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Newfoundland and Labrador 2002 Shellfish RAP Proceedings.

Compte rendu de la réunion du PCR de la région de Terre-Neuve et du Labrador concernant les mollusques et les crustacés en 2002.

March 5-8, 2002
Battery Hotel, St. John's, Newfoundland and Labrador

G.P. Ennis

Science, Oceans and Environment Branch
Fisheries and Oceans Canada
P.O. Box 5667
St. John's, NL
AIC 5X1

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

CSAS@DFO-MPO.GC.CA

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ABSTRACT

Newfoundland and Labrador Region conducted assessments of northern shrimp and snow crab in March 2002. Summaries of the working papers presented along with ensuing discussion are provided here. Also included as appendices are lists of papers and other documents available to the meeting, participants, and briefing notes prepared following the meeting. Additional information on the resources assessed is available in CSAS research documents and stock status reports.

RÉSUMÉ

La Région de Terre-Neuve et du Labrador a procédé à des évaluations de la crevette nordique et du crabe des neiges en mars 2002. On trouvera ici des résumés des documents de travail présentés ainsi que des discussions auxquelles ils 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 les documents de recherche du SCES et dans les Rapports sur l'état des stocks.

INTRODUCTION/SUMMARY

Regional assessments of northern shrimp (*Pandalus borealis*) and snow crab (*Chionoecetes opilio*) were conducted March 5– 8, 2002. These proceedings contain summaries of the working papers presented at the meeting, as well as summaries of the discussions of these papers. Information on oceanic conditions during 2001 in comparison to long term norms was also presented. A list of working papers and other documents available to the meeting is included in Appendix I and a list of meeting participants is included in Appendix II.

For the northern shrimp fishery, 2001 was the second of a 3-year management plan. A review was conducted and an update SSR produced. The briefing note prepared is included in Appendix III. Use of a “traffic light” evaluation of the resource was continued and included in the SSR. Shrimp continue to be distributed widely throughout Div. 0B to 3K at a high level of abundance.

For the snow crab fishery, 2001 was the third of a 3-year management plan. A full review was conducted and a new SSR produced. The briefing note prepared is included in Appendix III. Use of a “traffic light” evaluation of the resource was continued and included in the SSR.

For additional information on these resources, see references provided in the SSRs, check the CSAS research document series, or consult with authors listed in Appendix I regarding status of documentation.

DOCUMENT SUMMARIES AND RELATED DISCUSSIONS

WP SF 2002/01. An assessment of Newfoundland and Labrador snow crab in 2001 by.E.G. Dawe, H.J. Drew, P.J. Veitch, R. Turpin, P.G. O'Keefe, and P.C. Beck

DISCUSSION

Changes and trend in commercial CPUE were examined in relation to events in the fishery that might affect interpretation for stock status. The discrepancy between inshore and offshore catch rates in Div. 3K after 1998 (i.e. increasing inshore, decreasing offshore) could be due to differences in fishing conditions and practices for the offshore fleet. Industry noted that, in the summer of 2001, there was a large amount of soft-shelled crab forcing fishermen to search more than usual. Therefore, the number of trap hauls might have increased for the same amount of catch. Further, the "buddy-up" system might have artificially inflated the effort estimates, thereby decreasing the CPUE. There was general agreement that changes in area fished by various fleet components confound the CPUE series and interpretation requires caution. The need for a standardized CPUE, weighted by effort and including other important variables (e.g. area, season, etc.) was identified.

Discussion on the results of the fall research trawl surveys focused on the uncertainties of the recruitment indices. One source of uncertainty related to catchability of crabs by the Campelen trawl. Some between year comparisons yielded negative mortality, not biologically possible, reflecting an unquantified year effect. Animals between approximately 40 and 70 mm CW are poorly represented in the surveys each year. The size range within this "trough" includes both male and female crabs, which probably occur more frequently on substrates other than mud. Trap surveys for this size range would not be effective because the larger male crab would have competitive advantage for the bait. Another source of uncertainty was the high variance associated with the estimates of the pre-recruits. It was not clear whether this was due to overall aggregation or to anomalous high catches within certain strata.

It was questioned whether the resource was contracting, as suggested by the survey and reflected in continued high commercial CPUE, or whether the catchability of the research trawl changed after 1999. A reanalysis of trawl and CPUE data over a common depth range did not resolve the issue.

WP SF 2002/02. A study of the efficiency of the Campelen 1800 survey trawl in sampling snow crab by E.G. Dawe, B.R. McCallum, S.J. Walsh, P.C. Beck, H.J. Drew, and E.M. Seward.

