



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Science

Sciences

C S A S

Canadian Science Advisory Secretariat

S C C S

Secrétariat canadien de consultation scientifique

Proceedings Series 2003/029

Série des compte rendus 2003/029

**East and Southeast Newfoundland
2002 Herring RAP Proceedings.**

**Compte rendu de la réunion du
processus consultatif régional de
l'est et du sud-est de
Terre-Neuve concernant le hareng
en 2002.**

**October 28 - 31, 2002
Fisheries and Oceans Canada
Northwest Atlantic Fisheries Centre
St. John's, Newfoundland and Labrador**

D. C. Orr - Chairman

**Science, Oceans and Environment Branch
Fisheries and Oceans
P.O. Box 5667
St. John's, Newfoundland and Labrador
A1C 5X1**

October 2003

Canada

**East and Southeast Newfoundland
2002 Herring RAP Proceedings.**

**Compte rendu de la réunion du
processus consultatif régional de
l'est et du sud-est de
Terre-Neuve concernant le hareng
en 2002.**

**October 28 - 31, 2002
Fisheries and Oceans Canada
Northwest Atlantic Fisheries Centre
St. John's, Newfoundland and Labrador**

D. C. Orr - Chairman

**Science, Oceans and Environment Branch
Fisheries and Oceans
P.O. Box 5667
St. John's, Newfoundland and Labrador
A1C 5X1**

October 2003

© Her Majesty the Queen in Right of Canada, 2003
© Sa majesté la Reine, Chef du Canada, 2003

ISSN 1701-1272 (Printed)

Published and available free from:
Une publication gratuite de:

Fisheries and Oceans Canada / Pêches et Océans Canada
Canadian Science Advisory Secretariat / Secrétariat canadien de consultation scientifique
200, rue Kent Street
Ottawa, Ontario
K1A 0E6

<http://www.dfo-mpo.gc.ca/csas/>

CSAS@DFO-MPO.GC.CA



Printed on recycled paper.
Imprimé sur papier recyclé.

Correct citation for this publication:
On doit citer cette publication comme suit:

Orr, D.C. 2003. East and Southeast Newfoundland 2002 Herring RAP Proceeding, 28-31 October, 2002. DFO
Can. Sci. Advis. Sec. Proceed. Ser. 2003/029.

Table of Contents

Summary	iv
Introduction	1
Document Summaries and Related Discussion	2
Progress on Research Recommendations for 2000-02	10
List of other Documents	11
Appendix I – List of Attendees	12
Appendix II – Briefing Note	13

SUMMARY

During October 2002, Newfoundland and Labrador Region conducted assessments of the White Bay – Notre Dame Bay (WB-NDB), Bonavista Bay – Trinity Bay (BB-TB), St. Mary's Bay – Placentia Bay (SMB-PB) and Fortune Bay (FB) Atlantic herring stocks. Summaries of the working papers and ensuing discussions are provided here. Also included as appendices are lists of papers and other documents available to the meeting, participants, as well as, a briefing note prepared after the meeting. Additional information on the resources assessed is available in the Stock Status Report (SSR) and research document.

RÉSUMÉ

En octobre 2002, la Région de Terre-Neuve et du Labrador a procédé à des évaluations des stocks des régions baie White – baie Notre Dame, baie de Bonavista – baie de la Trinité, baie St. Mary's – baie de Plaisance et baie de Fortune. On trouvera ici des résumés des documents de travail et des discussions auxquelles elles ont donné lieu. Sont également jointes en annexes une liste des documents techniques et autres présentés à la réunion, une liste des participants et les notes de breffage établies après la réunion. Des renseignements supplémentaires sur les ressources évaluées figurent dans le Rapport sur l'état des stocks (RES) et dans le document de recherche.

INTRODUCTION

The Herring Working Group of the Small Pelagics Advisory Committee met on October 22, 2002 to review scientific input for the 2002 regional assessment of four stocks of Atlantic herring (*Clupea harrengus*), off the northeastern and southeastern coasts of Newfoundland. An overview of all information available for the assessment was presented. There was general agreement among members of the Working Group that the information provided reflected their views of stock status.

The following document summarizes the 2002 regional assessment of herring stocks off the northeastern and southeastern coasts of Newfoundland.

