. B. Canada	506-529-5938 506-529-5862	van-eeckhauteL@mar.dfo-mpo.gc.ca
Evan Walters	Industry Representative Canada	902-637-3276 902-637-3270	stifa@klis.com
Maureen Yeadon	FRCC Canada	902-852-3005 902-852-2756	myeadon@ns.sympatico.ca

Appendix II. Terms of Reference

TRANSBOUNDARY RESOURCE ASSESSMENT COMMITTEE
THIRD MEETING
WOODS HOLE, MASSACHUSETTS
APRIL 26-28, 2000

TERMS OF REFERENCE

Eastern Georges Bank Cod (5Zjm)

Eastern Georges Bank Haddock (5Zjm)

Georges Bank Yellowtail (5Zjmnh)

Report on the status of the stocks, updating results for the latest information from fisheries and research surveys and characterize the uncertainty of estimates.

For a range of yield quotas in 2000, evaluate the consequences on exploitation rate in 2000 and on spawning stock biomass (or its proxy) in 2001.

Estimate the risk that the 2000 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2001 would not achieve a 0%, 10% and 20% increase compared to 2000, for a range of yield quotas in 2000.

Evaluate additional measures of stock status, and consider their interpretation.

Report on progress against research recommendations made at the 1999 TRAC.

Georges Bank Cod (5Z)

Georges Bank Haddock (5Z)

Update resource status through 1999 and characterize the variability of estimates of stock size and fishing mortality rates.

Appendix III. Agenda

TRANSBOUNDARY RESOURCE ASSESSMENT COMMITTEE*
THIRD MEETING
WOODS HOLE, MASSACHUSETTS
APRIL 26-28, 2000

AGENDA

April 26th - Wednesday

0830 - 0900	Welcome and Introduction
0900 - 0930	TAWG Report
0930 - 1200	Cod 5Zjm
1200 - 1300	Lunch
1300 - 1530	Cod 5Z
1530 - 1700	Haddock 5Zjm

April 27th - Thursday

0830 - 0930	Haddock 5Zjm (contd)
0930 - 1200	Haddock 5Z
1200 - 1300	Lunch
1300 - 1530	Yellowtail 5Z
1530 - 1700	Report Preparation and Review

April 28th - Friday

0830 - 1200	Report Preparation and Review
1200 - 1300	Lunch
1300 - ?	Report Preparation and Review

Appendix IV. Description of the TRAC Process

(Modified from a version printed in "Proceedings of the Transboundary Resources Assessment Committee" 20-24 April 1998, St.Andrew's, New Brunswick, Canada; Canadian Stock Assessment Proceedings Series 98/10)

Introduction

Since the termination of ICNAF in 1977, Canada and the USA have independently developed peer review processes for their stock assessments. In Canada, in late 1992, the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) was disbanded and the Regional Advisory Process (RAP) put in its place. RAP in the Maritimes Region currently provides advice on about 120 marine and freshwater finfish, shellfish and marine plant resources in the DFO Maritimes Region. In the Northeast Region of the National Marine Fisheries Service (NMFS), the Stock Assessment Workshop (SAW) series was initiated in 1985. The SAW process currently provides advice on about 44 marine finfish and shellfish resources in the Northeast Region of NMFS.

Collaboration between Canada and the USA on stock assessments and related research has been strong. Regular scientific meetings are held to co-ordinate joint research programs and facilitate inter-lab communication. Protocols for routine data exchange, particularly commercial and survey, have been established and joint work on assessment related issues is common. Finally, participation in each other's peer review process is routine.

The 1996 Canada/USA Scientific Discussions noted that it would be desirable to conduct joint assessments of the Georges Bank groundfish stocks during the 1997 assessment cycle. Thus in April 1997, scientists from Canada and the USA combined efforts to prepare assessments of Georges Bank cod, haddock, and yellowtail flounder. The peer review of these assessments was subsequently conducted first by RAP in Canada and then by the SAW Stock Assessment Review Committee (SARC) in the USA. Upon completion of the 1997 process, it was evident that there would be efficiencies realized by eliminating the duplication in the peer review process. This would also ensure that RAP and SARC would not produce divergent and inconsistent status reports on these stocks.

In the fall of 1997, discussions were initiated between the two countries to define a joint peer review process. The Transboundary Resources Assessment Committee, or TRAC, is the result of these discussions. The TRAC process is outlined in the following Sections.