DISCUSSION

A study that indicated the catchability of crabs by the survey trawl was highly variable with substrate and size of crabs raised questions on the usefulness of trawl surveys to predict short, medium and long-term recruitment. Existing data on bottom type can be analyzed, as a first step, to determine interannual consistency (or lack of) in sampling on different substrates. There was general agreement to formulate a Research Recommendation, endorsing the continuation of quantitative investigations designed for developing models to improve trawl survey recruitment indices for crab.

WP SF 2002/03 - Preliminary evaluation of the potential of 3L inshore time-series research trapping cruises for forecasting future commercial snow crab catch rates by.S.G. Sutton, D.M. Taylor, and P.G. O'Keefe

DISCUSSION

Recognizing, on the one hand, the potential for short-term forecasting of fishery performance (an indicator of resource status) and, on the other, that the time-series was relatively short for rigorous investigation, it was agreed that these types of models should be developed further and their predictions evaluated. Autoregression within a CPUE time-series is, in itself, a forecasting tool but it was shown that a supplementary and independent data set can improve the forecasts and offer insight with respect to the functional relationship (i.e. recruitment processes). Interaction terms were not investigated within the multiple regression models and the rationale for a 15% increase in commercial CPUE after 1994 to account for highgrading was considered to be tenuous.

WP SF 2002/04 – Preliminary evaluation of the effect of trap mesh size and soak time on the composition of snow crab (*Chionoecetes opilio*) catches by D.M. Taylor, S.G. Sutton, and P.G. O'Keefe.

DISCUSSION

Reaction by fishermen was mixed to some the conclusions of the mesh-size and soak-time investigations (i.e. effect on catch rates and proportion of premium-sized crab). However, consensus was reached regarding the reduction in undersized with larger mesh. It was suggested that the data be reexamined, taking into account the effect of mesh size on entry of soft-shelled crab to traps. If more work of this type is considered, another mesh size category (5 ¾ inches) should be included.

WP SF 2002/05 – Assessment of northern shrimp off Baffin Island, Labrador and northeastern Newfoundland by. D. Orr, D.G. Parsons, P.J. Veitch, and D.J. Sullivan

DISCUSSION

The generally favourable fishery performance in 2001 (the industry-imposed closure for the small vessel fleet notwithstanding) generated discussion about concerns raised during the 2001 assessment. Some concerns were based on the observations that the 1996 year class was the weakest observed during the 1990's and the 1995 year class weaker than most. With the recruitment of these year classes to the female stock in 2001 and 2002, it was felt that female biomass might decline in the short term. The 2001 fishery and research survey data for SFA 6 showed that the 1995 year class was stronger than expected and the female biomass did not decline. There was still some concern for the effects of the weak 1996 year class in 2002 but it was felt that residual female biomass and recruitment from the 1997 year class over the next two years should buffer any negative effects.

As in previous assessments, the decline in the mean size of females and the median size at sex inversion was debated. The phenomenon has occurred in all SFA's but the timing differs by area. In combination with decreasing abundance, high mortality, contracting fishery, etc., such observations would be viewed negatively. However, at historically high sock size, increasing CPUE and continued strong recruitment, other interpretations (e.g. density dependent growth/maturation, effects of temperature, etc.) are warranted.

The research survey in 2001 included all of SFA 5, but the survey was not directly comparable to previous years with respect to timing and vessel. It was generally agreed that, despite uncertainties and the lack of a survey in 2000, both the research and fishery data suggest higher stock size in 2001 compared to the 1997 – 1999 period.

Assessments for SFA's 2 and 4 were based on fishery data only and much of the discussion focused on the interpretation of CPUE and catch composition. Although catch rates are influenced by differences in area, season, ice conditions, incidence of soft-shell, etc., it was concluded that catch rates in SFA 4 were higher in 2000 – 01 than in 1998 – 99 and those in SFA 2 remained stable after 1996. Regarding the low catches from the exploratory fishery in SFA 2 in 2001, it was noted that the Nunavut quota was not utilized and there was some problem with soft-shell. Also, the 2001 observer and logbook data were incomplete for SFA 2.

A main concern of industry remains the loss of economic opportunities created by the lack of research in northern areas and the decreases in trawl survey coverage in Div. 2GH initiated in 2000. The Chair reminded participants of plans for a shrimp survey workshop in fall 2002. The Regional Director of Science, Oceans and Environment Branch, at the beginning of the current Shellfish RAP, committed to the workshop that would focus on ways and means to reinstate/initiate surveys in the north. Should surveys be reinstated in Div. 2G (SFA 4), linkages should be possible with results obtained in previous surveys.