Regional herring stock assessments were conducted over the period October 28 – 31, 2002. The purpose of the meetings was to discuss the 2001 commercial fishery and 2002 research gillnet, biological data and environmental monitoring results as related to previous years. Newfoundland herring stocks are assessed bi-annually to provide input for the 2 year herring management plan. A list of working papers and other documents available to the meeting is included in Appendix I, a list of meeting participants is provided in Appendix II, while Appendix III provides the briefing note written after the meeting.

The previous most recent assessment was conducted in the fall of 2000 (Wheeler et al. 2001; Wheeler 2003). Although the data sources in the 2002 assessment were similar to those in 2000, the assessment methodology differed considerably. The Integrated Catch at Age (ICA) analysis of previous assessments could not be run as fishing mortality was low compared to natural mortality. The lack of analytical assessments meant preclusion of the stock status classification system used in risk analysis as provided in previous assessments. However, performance reports were developed as tools used in summarizing current status and future prospects of each stock.

Herring abundance was low within White Bay - Notre Dame Bay and Bonavista Bay - Trinity Bay, low but increasing in St. Mary's Bay, and still high in Fortune Bay, relative to the 1980's and 1990's.

For additional information on these resources, see references provided in SSRs and CSAS research documents, or consult with authors listed in Appendix I.

Document Summaries and Related Discussions

Reference:

WP Herring 2002/01: Description of the East and Southeast Newfoundland 2000 and 2001 commercial herring fisheries as age, by: J.P. Wheeler, B. Squires and P. Williams.

Summary:

As per the 2001- 2002 herring management plan, there was a scientific fishery in White Bay – Notre Dame Bay (WB-NDB) while commercial fisheries were allowed in Bonavista Bay – Trinity Bay (BB-TB), St. Mary's Bay – Placentia Bay (SMB-PB) and Fortune Bay (FB). A scientific fishery, with a fishing mortality of less than 5%, was established in the northern area as stock status was considered poor. A 20% fishing mortality was recommended for BB-TB, where stock status was good. Fishing mortalities of 10-20% were recommended for SMB-PB and FB where status was considered moderate to good. Since 2000, TACs decreased in WB-NDB and FB, increased in BB-TB but remained the same in SMB-PB.

Quotas were not taken in any of the stock areas and 2001 landings (2300 t) were lower than in 2000 (3500 t).

Biological samples have been collected each year from the eastern and southeastern Newfoundland commercial herring fisheries. Long term trends in relative number of spring versus autumn spawners, relative year class strength, and mean weight at age were evaluated using this information.

Policy and Economics Branch provided commercial catch data (t), by bay, month and gear type. Data for recent years were considered preliminary, as catch statistics had not been finalized for these years. Commercial catch statistics since 1996 were not inclusive, as they did not include catches used for bait purposes.

The level of biological sampling was considered adequate as 838 herring were sampled from catches distributed throughout all areas over the entire year.

Analysis of data obtained from biological sampling indicate that spring spawners accounted for more than 88% of the catch in WB-NDB and FB, whereas spring spawners accounted for 53% and 63% of the catch in BB-TB and SMB-PB respectively. Year class dominance varied between stocks. The 1999 year class dominated catches in WB-NDB. A broad range of year classes were present in BB-TB catches. In SMB-PB, the distribution was dominated by the 1996 year class and fish aged 11+. Whereas, the 1996 year class dominated catches in FB.

The 2001 mean weights at age were similar to those in 2000.

Discussion:

Commercial fishing data and summary bullets were reviewed. The number of biological samples per stock was discussed and it was concluded that sampling was probably adequate.

Commercial catch data would be verified and updated.

Trends in relative year class strength were discussed. The 1982 and 1992 year classes were the only two significant year classes, in recent years. It was concluded that strong year classes tend to be sporadic. The White Bay – Notre Dame Bay stock is at the northern most edge of the range where environmental conditions and present low abundances may hamper significant recovery.

Reference:

WP Herring 2002/02: Results of the East and Southeast Newfoundland herring research gill net program, by: J.P. Wheeler and P. Williams.

Summary:

The research gill net program was initiated in 1982 to provide fishery independent age disaggregated abundance indices. There is a fifteen year time series for WB-NDB and BB-TB, and a twenty-one year time series for SMB-PB and FB. Each year, commercial fishers are contracted to provide catch rate data and biological samples from their catches.