The Joint Peer Review Process

There has been close interaction between Canada and the USA on 5Z cod, haddock, and yellowtail flounder. To date, these stocks have been the principal focus of the TRAC process, although other "transboundary" resources in the Georges Bank - Gulf of Maine region may be

considered in future years.

Structure of the Peer Review

Transboundary Assessment Working Group

The Transboundary Assessment Working Group (TAWG) includes Canadian and USA scientists with a range of backgrounds and thus is multidisciplinary in nature. As well, industry participation from both countries is encouraged. Its mandate is to:

- analyze pertinent assessment information and produce stock assessments on identified stocks;
- formulate research recommendations which will lead to long-term improvements in the assessments.

Meetings of the TAWG are arranged on a mutually agreed basis by both countries. The TAWG is co-chaired by a stock assessment scientist from each country. Annual meetings are held alternately in Canada and the USA to prepare assessments and to address other issues as requested by the TRAC.

Transboundary Resources Assessment Committee

The Transboundary Resources Assessment Committee (TRAC) has been established to peer review stock assessments produced by the TAWG. The TRAC is distinct from RAP and SARC. The Committee is co-chaired by representatives from Canada and the USA who are responsible for all logistical arrangements associated with TRAC meetings (e.g., dates, venue, participation). As for the TAWG, the TRAC alternates its venue between Canada and the USA. The TRAC is responsible for producing final, approved assessments and supporting documentation on the status of transboundary resources.

Participation is by invitation and includes stock assessment scientists, fisheries managers, and industry representatives from both countries. While there are currently no limitations on numbers of participants it is likely that 10-15 participants from both countries will attend future meetings.

Management Advice and Public Meetings

Once the TRAC review process has completed its deliberations, the results may be used by either country for fisheries management purposes as appropriate e.g., preparation of management advice in Canada by the Fisheries Resource Conservation Council (FRCC) and in the USA by the Multispecies Monitoring Committee (MMC) of the New England Fishery Manageemnt Council (NEFMC). Each country may conduct independent consultations with clients or disseminate the information to the public, informing the other side as required.

Stock Status/Advisory Documents

The purpose of the joint Canada/USA stock assessment process for transboundary resources is only to produce and peer review assessments of stocks of mutual interest and not to prepare management advice. The assessment results from this joint process will be used by each country for their respective fisheries management purposes. The document series currently employed by each country (i.e., the DFO Stock Status Report series in Canada and the SAW Advisory Report on Stock Status format in the USA) will be used. In addition, more comprehensive research reports will be produced for the Canadian Research Document Series under the auspices of the Canadian Stock Assessment Secretariat and the USA NEFSC Reference Document series.

Appendix V. List of Working Papers

Brown, R. U.S. stock assessment of 5Z Georges Bank haddock, 1931-1999. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/D, 66 p, Appendices.

Cadrin, S. X., J. D. Neilson, S. Gavaris, and P. Perley. Stock assessment of Georges Bank yellowtail flounder stock for 2000. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/E, 22 p, Appendices.

Gavaris, S. and L. Van Eeckhaute. Assessment of haddock on eastern Georges Bank. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/C, 64 p.

Hunt, J.J. and B. Hatt. Population status of eastern Georges Bank cod (Unit Areas 5Zj,m) for 1978-2000. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/A, 39 p.

O'Brien, L. Assessment of the Georges Bank cod stock for 1999. Transboundary Resources Assessment Committee, Third Meeting, Working Paper 2000/B, 10 p, Appendices.

Appendix VI. Report of the Transboundary Assessment Working Group Meeting

Transboundary Assessment Working Group
Meeting: 3 - 5 April 2000
Biological Station
St. Andrews, NB