Concern was raised that, although increased coverage by research trawl surveys is desirable and necessary to effectively monitor changes in the shrimp resource, long-term recruitment prospects (i.e. studies of the larval stages and early life history) are being neglected. It was noted that investigation into the effects of the environment (physical and biological) enable inference and hypothesis testing for early life history dynamics but directed surveys for shrimp larvae do not exist.

Questions were raised with respect to the integrity of the current assessment/management areas for shrimp and whether clear separations exist. It was noted that recent information about shrimp distribution during a period of high stock size requires review and that a reexamination of stock structure for shrimp likely will be included in the 2003 RAP. Results might suggest some change to the existing assessment units that currently correspond to the management units (SFA's). This raised concern for some participants who felt that management areas would be have to be changed, as well. It was pointed out that, although it is convenient that the units for assessment and management coincide, it is not necessary in that sub units or combined units can be accommodated within the management regime.

WP SF 2002/06 – Update of the juvenile shrimp net analysis. (Oral presentation) by D. Orr.

DISCUSSION

It was agreed that the catches in the small mesh net provided valuable information on the relative abundance of young shrimp, particularly in SFA 5 where their representation within the main Campelen trawl is low. Although the cost of obtaining samples is negligible, there is considerable cost for data collection and processing. Usefulness of the information obtained for snow crab needs to be considered in light of results of the study on the catchability of crabs by the research trawl (see WP 2002/02).

PROGRESS ON RESEARCH RECOMMENDATIONS FOR 2001

1. Continue modeling the relationship between biomasses/abundances in Hopedale – Cartwright Channels. The objective of this exercise is to eventually produce a multiplicative model that would allow biomass/ abundance estimation in the northern portion of SFA 5 during alternate years when surveys are not conducted north of 2J.

   This study has been initiated and will take several years to complete.

2. Continue using the juvenile shrimp net to capture early instar snow crab and shrimp.

   An update on this research is provided in WP SF 2002/06.

3. Address the lack of shrimp research north of SFA 5.

   Discussions were held with industry and various scientists. Research proposals were written (Nunavut Implementation Fund, Strategic Science Fund and Nunavut Wildlife Management Board). These proposals outlined a long term northern multi-species research program and request government funding to aid in the research.

4. Investigate the effects of annual variation in trawl catchability and/or efficiency on survey-based biomass indices.

   A summary of progress on this research is provided in WP SF 2002/02.

5. Investigate the effect of annual variation in fishing practices on commercial catch rates.

   A summary of progress on this research is provided in WP SF 2002/01.

6. Evaluate utility of inshore trap survey catch rates in assessment of resource status.

   A summary of progress on this research is provided in WP SF 2002/03.

RESEARCH RECOMMENDATIONS FOR 2002

1. Continue investigation of variability in multispecies survey trawl catchability for crab as a basis for applying a correction factor in estimation of abundance indices.

2. In conjunction with 1) integrate seabed classification (Roxann) database in estimation of crab abundance indices.

3. Investigate spatial scale for delivery of defensible scientific advice for snow crab throughout the Newfoundland-Labrador area.

4. Continue investigation of variability in spatial/temporal patterns of crab fishing effort distribution to provide a basis for interpretation of fishery performance data.

5. Continue investigation of inshore trap survey catch rate time series to develop a predictive tool in assessment of resource status.

6. Continue investigation of relevant environmental/ecological/abundance time species indices to elucidate mechanisms involved in determining year-class strength in shrimp and crab.

7. Continue investigation of data from the juvenile sampling bag attached to the multispecies survey trawl as a basis for determining relative year-class strength in shrimp and crab.

8. Continue attempts to address the lack of shrimp research north of SFA 5.

APPENDIX 1: LIST OF WORKING PAPERS

WP SF 2002/01 An assessment of Newfoundland and Labrador snow crab in 2001 by E. G. Dawe et al.

WP SF 2002/02 A study of the efficiency of the Campelen 1800 survey trawl in sampling snow crab by E. G. Dawe et al.

WP SF 2002/03 Preliminary assessment of the predictive value of 3L inshore time-series research cruise catch rate data by S.G. Sutton et al.

WP SF 2002/04 Effect of trap mesh size and soak time on commercial catch rates and size-frequency distribution by D. M. Taylor et al.

WP SF 2002/05 Assessment of northern shrimp off Baffin Island, Labrador and northeastern Newfoundland in 2001 by D. Orr et al.

WP SF 2002/06 Update of the juvenile shrimp net analysis by D. Orr.

LIST OF OTHER DOCUMENTS

Summary of physical oceanographic conditions on the Newfoundland and Labrador Shelves during 2001 by E. Colbourne.