Age distributions of herring (by number) from the research gill net program were available up to and including 2001; however, biological samples from the 2002 program had not been processed in time for this assessment. In all areas, spring spawners accounted for more than 82% of the 2001 catches. As in the commercial fishery, no single year class dominated, and with minor differences, the distribution of ages was similar in 2000 and 2001. In WB-NDB, and BB-TB the 1995 year class was dominant; the 1996 year class dominated the SMB-PB and FB catches. The 1994 year class, which accounted for 30% to 40% of the 2000 catch in WB-NDB and BB-TB, accounted for less than 20% of the 2001 catch in each area.

Year classes are normally recruited to the research gill nets by age three or four. There was substantial recruitment of the 1997 year class as 4 year olds in 2001 in WB-NDB, accounting for up to 35% of the catch. The 1997 and 1998 year classes recruited to the BB-TB fishery where each accounted for approximately 10% of the 2001 catch. However, there has been no evidence of recruitment since 1996 in either SMB-PB or FB.

Research gill net catch rates decreased in WB-NDB and BB-TB to approximately 4 and 8% of historic peak rates for the respective stocks. Catch rates increased in SMB-PB to historically high levels. Since 1998, catch rates have been declining in FB, however, they are still higher than for any other stock. Catches in FB are supported by a broad age range, including substantial numbers of 11+ year old fish.

Relative year class strength is evaluated by tracking research gill net catches of age 4 herring. The 1990 – 1997 period was characterized as a time of relatively weak year class strength in WB-NDB and BB-TB. In SMPB – PB and FB, the 1996 year class index was less than half that of the 1982 year class, which in previous assessments, was estimated to be of moderate strength.

Discussion:

The analysis may be confounded by seasonality changes in herring movements and fisher activities.

The water was very warm in St. Mary's Bay and Placentia Bay during 1996. This may have provided conditions favorable for herring survival resulting in improved catches during 2001. However, it was pointed out that even though catches are improving in SMB-PB, the 1996 year class is still poor to moderate in relation to historic levels among stocks.

Catch rates in FB were considered to be very high, in the order of 600 – 1000 fish per day, but were mainly characterized by older fish. There was no evidence of recruitment of young fish in Fortune Bay.

There is among bay variation in catch rates. This is especially true in small areas. As well, license conditions allow only fixed gear fishers to work in research gill net program. As the number of full-time fixed gear licenses decreases, one should expect the amount of variation to increase because the number of sampling areas is decreasing. For this reason, the program should be expanded to include bait fishers.

Reference:

WP Herring 2002/03: Distribution and abundance of Atlantic herring from acoustic surveys of: 1) White Bay – Notre Dame Bay, November – December 2000; 2) Fortune Bay, March 2001, by: J.P. Wheeler.

Summary:

Acoustic surveys have been conducted from 1983 until 2001 to assess Atlantic herring stocks within the Newfoundland Region. Biomass estimates, distribution and behavioral information are available from two surveys conducted since the last assessment. One acoustic survey was conducted in WB-NDB during the fall of 2000, while the other was conducted in FB during the winter of 2001. Where

concentrations warranted, and depth and weather conditions permitted, biological samples of herring were collected using a purse seine. Acoustic back-scatter was converted to herring density using the following target strength - fish length relationship:

$$T.S. = 20 \log L - 65.5$$

Mean fish lengths were derived from biological samples collected during the survey. Target strength per fish was converted to target strength per unit fish weight using mean fish weights from these samples. The samples also allowed the derivation of age distributions. Mean densities, variances, and biomass estimates were then calculated.

For the purpose of plotting herring distributions, mean densities (g/m^2) were calculated per 10 sec. (~30 m) intervals along each transect for the surveys.

A biomass index of approximately 312 t was estimated for WB-NDB. All of these herring were found in Notre Dame Bay and Green Bay. Spring spawners accounted for 72.0% of the WB-NDB abundance. The biomass of spring spawners (230 t) decreased significantly since 1998. The 1995 year class accounted for approximately 55% of the population estimate; however, there was limited evidence of recruitment of the 1996 and 1997 year classes each of which accounted for less than 10% of the population estimate.

A biomass index of 3452 t was derived for the area surveyed within Fortune Bay. At least 99% of the biomass was detected in Long Harbour. Spring spawners accounted for 94% of the abundance index within Fortune Bay. The biomass index for spring spawners (3215 t) represented a substantial decrease since 1999 and was the second lowest in the time series. The 1996 year class dominated the 2001 FB indices, accounting for approximately 50% of the abundance and biomass.

