Northeast Fisheries Science Center Reference Document 04-05

Proceedings of the Seventh Meeting of the Transboundary Resources Assessment Committee (TRAC), Woods Hole, Massachusetts, May 27-29, 2003

William J. Overholtz,

TRAC Chairman

February 2004

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Abstract

The seventh Transboundary Resources Assessment Committee (TRAC) meeting was held at the Northeast Fisheries Science Center, Woods Hole Laboratory in Woods Hole, MA, USA during May 27-29, 2003. Updated assessments for Eastern Georges Bank cod and haddock and Georges Bank yellowtail flounder were presented and reviewed during the meeting. These discussions produced Transboundary Status Reports (TSRs) for Eastern Georges Bank cod, haddock and Georges Bank yellowtail flounder to be used by the Transboundary Management Guidance Committee (TMGC) in developing advice for the management of these resources. This was the first attempt to produce a stock status document that combined both the Canadian Stock Status Report (SSR) and the US Northeast Regional Advisory Report on Stock Status into a single document. Technical issues related to the assessments were discussed throughout the meeting and several research recommendations were advanced.

Introduction

The seventh meeting of the Transboundary Resources Assessment Committee (TRAC) was held in Woods Hole, MA during May 27-29, 2003. The meeting was attended by 19 scientists and industry representatives involved in fishery management (Appendix I) and was chaired by Dr. W.J. Overholtz (NMFS, USA). Updated assessments for Eastern Georges Bank cod and haddock and Georges Bank yellowtail flounder were reviewed at the meeting. Transboundary Status Reports (TSR) from the meeting will provide information to inform the process for setting quotas and shares (US and Canada) for the 2004 fishing year. Terms of reference, and the agenda for the meeting are presented in Appendices II and III. Pre-assessment consultations with Canadian stakeholders were held in Yarmouth, Nova Scotia on 28 April 2003 (Appendix IV).

All participants introduced themselves and identified their goals for the meeting. The meeting specifics were then outlined by the Chair including the agenda, terms of reference, and expected products. It was agreed that the TRAC would produce a Proceedings report from the meeting and a separate TSR report for each stock. In the past, Canada has produced Stock Status Reports (SSR) and the USA has produced Northeast Regional Advisory Reports on Stock Status, each report independently presenting scientific advice for management of the transboundary groundfish resources in the Georges Bank/Gulf of Maine region.

The objective of the seventh TRAC was to produce a single document that would be useful for the management processes in both countries. Under the direction of the Transboundary Management Guidance Committee (TMGC), the TRAC produced a Transboundary Status Report (TSR) that contains the requisite scientific information for the TMGC to develop annual quota guidance for the Eastern Georges Bank cod and haddock stocks and for the Georges Bank yellowtail flounder stock.

Five working papers were prepared for the meeting (Appendix V). Rapporteurs were assigned to each stock.

Eastern Georges Bank cod	Loretta O'Brien
Eastern Georges Bank haddock	Jon Brodziak
Georges Bank yellowtail flounder	Steve Cadrin

One or more of the authors of the working papers presented the assessment results. This was followed by a thorough discussion of the input data and details for each assessment. Presentations were also made on estimating discards in the cod fishery, yellowtail flounder tagging results, sensitivity analysis of the yellowtail flounder VPA, and the results from an alternate assessment model formulation (ASAP) for yellowtail flounder. In addition, Chris Glass (Manomet Center for Conservation Sciences) provided an overview of a cooperative research study examining temporal/spatial catch patterns of commercial vessels targeting yellowtail flounder in an experimental fishery in Closed Area II on Georges Bank.

TSRs for each species were developed and reviewed, and the meeting was adjourned after all the Terms of Reference had been successfully addressed.

Stock Assessments

Eastern Georges Bank Cod (WPs 2003/11 and 2003/14)

Working Paper:

Hunt, J.J. and B. Hatt. 2003. Population status of eastern Georges Bank cod (unit areas 5Zjm) for 1978-2004. Working Paper 2003/11.

Summary

Information was presented on the Canadian and USA commercial cod fisheries, and DFO and NMFS research survey indices of abundance and population status. A substantial reduction in total landings occurred between 2001 and 2002 due to a 33% decline in Canadian catches (from 2,100 t in 2001 to 1,400 t in 2002). No changes in either the spatial or temporal distribution of the fishery were evident. The 1998 and 1996 year-classes accounted for the bulk of the catches in 2002. Two approaches to estimating possible discards in the Canadian fishery were presented: one approach was associated with estimating the size and age composition of the discards, while the other approach addressed estimating the total amount of discards. Both methods were adopted as candidates for estimating the catch at age associated with annual discards.