Report

Points of Concern

* Low sampling intensity for the USA haddock fishery is compromising ability to characterize catch at age and will have an impact on the assessment results.
* Age composition for the commercial catch of haddock acknowledges potential differences in growth between east and west. This might be investigated further by examination of age compositions of survey indices but this might be compromised by limited age determinations.
* One tow during the DFO 2000 survey caught large quantities of haddock (primarily of the 1998 and 1999 year classes) in an area where haddock are not normally seen. Because of the large area of the stratum, the low sampling intensity in this stratum and the magnitude of the catch, this tow may impact results unduly. The sensitivity of assessment results to this observation should be considered.
* Low sampling intensity for the USA cod fishery, particularly for the large market category, is compromising ability to characterize the representation of older cod in the catch and will impact population estimates for older cod.
* Indices for cod at age 1 seem particularly variable. The impact on assessment results of excluding these indices should be evaluated.
* One tow during the DFO 2000 survey caught large quantities of cod. This tow occurred in an area where cod are normally seen. The sensitivity of assessment results to this observation should be considered.
* Low sampling intensity for the USA yellowtail fishery required pooling of sexes by half year and is compromising ability to characterize the catch at age. Variations in average size at age may be an artifact of low sampling intensity.
* Lack of an age determination program for the Canadian fishery samples and the DFO survey has required "borrowing". There are concerns that small scale spatial differences could compromise this practice thereby invalidating the age compositions for the Canadian fishery and the DFO survey. Further, disaggregating by sex may reduce sampling levels to unacceptably low levels.
* Exclusion of the age 1 DFO survey index for yellowtail may not be warranted given the large partial variance for other age 1 indices. Further insight could be gained by exploring sensitivity analyses including the age 1 DFO survey index, with and without weighting of indices.
* Absence of sea-sampling from the Canadian scallop fishery precludes evaluation of potential yellowtail by-catch.

Projection Guidelines

* For short term projections, catch and stock weights at age, maturity ogives and partial recruitment to the fishery should be averaged over a suitable recent period of stable patterns if there are no trends over time. If trends are detected, suitable measures to reflect the most recent patterns should be applied.
* For short term projections, recruitment should be based on draws from the most recent years with similar SSB or from the entire time period if an SSB threshold is not evident.
* Long term projections present difficult challenges and conclusions drawn from them can be highly dependent on assumptions which are difficult to support. Equally feasible models with alternative assumptions may yield contradictory results. This type of uncertainty due to choice of assumptions and models is not captured through the statistical risk. We consider that long term projections are most useful for exploration of alternative harvest strategies in terms of relative performance, evaluated across the range of models with alternative assumptions and hypotheses. The utility of long term projections for establishing explicit annual measures to achieve rebuilding is less certain. If long term projections are undertaken, particular care should be given to the impact of assumptions about stationary growth, maturity and environmental dynamics but particularly to the generation of forecast recruits and the linkage to spawning stock biomass.
* Great care should be used regarding the incorporation of fishery or survey information available between the completion of 2000 stock assessments and generation of projection information. The TAWG supports use of landings information to project for fishery removals during the current year (2000). The TAWG cautions against the use of research survey information in any quantitative way due to uncertainties that often arise in relation to interpretation of these indices (e.g., large tows, age length keys).

Participants

Russell Brown
Steve Cadrin
Don Clark
Steve Correia
Stratis Gavaris (Co-Chair)
Bette Hatt
Joe Hunt
John Neilson
Loretta O'Brien (Co-Chair)
Stacy Paul
Peter Perley
Heath Stone
Lou Van Eeckhaute

Appendix VII- Minutes of Science and Industry Meeting on Georges Bank Groundfish

Minutes of
Science and Industry Meeting on Georges Bank Groundfish
at the Grand Hotel, Yarmouth
Mar. 27, 2000

Participants: See list below.

5Zjhmn Yellowtail Flounder

* Industry commented that some fishermen used a regular net in 1999 instead of the specially rigged flounder nets used in previous years. The specially rigged flounder nets are better at catching flounder, possibly catching twice that of a regular net, so catch rates for 1999 would be higher if all boats had used the flounder gear. Catch rates were so good in 1999 that the flounder gear was not needed. Also, fewer small flounder are caught with the regular gear. The regular gear has a bigger gap between the bottom and the net than the flounder gear.

--> It was noted that catch rate is not used as an index in the assessment.

* Industry inquired as to whether there was any information from the Canadian scallop fishery on the amount of yellowtail caught?

--> The scallop fishery is legislated to discard groundfish except monkfish and there was no observer coverage to record those discards. Most of the fleet fishes in the northern part of the bank, away from the main yellowtail grounds.

5Zjm Haddock

* Industry asked what environmental conditions were contributing to good haddock recruitment?

-->No linkage between environmental factors and recruitment has been determined but the increased spawning biomass should be a contributing factor to the recent good recruitment seen for this stock.

* Industry was concerned about the omission of the large haddock tow from the index and wondered why it was not included.