Discussion:

The relatively high number of autumn spawners, in the 2001 samples, was discussed. It was felt that due to the low abundances of herring, the surveys and commercial fishery may be picking up an increased proportion of autumn spawners relative to spring spawners. Any change in seasonality among herring may have an impact upon results obtained in the commercial fishery, the research gill net project and acoustic survey.

Reference:

WP Herring 2002/04: Results of the East and Southeast Newfoundland herring commercial fixed gear logbooks for 2000 – 2002, by: J.P. Wheeler and B. Squires.

Summary:

The logbook program began in 1996 in order to increase the scientific information derived from the fixed gear herring fishery and to capture quantitative input from commercial fishers. The long-term goal of this program is to develop a time series of catch per unit effort (CPUE) data.

The logbooks were prepared by the herring assessment team within Science, Oceans and Environment Branch in St. John's, NL. Between 1996 and 1999, logbooks were distributed by Fisheries Management Branch to more than 2000 fishers along the eastern and southeastern coasts of Newfoundland as part of the fisher's fixed gear herring license package. Since 2000, logbooks have been mailed directly to approximately 2800 fishers. The logbooks are to be completed by gill net fishers involved in the spring commercial (food fish) fishery, spring bait (lobster) fishery, and/or fall commercial fishery. Subsequent to the 1998 fishery, the logbook was revised to allow fishers to indicate the number of nights that each net was fished each time that it was hauled. In 2000, panel area was standardized for each mesh size. Catch rates for the entire time series were then standardized to allow for comparisons between areas and years.

Depending upon the area fished, most logbooks were from winter, spring or early summer fisheries. Logbooks from fall fisheries were limited in number and therefore, were not included in the analysis. All logbooks received by September 2002 have been included in the analyses.

Fewer than eleven logbooks have been returned from anyone area or year. During 2002, 6, 7, 3 and 5 logbooks were returned from WB-NB, BB-TB, SMB-PB and FB respectively. There was general agreement between the logbook, the commercial fishery, the research gill net program, and acoustic survey results. All four methods indicated decreases in population indices among WB-NDB and BB-TB stocks, while SMB-PB and FB stocks indicators showed increases. Similarly, the logbooks indicated that spawning intensities were below average in WB-NDB, BB-TB, but were increasing in SMB-PB and FB.

Discussion:

The logbook program is voluntary rather than a license condition, therefore, one should expect that returns may be low. However, it was argued that voluntary logbooks may contain information that is more complete and accurate than those obtained as a license condition. The voluntary logbooks are one way of obtaining standardized quantitative traditional knowledge that may be incorporated into stock assessments. The herring logbooks provide catch rate and abundance information.

Through small working groups, fishers are being educated, and as a result, interest in filling logbooks is being maintained and high quality information is received for assessment purposes.

The percentage of logbook returns is unknown because the number of fishers who participate in the herring fishery is unknown. However, it was felt that 30-35% of the fishers return logbooks. It was pointed out that effort can be reduced by obtaining information from purchase slips. Unfortunately, bait fishers would be overlooked using this method.

Reference:

WP Herring 2002/05: Results of the East and Southeast Newfoundland herring purse seine questionnaires for 2000 and 2002, by: J.P. Wheeler and B. Squires.

Summary:

There is a fall purse seine fishery within WB-NDB and BB-TB and a late winter/ early spring fishery in SMB-PB. Purse seining is not allowed in FB. Purse seining occurred in all three stock areas during 2000, in BB-TB and SMB-PB during 2001, but only SMB-PB during 2002. Over this time period the number of fishers decreased from 20 in 2000, to 7 in 2001 and finally 5 during 2002.

The commercial purse seine survey is completed by telephone to minimize time and costs. The present analysis included data collected just after 2002 SMB-PB purse seine fishery.

Fishers in all areas indicated that the number and sizes of schools had increased since 2001. The number of successful sets remained high, however, successful sets were restricted to only a few strata within each stock area. The majority of these sets were taken during daylight hours.

The commercial logbook catches usually agreed with the questionnaire catches. However, at times, the questionnaire catches exceeded logbook values. This discrepancy was due to the fact that the questionnaire catches accounted for discarding whereas logbooks may not.