Results from the NMFS fall 2002 survey, the NMFS spring 2003 survey and the DFO spring 2003 surveys were presented. The NMFS fall 2002 survey catch per tow index of cod increased markedly from 2001 and is the highest observed value in the time series. The high survey index appeared to be due to a "year effect" from several high catches including one catch of over 600 kg that accounted for about 60% of the overall estimate. The DFO spring 2003 survey index showed a substantial decline from 2002, while the NMFS spring 2003 survey index was similar that in spring 2002. This was the first time that current year NMFS spring survey indices were available for inclusion in the assessment analysis. Recruitment estimates from all three surveys were relatively low.

Based on the 2003 VPA, the adult (age 3+) biomass of Eastern Georges Bank cod declined from the recent high in 2001 (18,000 t) to about 13,000 t at the beginning of 2003. Fishing mortality for fully recruited ages (4-6) ranged between 0.20 and 0.32 during the past five years, above the F_{ref} of 0.18. Assuming a catch in 2003 of about 2,800 t (equal to the 2002 catch), the yield in 2004 at F_{ref} was projected to be 1,300 t and would generate only a small improvement in adult biomass.

TRAC Discussion

Discarding is not technically allowed in the Canadian fishery as all fish are supposed to be landed. However, if more than 15% of the catch (by number) is less than 43 cm (16.9 in), an area can be closed to fishing under the "small fish protocol". In the US fishery, cod below the minimum size of 22 inches (56 cm) cannot be landed or possessed at sea. Prior to August 2002, the US minimum size for cod was 19 in (48 cm). Discarding of cod in the US fishery is primarily due to catches of undersized fish, whereas discarding in the Canadian fishery may occur as a consequence of the disparate TACs for cod and haddock. The current assessment does not account for any discarding, which may affect the perception of stock status.

1. The TRAC recommends that discard estimates in both US and Canadian fisheries be explored for potential inclusion in the next assessment.

Comparison of age-length keys between the two countries revealed some differences. Cod otoliths are prepared for ageing differently in each country. This difference in methodology may contribute to the observed differences in age compositions.

2. The TRAC recommends that age comparisons be done on otoliths prepared with the same methodology. The TRAC also recommends that an ageing workshop on gadids (cod and haddock) be held within the next year.

Comparison of at-sea and on-shore length frequency samples indicate generally good correspondence for otter trawl, longline, and gill net gear, with some notable exceptions. While these exceptions may indicate that discarding is occurring, the differences may also be explained by spatial coverage of observed vs. unobserved trips. Also, when the Canadian longline fishery is directing for haddock, a smaller hook size is employed which may incidentally catch small cod.

The Canadian longline industry survey index for cod has shown an increasing trend since 1999, with a substantial increase in the 2002 weight per tow index. Age 4 is the first fully recruited age in this survey, and the increase in the 2002 index appears to be due to the recruitment pulse of the 1998 year-class.

Mean weights-at-age of cod in the DFO 2003 survey declined for all ages. There has been a noticeable increase of slower growing cod in the Eastern Georges Bank landings (as detected by otoliths) that may be contributing to the decline in mean weight. Differences between beginning year and mid-year mean weights indicate a decrease in weight by mid-year. This has been previously been observed in pollock and is attributed to loss of weight after the spawning season. In the projections, variability in mean weights is accounted for by using average mean weight-at-age values (from the most recent three years).

NMFS spring and fall surveys exhibit relatively high sampling variability compared to the DFO spring survey. However, this does not affect the perception of stock abundance as the calibration of these surveys within the VPA ADAPT framework appears to be suitable.

A retrospective pattern is evident in the current assessment and is similar to that observed in the 2002 assessment. Generally, the more abundant younger ages are underestimated and the older ages are overestimated, although the 1998 year-class in the 2003 assessment is larger than previously estimated. This retrospective pattern needs to be explored further. Possible causes may be related to the US closed areas and the lack of discards in the catch-at-age.

Working paper:

Van Eeckhaute, L., and S. Gavaris. 2003. Determination of Discards of Georges Bank cod by comparing observed and unobserved species compositions. Working Paper 2003/14.

The analysis explored a potential approach for estimating discards in the Canadian fishery. Although misreporting of cod as another species is not a problem with mandatory dockside monitoring, a potential for discarding exists when there is a large difference in the cod and haddock TACs, which occurred during the late 1990s.