--> This tow was in a stratum which has not been included in the index in the past. The tow was taken in a deep stratum where haddock are not typically found. Leaving this stratum out gives a less variable signal. The tow in question consisted of mostly ages 1 and 2 haddock so there would not be a large affect on the assessment by leaving them out as they will not be recruited to the fishery in 2000. However, this tow is a positive indicator for the size of the 1998 and 1999 year classes.

* Industry commented that the 3+ biomass should be above the 40,000 t level where better recruitment could be expected as observed from the recruitment/spawning stock biomass patterns.

-->with 3+ biomass in the upper zone of the pattern we should expect more consistent recruitment, especially when the age structure is represented by more year classes.
* Industry commented on the concerns by science over low catches near the end of the year. They stated that most of the haddock quota had been caught earlier. There were still good signs of haddock at the end of the year but most boats were looking for cod at that time.
* Industry stated that caution should be used when using certain indicators of abundance. For example, "species sought" is not necessarily what is actually caught.

5Zjm Cod
* Industry commented on the age classes being caught by longline survey gear and the RV survey gear in that no commercial gear is catching 2 year old fish so there would be an consistency between the age structure seen from these 2 sources.
* Some industry members showed confusion about how the survey biomass estimate was used.
-->Catch at age gives an absolute estimate, not the survey. The survey is used as a relative index or trend which is proportional to the absolute estimate from the catch at age.
* Industry observed that the survey underestimates the younger ages as numbers caught of a year class increases from about ages 1 to 3 and then starts to decrease.
-->It was acknowledged that survey results show that catchability increases to about age 3. This should not compromise the analysis as age specific catchability is allowed for.
* Industry was not as concerned with the low survey estimates of cod recruitment as they would be for haddock since the survey seems to underestimate the number of cod at younger ages.
--> It was pointed out, however, that the survey estimates are lower than earlier recruitment signs from the survey and that the survey, at best, is probably underestimating a small number.
* Fixed gear sector were concerned that the estimate of 3+ biomass for haddock is greater than for cod but fixed gear regularly catch more cod than haddock which makes fishermen think there is more cod than haddock. Have been told it is the higher catchability of fixed gear for cod but the RV survey could have a higher catchability for haddock than cod thereby giving lower estimates of cod than are warranted. For example, the RV survey typically does not fish well on hard (rough) bottom which is where the cod are concentrated.
Noted that RV catchability for cod may be lower but the important point is that the catchability is constant over years and sampling is representative.
* Industry commented that the fixed gear survey sets were moved in 1999 away from the cod areas they used the year before. They would not have chosen to set on the coordinates they were given in 1999 and don't think the spots should have been moved.
-->A consistent protocol needs to be developed for the fixed gear survey.
* Fishermen feel cod biomass is higher than what was presented.
--> Outlook is more optimistic than previous years.

Participants:

NAME	AFFILIATION	TELEPHONE NO.
Brian Giroux	SFMGFA	902-742-6732
Aldric D'Eon	Inshore Fisheries Fisherman	902-762-3400
Claude d'Entremont	Inshore Fisheries Ltd.	902-762-2522
Martin d'Entremont	Fisherman	902-762-3083
Paul d'Entremont	Fisherman	902-762-2618
Tim Nickerson	SFIFA	902-768-2535
Evan Walters	SFIFA	902-637-3276
Waldon Smith	SCFGQG	902-768-2076
Klaus Sonnenberg	GMFA	506-662-8481
Frank d'Entremont	Pubnico Ledge Fisheries	Fax 762-2965
B. d'Entremont	Acadian Fisheries	902-762-2700
Ronald Wolkins	SWFRA	902-745-2632
Michael Oconnor	NSP	902-634-5200
Peter Van Buskirk	SCGGAssoc.	902-875-2213
Clary Reardon	Nova Scotia Department of Fisheries	902-424-0349
Howard d'Entremont	Little Island Fisheries	
Troy Waybuf	SFIFA	
George Rennehan	NSFG 45-65'	Fax 875-1573

NAME	AFFILIATION	TELEPHONE NO.
Geraldine Dedrick	SCFGQG <45'	Fax 875-4236
Pamela Decker	SCCFA	Fax 656-2006
Kevin Perry		
John Neilson	DFO, St. Andrews Biological Station	506-529-5913
Stratis Gavaris	" "	506-529-5912
Joe Hunt	" "	506-529-5893
Bette Hatt	" "	506-529-5920
Lou Van Eeckhaute	" "	506-529-5938
Emilia Williams	DFO, Port Sampler	

Prepared by: L. Van Eeckhaute
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