Discussion:

Discussions, within both the Atlantic Herring Working Group and the assessment meetings, indicated a high proportion of small herring (≤ 26.5 cm fork length).

Prices were relatively low (8-10 cents/ lb) and there was a high abundance of small herring. Conservation measures restricted the percentage of small herring to less than 10% of the total catch. Due to the ability to fish more lucrative species, the low

price of herring and the 10% catch restriction, fishers in WB-NDB and BB-TB stopped purse seining herring.

Size did not appear to be a problem in the south, consequently there was a purse seine fishery in SMB-PB.

Reference:

WP Herring 2002/06: Examination of biological and ecological data for east and southeast Newfoundland herring 2000 to 2002, by: J.P. Wheeler, G. Maillet and G. Stenson.

Summary:

Strong recruitment during the 1960's – 1980's was attributed to warm over-wintering temperatures and high salinities prior to spawning. There was poor recruitment during the early to mid 1990's; a period of below average ocean temperatures and salinities. Since 1997, ocean temperatures have returned to the long term average, however, salinities remained low.

The age at which herring mature has remained stable, since the 1980's. Most herring mature at the age of 6 and may live to 11 years of age. However, due to reduced growth rates, the size at maturity has decreased. A 1 cm reduction in length at maturity can result in a 12 – 16% reduction in fecundity. However, the impact of reduced fecundity is known.

Quantitative data on predation of herring exist for seals only. It has been estimated that, consumption of herring by seals increased between 1990 and 1996. In WB-NDB and BB-TB, total consumption in 1996 was thought to be approximately 36000t.

Discussion:

A participant asked whether the decrease in weights at age was related to reduced availability of food. The authors were not sure. It was then pointed out that one may review the Continuous Plankton Recording (CPR) data to determine whether plankton quantities and qualities changed since the 1970's.

Size/ age at maturity and timing of spawning were then discussed. John noted that spring spawning appears delayed during recent years. Due to small sample sizes, it was not clear whether fall spawning was also delayed.

Research data concerning predation of herring by seals was mainly conducted in the northeastern part of the stock complex. Logbook data confirm that most of the predation occurs in the northeast.

Progress on Research Recommendations for 2000 – 2002

No research recommendations were suggested during the 2000 RAP meetings.

Research Recommendations for 2002

1. Performance reports provide a good method to qualitatively evaluate stock indicators, such as abundance indices, biological characteristic and ecological considerations. However, in this assessment, current stock status and future prospects were derived from a subjective review of the above indicators. Methodologies must be developed to objectively define status for these stocks. A meaningful weighting for all parameters should be developed because not all indices are equally important in maintaining a sustainable fishery.
2. The methodologies need to be formalized.
3. Performance reports were presented as a new assessment tool for herring stocks off the eastern and southeastern coasts of Newfoundland; therefore, a set of retrospective performance reports should be produced for the recent few years. The outcomes from the retrospective analyses are to be compared with previous assessment output to determine whether the overall message presented to resource management is dependent upon the tool used. Present performance reports may not provide risk analysis, however, do they provide a different overall impression of stock performance than ICA?
4. A suggestion was also made to contact fish harvesters in the Fortune Bay area (eg. B. Fidley) to obtain one or two representative samples.

APPENDIX I

WP Herring 2002/

- 01 Description of the East and Southeast Newfoundland 2000 and 2001 commercial herring fisheries as age, by: J.P. Wheeler, B. Squires and P. Williams.
- 02 Results of the East and Southeast Newfoundland herring research gill net program, by: J.P. Wheeler and P. Williams.
- 03 Distribution and abundance of Atlantic herring from acoustic surveys of: 1) White Bay – Notre Dame Bay, November – December 2000; 2) Fortune Bay, March 2001, by: J.P. Wheeler.
- 04 Results of the East and Southeast Newfoundland herring commercial fixed gear logbooks for 2000 – 2002, by: J.P. Wheeler and B. Squires.
- 05 Results of the East and Southeast Newfoundland herring purse seine questionnaires for 2000 and 2002, by: J.P. Wheeler and B. Squires.
- 06 Examination of biological and ecological data for east and southeast Newfoundland herring 2000 to 2002, by: J.P. Wheeler, G. Maillet and G. Stenson.