Observer coverage of about 10% or greater is needed in the Canadian fishery to obtain a good estimate of the landings multiplier used to derive discarded catch. Multipliers that were less than unity or were 'too large' were not included in this preliminary analysis. Either bootstrapping the model residuals or using the standard error of the landings multiplier to estimate confidence intervals would provide objective criteria to determine the feasibility of each landings multiplier. This would be a one-sided test since a multiplier less than one would indicate no discarding and therefore be excluded from the analysis. Landings multipliers less than unity could, however, provide information on the variability of parameters greater than one.

This method may potentially be applied 'in reverse' to the US 5Z data to determine if estimates of discards agree with the direct estimates of discard derived from the sea sample data.

3. The TRAC recommends future analysis of discarding since 1995 when more limiting cod quotas were implemented in the Canadian fishery.

Eastern Georges Bank Haddock (WP 2003/12)

Working Paper:

Van Eeckhaute, L., S. Gavaris, and J. Brodziak. 2003. Assessment of Haddock on Eastern Georges Bank. Working Paper 2003/12.

Summary

The input data to the assessment were presented and included the Canadian and USA commercial catches, the catch at age matrices, length and age sample summaries, and results of between reader and inter aging precision tests. Canadian CPUE was not used in the calibration but was presented. The three research vessel survey time series used in the calibration were described, and survey data were reviewed on abundance at age, distribution by age group(s), and adult biomass and recruitment trends. The NMFS 2003 spring survey, which is not usually available until the following year's assessment, was available for inclusion in this year's assessment. Overall, the surveys indicated that biomass/abundance increased during the mid 1990s, and that the 2000 year-class is strong but the 2001 and 2002 year-classes are weak. Weights-at-age in both the surveys and commercial fisheries showed no obvious trends. Weights-at-length from the DFO survey, used as a measure of condition, have fluctuated without trend.

The ADAPT formulation in 2003 was much the same as in the 2002 assessment with a few minor changes relating to the inclusion of the 2003 NMFS spring survey (in previous assessments, only the previous year's survey was available) and the estimation of population size at the beginning of April 2003 (assuming a catch of 0 for the 1st quarter), rather than at the beginning of the year (i.e., January 1st). The diagnostics (residual and retrospective patterns, and the standard error and bias on the final year abundance estimates from bootstrap analyses) were deemed to be acceptable.

The assessment results indicated that adult biomass (age 3+) has steadily increased since 1993 and was about 78,000 t at beginning of 2003, which is at the lower range of the 1930 to 1950s historical level when productivity was higher. The fully recruited (4+) F has been below F_{ref}=0.26 since 1995. Several years of improving recruitment and increased survivorship (due, in part, to reduced exploitation) has contributed to the increased abundance of the stock. The stock is now at a level where recruitment success is more likely than when spawning stock biomass was depressed.

A projection to the beginning of 2005, assuming a catch of 8,000 t in 2003, indicated that a combined Canada/US yield of 8,000 t in 2004 resulted a very low risk of exceeding F_{ref}, a negligible chance of biomass decline, and a low risk of the biomass falling below the median 2005 rebuilding biomass of 65,000 t.

TRAC Discussion

Catch Data

Eastern Georges Bank haddock catches in 2002 were dominated by the 1998 year-class at age 4. The 1996 year-class also comprised a substantial fraction of the catch. The expansion of haddock age structure continued in 2002 and an increasing abundance of older age fish was evident in the fishery. Canadian fishery catch-per-unit-effort has increased since 1993.

Canadian fishery length and age sampling in 2002 provided an accurate characterization of the Canadian catch, which accounted for nearly 88% of the total 2002 Eastern Georges Bank haddock catch. Length and age sampling in the USA fishery was much lower than in the Canadian fishery, similar to the pattern in recent years. Sampling intensity of the USA fishery should be increased in the future.

Survey Data

DFO and NMFS research surveys all show a strong 2000 year-class. For example, the catch per tow of haddock in the NMFS autumn 2002 survey was the highest since 1976, with the index dominated by the 2000 year-class. Survey data consistently show that older haddock are now more abundant than in previous years.

Abundance and biomass indices of haddock in the DFO and NMFS autumn surveys show similar trends in recent years. The NMFS spring survey suggests a more moderate increase in haddock biomass.

Canadian survey data show no trends in condition index (weight-at-length) during recent years. Haddock growth rates appear stable.

Assessment Model

An analytical assessment of Eastern Georges Bank haddock was conducted using a sequential population analysis model. The model formulation was the same as in the 2002 assessment, except that NMFS 2003 spring survey data were available for inclusion in the tuning.

Assessment results were consistent with the 2002 assessment results. Bias-corrected bootstrap estimates were used for inference. Residual patterns from the tuning indices were similar to those in the 1998 benchmark assessment.

There was no persistent pattern in retrospective analyses in the Eastern Georges Bank haddock assessment. The strength of the 2000 year-class was lower in the retrospective analyses. This year-class now appears to be stronger than estimated in the 2002 assessment.

Stock Status

The TRAC agreed upon the assessment and results. Haddock biomass is the highest in over 30 years. The 2000 year class now appears larger than both the 1975 and 1978 year-classes, but the 2001 year-class is well below-average and preliminary estimates of the 2002 year-class are low. Despite the weak 2001 and 2002 year-classes, recruitment generally appears to be improving. Fishing mortality has been below F_{ref} =0.26 since 1995 and survivorship of recent year-classes has been relatively high.
Projections

Deterministic and stochastic projections were conducted for Eastern Georges Bank haddock. The TRAC agreed that use of a two-state stock recruitment model with a spawning biomass cutpoint of 40,000 t was appropriate for Eastern Georges Bank haddock. This is the same approach used in stochastic projections by USA scientists of the entire Georges Bank haddock stock.

Sources of Uncertainty

1. USA fishery catch-at-age data have low precision due to low sampling intensity.

2. The 2002 year-class appears to be weak.

3. Cautious interpretation of the probability of a biomass increase from 2004 to 2005 is warranted due to the dominance of the strong 2000 year-class.

Georges Bank Yellowtail Flounder

Working Paper:

Stone, H.H., and C.M. Legault. 2003. Assessment of Georges Bank (5Zhjmn) yellowtail flounder for 2003. Working Paper 2003/13.

Summary

Input data for the 2003 assessment of Georges Bank yellowtail flounder were reviewed and information presented for both Canada and the USA on commercial fishery landings, catch size composition, port and sea sampling results, and catch- and weight-at-age. The Canadian fishery in 2002 was comprised mainly of fish in the 32-41 cm size range, while the USA fishery proportionally captured slightly larger fish (34-44 cm). The 2000 year-class (age 2) and the 1999 year-class (age 3) occurred in equal proportions in the 2002 catch, with age 2 fish dominant in Canadian catches during the 2nd half of the year, and age 3 fish dominant in USA catches during the first half of the year. Although not used in the VPA calibration, a standardized catch rate series for Canadian mobile gear was

updated and compared to the DFO spring survey biomass index for stratum 5Z2 (Canadian portion of the Bank < 90m). Canadian mobile gear catch rates increased in 2002.

Abundance and biomass indices from DFO spring and NMFS spring and fall surveys were presented and discussed, along with the spatial distribution of survey catches and survey size composition data, by sex and sampling strata (e.g.., 5Z2/5Z4). All three groundfish surveys indicated a decline in abundance since 2000, but survey indices are still relatively high compared to the mid 1990s. The 1999 year-class (age 3) was dominant in the 2002 DFO and NMFS spring surveys, but not in 2003 at age 4. The 2000 year-class at age 2 was relatively abundant in the NMFS 2002 fall survey and also at age 3 in the 2003 DFO and NMFS spring surveys. Abundance indices of age 1 yellowtail in the NMFS sea scallop survey index increased again in 2002.

The VPA (ADAPT) and surplus production model (ASPIC) formulations were the same as used in the 2002 assessment. Retrospective analyses using the updated ADAPT results indicated a more pronounced retrospective pattern than in previous assessments, and showed a strong tendency to underestimate F on ages 4 and 5, and to overestimate spawning stock biomass (SSB) and age 1 recruitment. The impact of this pattern on abundance and F was apparent back to 1994. The trajectories of F, SSB and recruitment are now considerably different from those in the 2002 assessment. There are several large negative residuals in the 2003 DFO and NMFS spring survey indices (ages 5-6+) and in the NMFS 2002 fall survey (ages 4-6+) (i.e., the model predicts higher abundance for these ages), and concern was expressed that these may significantly affect the estimates of current abundance.