List of Other Documents

- Caddy, J. F. 1998. A short review of precautionary reference points and some proposals for their use in data-poor situations. FAO Fisheries Technical Paper No. 379, 30 pp.
- DFO, 2001. 2001 – 2002 Integrated management plan. East and south coast of Newfoundland, herring (NAFO Divisions 2J3KLPs). 18 p.
- DFO, 2002. East and southeast Newfoundland Atlantic herring. Stock Status Report B2-01 (2002). 21 p.
- Hammil, M. O. and G. B. Stenson. 2000. Estimated prey consumption by harp seals, hooded seals, grey seals, and harbour seals in Atlantic Canada. J. Northw. Atl. Fish. Sci. Vol. 26: 1-23.
- Hodder, V. M. 1972. The fecundity of herring in some parts of the Newfoundland area. INFAF Research Bulletin No. 9, 99-107 pp.
- Wheeler, J. P., B. Squires, and P. Williams. 2001. Newfoundland east and southeast coast herring - an assessment to the spring of 2000. C.S.A.S. Res. Doc. 2001/018, 129 p.
- Wheeler, J.P. 2003 Proceedings of the Newfoundland Regional Advisory Process for East and Southeast Newfoundland Herring. C.S.A.S Proceedings 2003/15, 8 p.
- Wheeler, J. P., B. Squires, and P. Williams. Newfoundland east and southeast coast herring - an assessment to the spring of 2002. C.S.A.S. Res. Doc. (in prep.).

APPENDIX I

List of Attendees – East and Southeast Newfoundland Herring RAP 2002

Name	Affiliation	Phone No.	Fax No.	E-mail address
Bruce Mayne	DFO – FM	772 – 4472	772 - 3628	MayneB@dfo-mpo.gc.ca
Brian Nakashima	DFO – SOE	772 - 4925	772 - 4105	NakashimaB@dfo-mpo.gc.ca
Dave Orr	DFO - SOE	772 – 7343	772 – 4105	Orrd@dfo-mpo.gc.ca
Brian Johnson	NL gov. – Fisheries and Aquaculture	729 – 3766	729 – 1881	Bjohnson@mail.gov.nf.ca
Paul Williams	DFO – SOE	772 – 3673	772 – 4105	WilliamsPa@dfo-mpo.gc.ca
John Wheeler	DFO – SOE	772 – 2005	772 – 4105	WheelerJ@dfo-mpo.gc.ca
Jim Carscadden	DFO – SOE	772 – 5541	772 – 4105	CarscaddenJ@dfo-mpo.gc.ca
Brad Squires	DFO – SOE	772 – 5305	772 – 4105	SquiresB@dfo-mpo.gc.ca
Fran Mowbray	DFO – SOE	772 – 5542	772 – 4105	MowbrayF@dfo-mpo.gc.ca
Dale Richards	DFO – SOE	772 – 8892	772 – 6100	RichardsED@dfo-mpo.gc.ca

Appendix II

BRIEFING NOTE FOR THE ASSISTANT DEPUTY MINISTER

BRIEFING NOTE

(Information Only)

SUMMARY

Briefing note for the Regional review (RAP) of east and southeast Newfoundland Atlantic Herring (Divisions 3KLPs).

Background

- The status of this resource was reviewed at a regional advisory meeting (RAP) in St. John's, Newfoundland and Labrador, in October 2002.

Analysis / DFO Comment

- The stock status classification system, predicated upon a quantitative assessment and used for the management of these stocks since the mid 1990's, could not be utilized in this assessment due to the low commercial catches and relatively high bait catches that cannot be quantified.
- Based on Performance reports, including evaluation of abundance indices and biological characteristics, in the two northern areas, White Bay - Notre Dame Bay and Bonavista Bay - Trinity Bay, abundance is low, possibly the lowest in twenty years. In St. Mary's Bay - Placentia Bay, abundance is low but increasing. In Fortune Bay, abundance is still at a high level relative to the 1980's and 1990's. With the exception of Fortune Bay, the other stocks are at low levels relative to peak levels in the 1970's.
- Year classes produced during the 1990's were generally weak, contributing to the low abundance. There is no quantitative evidence of strong recruitment.

- This assessment includes data to June of 2002. Consequently, 2002 catches are incomplete.

D.B. Atkinson
Regional Director,
Science, Oceans and Environment

I concur
Wayne Follett,
Regional Director General,
Newfoundland Region

Attachments