Overall, results from the current assessment showed lower abundance and higher Fs for the same age groups than the values provided in the 2002 assessment. Age 1+ VPA population biomass (38,300 t) in 2003 was lower than that predicted in last year's assessment (58,000 t) and considerably lower than the total biomass estimated from the surplus production model (64,000 t). Similarly, the estimated 2003 adult (age 3+) biomass of 26,000t is much lower than that forecasted from the 2002 assessment (40,000 t). Although recruitment has improved since the mid-1990s - with several good year-classes from 1997 onward - estimates of abundance are much lower than in last year's assessment. The 1997 year-class is now estimated to be only of moderate strength (age 1 abundance of 28 million fish vs. 59 million fish estimated last year), while the 2000 year-class (the strongest since 1980) is now estimated to be 48 million fish at age 1 vs. 62 million at age 1 in the 2002 assessment. While the proportion of older fish (age 4+) in the population is increasing, younger fish (ages 1 and 2) still predominate. Fishing mortality (age 4+) since 1994 is now higher than previously estimated but declined to below F_{ref} =0.25 in 2002. Exploitation on age 3 has also decreased to F_{ref}, but has not followed the same trend as age 4+. Catches at F_{ref} in 2004 was projected to be 7,900 t. The 2001 and 2000 year-classes are expected to contribute about 58% of the total yield in 2004 and constitute 49% of the total stock biomass. At the projected F_{ref} yield of 7,900 t in 2004, adult biomass is expected to increase from 32,500 t in 2004 to 33,300 t in 2005.

TRAC Discussion

The updated ADAPT calibration, configured in the same way as in the most recent benchmark assessment (Neilson and Cadrin 1998), suggests that previous assessments were optimistic. Revised estimates of 1997-2001 SSB are now less than one-third of the estimates obtained in recent assessments. Revised estimates of the 1997-2001 Fs are more than three times greater than estimates from past assessments. A retrospective pattern has been apparent since the 1990s, but the magnitude of inconsistency in the 2003 update is much greater. The most recent survey abundance values produced large, negative calibration residuals at older ages, balanced by several years of large positive residuals in preceding years.

Several sensitivity analyses were conducted to investigate potential sources of the retrospective pattern. Four alternative ADAPT configurations were run assuming a "flat-topped" partial recruitment schedule (i.e., estimating 2003 F for only age 4 and assuming the same F for ages 5 and 6+), assuming a dome-shaped PR, truncating the catch at age (age 1 to age-5+), artificially increasing discards of age 1 and 2 fish, and removing the age-6+ calibration series. All seven alternative configurations had similar retrospective patterns, with large 2003 residuals at older ages (age 6+). Additionally, sensitivity analyses were completed using a range of assumed Ms (from 0.1 to 1.0). The results showed reduced retrospective patterns with increased M values to M=0.7, with a reversal of the retrospective pattern (overestimated F) when M was between 0.7 and 1.0.

An exploratory application of a statistical catch at age model (ASAP: Legault and Restrepo 1999) was applied to further investigate the retrospective pattern. The model emulated the ADAPT configuration, except that constant selectivity was assumed, observation error in catch at age was included, and the underlying population processes were calculated forward from age 1 (rather than backward from age-6+). The results indicated that allowing for errors in the catch-at-age (ASAP) produced a closer fit to the survey trends (i.e., the negative 2003 residuals at older ages persisted, but were not as large as those from ADAPT). However, there was a noticeable pattern of negative catch residuals at older ages (i.e., the model expected a relatively greater abundance of older fish in the catch).

Several possible reasons for the retrospective pattern were considered:

The ADAPT VPA calibration assumes that older fish (age 6+) are fully vulnerable to the fishery. The possibility of Closed Area II offering a refuge for these fish was discussed. Length distributions from several sources inside and outside Closed Area II were examined. In all years, length distributions from the Canadian survey were similar inside and outside, except in 2002 when the Closed Area stations had more large fish. Monthly length frequencies from a 2002 Closed Area II access study (C. Glass, personal communication; Manomet Center for Conservation Sciences 2003) were compared to both fishery and survey length frequencies in 2002. The size (mode) from fishery samples outside the Closed Area was smaller, with relatively more 33-38 cm fish in the fishery samples and relatively more fish greater than 38 cm in the Closed

Area samples. However, the 20 min tows in the Manomet study may have had a lower selectivity for small yellowtail than in the fishery because the meshes may have been relatively unclogged in comparison to commercial tows (which typically are several hours in duration). The relative frequencies of medium and large fish (>41cm) were very similar among the fishery, survey, and access study samples. Overall, there was no compelling evidence of a refuge effect for larger yellowtail in Closed Area II.

The difficulty in determining the age of older fish using scales, and the potential for underaging older fish were also discussed as possible reasons for the retrospective pattern. It was noted that catch-at-size has gradually increased in recent years, but catch-at-age of older fish has not. Size at age in the surveys increased in the mid-1990s, but not in recent years. Eight published studies on the scale method of aging yellowtail were reviewed including validation studies and quality control information. Yellowtail can be reliably aged with the scale method to age 7, but determination of older ages may be problematic (Walsh and Burnett 2003). Regarding the aging of yellowtail by the Northeast Fisheries Science Center, it was reported that: (1) age determinations from scales are considered reliable up to age 6; (b) processing methods and ageing protocols have been consistent since the 1960s; and (3) the shift in size at age observed in the mid 1990s does not coincide with a change in age readers. The TRAC noted that there are several other processes that can produce a shift in size at age (e.g., natural variability, poor sampling, borrowed age-length keys, fishing patterns, etc). Therefore, there is no evidence of systematic underaging of fish from age 1 to age 6.

Other reasons for underestimating age compositions were discussed as possible causes of the retrospective pattern. Non-representative sampling resulting from low sampling intensity or small sample sizes may generate different proportions of older fish in the catch vs. the population. The use of USA commercial age samples and NEFSC fall survey age samples to characterize the age composition of the Canadian commercial catch may result in an under representation of the proportion of old fish in the population. The application of NEFSC spring survey age-length keys to the DFO spring survey yellowtail catches may also bias the estimation of survey catch at age because of potential spatial patterns in demographics. Such spatial patterns are suggested by the general increase in proportion of male yellowtails in the Canadian fishery. The mean length of fish sampled from the USA fishery is larger than that in the Canadian fishery. Observations from the Closed Area II access study (Manomet Center for Conservation Sciences 2003) suggest that yellowtail seasonally disperse, and a recently developing autumn fishery along the southern edge of Closed Area II may be associated with a seasonal shift in yellowtail distribution that was not apparent historically. Differences in biological characteristics among spatial groups may bias the estimation of age composition. However, the available data are insufficient to evaluate sampling error as a potential source of the retrospective pattern.

Sexually dimorphic growth was also discussed as a possible source of underaging fishery and survey catches. Canadian survey and fishery data are characterized by both sex and age, whereas USA fishery and survey data are not. Previous comparisons of

catch at age estimates using pooled-sex and separate sex age-length keys produced only minor differences that were insufficient to explain the retrospective pattern. Sensitivity analyses suggest that the assumption of M=0.2 may produce the retrospective pattern, if M is actually greater than this. Natural mortality (M) has been assumed to be 0.2 based on yellowtail tag returns (Lux 1969), relationships of Z to effort (Brown and Hennemuth 1971), and the age of the oldest individual sampled from the stock (age 14). However, different size and age distributions by sex suggest that males may have a higher natural mortality rate than females.

Underestimation of catches was the final potential source of the retrospective pattern that was discussed. USA yellowtail catches, by stock area, are prorated according to vessel trip reports and may underestimate the portion of yellowtail landed from Georges Bank. However, other USA stocks of yellowtail have similar retrospective patterns, suggesting that catch is not overestimated everywhere simultaneously. There is also considerable uncertainty in discard estimates. However, sensitivity analyses suggest that discards would have to be severely underestimated to produce the observed retrospective pattern.

Given the magnitude of the retrospective inconsistency, the TRAC concluded that there is substantially greater uncertainty in the assessment in 2003 than in previous years. Although there is obvious need for a revised benchmark assessment, such a revision was not possible at this meeting. The TRAC agreed that stock status should be based on survey observations and the range of results from the current benchmark assessment methods (i.e., the 2002 ADAPT solution, the 2003 ADAPT solution and the 2003 ASPIC solution) to communicate the uncertainty in stock status determination. To meet the term of reference, the TRAC agreed to use the 2003 ADAPT results to perform projections, with the understanding that results are highly uncertain. For example, using the 2003 ADAPT result, the projected 2004 catch at F_{ref} is 7900 t (Stone and Legault 2003). Considering the great uncertainty in the assessment, a status quo catch strategy (6100 t) may be reasonable.

Due to the large retrospective pattern seen in this assessment and the divergence with the production model results, a benchmark assessment is recommended for Georges Bank yellowtail flounder.

In addition to examining changes in model formulation and alternative models, this benchmark should consider topics such as closed area impacts, sexual dimorphism in growth and natural mortality rates, movements within and among management areas, catch estimation and alternative methods to estimating catch at age in recent years.

4. The TRAC recommends that a benchmark assessment be conducted for Georges Bank yellowtail flounder in 2005.

References

Brown, B.E. and R.C. Hennemuth. 1971. Assessment of the yellowtail flounder fishery in Subarea 5. ICNAF Res. Doc. 71/14, 57 pp.

Legault, C.M. and V.R. Restrepo. 1999. A flexible forward age-structured assessment program. ICCAT Coll. Vol. Sci. Pap. 49(2): 246-253.

Lux, F.E. 1969. Landings per unit of effort, age composition, and total mortality of yellowtail flounder, *Limanda ferruginea* (Storer), off New England. ICNAF Res. Bull. 6: 47-52.

Manomet Center for Conservation Sciences. 2003. Collaborative program to assess possible temporal access to Closed Area II: Targeting yellowtail flounder without significant bycatch of cod and haddock. Interim Summary Report to NMFS.

Neilson, J.D. and S.X. Cadrin. 1998. 1998 Assessment of Georges Bank (5Zjmnh) Yellowtail Flounder. Canadian Stock Assessment Secretariat Res. Doc. 98/67.

Walsh, S.J. and J. Burnett (Eds.). 2002. The Canada-United States yellowtail flounder age reading workshop. 28-30 November 2000, St. John's, Newfoundland. NAFO Sci. Coun. Studies 35: 1-59.

Working Paper:

Stone, H.H. 2003. Update on Georges Bank Yellowtail Flounder Tagging Studies. Working Paper 2003/15.

Results from Canadian yellowtail flounder tagging studies on Georges Bank were presented. In 1999, 2,155 yellowtail were released in the "Yellowtail Hole," and in 2002, 452 were released in Closed Area II near the international boundary. Of 108 recaptures with location information from the Yellowtail Hole releases in 1999, nearly all (106) were caught in the Yellowtail Hole over a three-year period from 2000-2002. One fish moved to the northeast peak of Georges Bank, and one moved to the northern edge in USA waters. Eight yellowtail flounder recaptures were reported from the Closed Area II releases. All were from Canadian yellowtail directed trips in the Yellowtail Hole area during August and September 2002. Results from these studies support earlier tagging experiments by Royce and Lux and indicate that yellowtail on Eastern Georges Bank undertake limited movements with a possible seasonal component. They are also capable of transboundary movements in both directions.

Appendix I. List of Participants

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Appendix II. Terms of Reference.

Remit
Transboundary Resource Assessment Committee
Aquarium Conference Center, NEFSC, Woods Hole
27 – 29 May 2003

Stock Assessments

For the following resources:

Eastern Georges Bank Cod
Eastern Georges Bank Haddock
Georges Bank Yellowtail

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

- Estimate the 10^{th} percentile, median, and 90^{th} percentile rebuilding biomass path for a at the beginning of each year from 2004 to 2008, assuming that the stocks are exploited at fishing mortalities of 018 (cod), 0.26 (haddock) and 0.25 (yellowtail flounder) respectively..

- For a range of values for total catch in 2004, estimate the risk that
  - the 2004 fishing mortality rate would exceed 0.18 (cod), 0.26 (haddock) and 0.25 (yellowtail flounder) respectively
  - the biomass at the beginning of 2005 would be lower than the respective B_{msy}.
  - The biomass at the beginning of 2005 would not achieve a 0%, 10%, and 20% increase compared to the beginning of 2004.

Appendix III. Agenda

Agenda
Transboundary Resource Assessment Committee
Aquarium Conference Center, NEFSC, Woods Hole
27 – 29 May 2003

27 May 2003 – Tuesday

08:30 – 09:00 Welcome and Introduction

09:00 – 12:00 Cod 5Zjm

12:00 – 13:00 Lunch

13:00 – 16:30 Haddock 5Zjm

28 May 2003 – Wednesday

08:30 – 12:00 Yellowtail Flounder 5Zhjmn

11:00 – 12:00 Report Preparation

12:00 – 13:00 Lunch

13:00 – 16:30 Further considerations and Report Review

29 April 2003 – Thursday

08:30 – 12:00 Further considerations and Report Review

12:00 – 13:00 Lunch

13:00 – 16:00 Further considerations and Report Review

16:30 Adjournment

Appendix IV.

Pre-Assessment Consultation
Yarmouth
28 April 2003

Minutes

The Transboundary Resource Assessment Committee will review assessments of Eastern Georges Bank cod and haddock and of Georges Bank yellowtail flounder during 27-29 May 2003 with respect to fisheries management advice for the 2004 fishing year.

The purpose of the meeting was to review survey and fishery observations in relation to what they indicate about stock status and how they can be interpreted. DFO science staff presented summaries of available information as a starting point for discussion. As Canada and USA move towards consistent management of these transboundary resources, it is necessary to harmonize, to the extent possible, the respective fishing seasons to ensure that management measures in both countries are based on a common assessment. The recent developments and the anticipated evolution of the process were discussed.

The following points were raised during discussion.

Eastern Georges Bank Cod

- A discrepancy between the size composition of landed samples and samples taken at sea by observers raised concerns about the possibility of discarding, but no corroborative accounts were offered by participants. Further exploration was warranted to determine if the disparity might be due to differences in location of fishing. It was noted that observer coverage on fixed gear was only 5% where the target was 10%.
- It was noted that port samplers would avoid taking a sample from a landing where discarding or high-grading was suspected. This diminishes the utility of comparing port samples and sea samples for the purpose of detecting potential discarding.
- An observation was made that difference in the size composition of landings was not apparent in the historical plant records. The size of fish landed by the longline fishery appeared to be relatively consistent in past years. This is in contradiction to observations in the assessment of strong and weak year-classes passing through the fishery. An examination of the longline fishery length composition over time should be undertaken to investigate this observation.
- The variability in trawl catches was questioned and it was suggested that differences in trawl performance may be influential. It was noted that a rigorous protocol was followed during all survey operations to ensure comparability over time. The use of trawl monitoring equipment (Scanmar) has been employed experimentally to investigate the consistency of trawl performance but it cannot be deployed on a routine basis due to operational constraints.

- Tides, full moon, and other factors are thought to influence catchability. However, these factors introduce random effects and should not bias abundance trends.
- Feeding behaviour and fish are following the feed can also affect catchability. The Georges Bank survey is conducted during the same time of year each year to control for seasonal differences in behaviour. Further, it is conducted during spawning when feeding is not an issue.
- Shifts in spawning condition during the NMFS spring survey will be investigated.
- Declines in weight at age have been noted for this cod stock as well as other cod stocks and some haddock stocks (not Georges Bank haddock). Hypotheses about ecosystem effects such as competition for feed do not appear to explain the patterns as it was noted that herring abundance is increasing.
- The longline survey weights at age will be examined for trends.
- Some movement between the Georges Bank and Browns Bank is evident but cannot be quantified at this time. The tagging project, currently in progress, may give information on population structure.
- The longline survey showed an increase in both numbers and weights in 2002, however some boxes were dropped this year compromising the comparison of results with previous years. Fishermen who conducted the survey noted there were valid reasons for dropping these boxes because of damage to their equipment.
- The benefits of area/season closures and quota management measures were questioned. It was noted that that there has been an increase in biomass however we're not seeing recruitment. The underestimation of recruitment by the DFO survey was questioned but it was noted that the DFO age 1 index was not used in the assessment.

Eastern Georges Bank Haddock

- A request was made for calculation of the rate at which biomass is increasing.

Georges Bank Yellowtail Flounder

- Age determination of yellowtail flounder remains an issue. Participants asked if collaboration had been made with Newfoundland on aging. Scientists from St. Andrews and Woods Hole had collaborated on methodology at the recent workshop in St. John's Newfoundland.
- Approaches to reduce the bycatch of skates should be investigated.

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Appendix V. List of Working Papers for the Seventh TRAC.

1. Hunt, J.J. and B. Hatt. 2003. Population status of eastern Georges Bank cod (unit areas 5Zjm) for 1978-2004. Working Paper 2003/11. 37 pp.

2. Van Eeckhaute, L. and S. Gavaris. 2003. Determination of Discards of Georges Bank cod by comparing observed and unobserved species compositions. Working Paper 2003/14. 7 pp.

3. Van Eeckhaute, L., S. Gavaris, and J. Brodziak. 2003. Assessment of Haddock on Eastern Georges Bank. Working Paper 2003/12. 28 pp.

4. Stone, H.H. and C.M. Legault. 2003. Assessment of Georges Bank (5Zhjmn) Yellowtail Flounder for 2003. Working Paper 2003/13. 76 pp.

5. H.H. Stone. 2003. Update on Georges Bank Yellowtail Flounder Tagging Studies. Working Paper 2003/15. 15 pp

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