Groundfish bycatch within the inshore vessel (<500 ton; <100') shrimp fishery off the east coast of Newfoundland and Labrador during 2000 by D. C. Orr et al.

Report on the interaction between shrimp trawling and the snow crab resource. Project Report: EACT-1.2001.DFO (FDP 281).

Report on the interaction between shrimp trawling and the snow crab resource – phase II. Project Report: EACT-3.2002.DFO (FDP 281).

APPENDIX II: LIST OF PARTICIPANTS

NAME	AFFILIATION	PHONE #	FAX #	E-MAIL ADDRESS
Andrews, Ray	FPI	709-570-0115	709-570-0436	randrews@fpil.com
Angel, John	CPPA	902-826-7765	902-826-7065	jangel@hfx.eastlink.ca
Barrow, Julia	DFO – Ottawa	613-990-0091	613-990-7051	barrowj@dfo-mpo.gc.ca
Beazley, Reuben	Seawatch	709-726-1913	-	reuben.beazley@nf.sympatico.ca
Best, Glen	Harvester	709-266-1414	709-627-3495	glen.best@nf.sympatico.ca
Best, Tom	Harvester	709-747-4835	709-368-5759	tbest@roadrunner.nf.net
Birmingham, David	Harvester	709-	709-368-5759	tbest@roadrunner.nf.net
Blanchard, Tony	DFO- FMB	709-772-4680	709-772-3628	blanchardt@dfo-mpo.gc.ca
Broderick, Bill	Harvester	709-669-3226	709-669-3240	wbroderick@nf.sympatico.ca
Brown, Kirby	Harvester	709-939-2238	709-709-2140	
Bussey, Nelson	Harvester	709-786-7650	709-786-7650	-
Chafe, Bernard	Harvester	709-747-9766	709-368-5759	tbest@roadrunner.nf.net
Chafe, Keith	Harvester	709-368-7858	709-368-7858	tbest@roadrunner.nf.net
Chidley, Gerald	Harvester	709-363-2900	709-363-2014	a.chidley@nf.sympatico.ca
Coffin, David	DFO – P &E	709-772-0183	709-772-4583	coffind@dfo-mpo.gc.ca
Colbourne, Eugene	DFO – SOE	709-772-6106	709-772-4105	colbourn@dfo-mpo.gc.ca
Coombs, Rob	FANL	709-782-6244	709-368-2260	rcoombs@pennecon.com
Corbett, Frank	DFO	709-772-6935	709-772-4583	corbettf@dfo-mpo.gc.ca
Curran, Tom	DFO – RMB	709-772-2045	709-772-3628	currant@dfo-mpo.gc.ca
Dalton, James	Seawatch	709-364-3308	-	-
Dawe, Earl	DFO - SOE	709-772-2076	709-772-4105	dawee@dfo-mpo.gc.ca
Delaney, Brian	Harvester	709-729-3712	709-7294219	bjdelaney@mail.gov.nf.ca
Dooley, Tom	DFA	709-729-0335	709-729-6082	tdooley@mail.gov.nf.ca
Drew, Joseph	DFO - SOE	709-772-6014	709-772-4105	drewj@dfo-mpo.gc.ca
Dwyer, Judy	DFO- SOE	709-772-2302	709-772-6100	dwyerji@dfo-mpo.gc.ca
Ennis, Jerry	DFO – SOE	709-772-2094	709-772-4105	ennisg@dfo-mpo.gc.ca
Evans, Geoff	DFO – SOE	709-772-2090	709-772-4105	evansgt@dfo-mpo.gc.ca
Farrell, Joe	Harvester	709-745-1936	709-745-4283	j_farrell@nf.sympatico.ca
Flight, Jim	Minister's Office	709-772-7268	709-772-7281	jim.flight@pwgsc.gc.ca
Freake, Roy	Harvester	709-266-2559	709-266-2070	roy.freake@nf.sympatico.ca
Glavine, Paul	DFA	709-729-3735	709-729-6082	paulglavine@mail.gov.nf.ca
McCallum, Barry	DFO – SOE	709-772-4915	709-772-4105	mccallumb@dfo-mpo.gc.ca
McCurdy, Earle	FFAW/CAW	709-576-7276	709-576-1962	tpretty@ffaw.nfld.net
Naidu, Sam	DFO – SOE	709-772-2091	709-772-4105	naidus@dfo-mpo.gc.ca
O'Keefe, Paul	DFO – SOE	709-772-2886	709-772-4105	okeefep@dfo-mpo.gc.ca
Orr, Dave	DFO – SOE	709-772-7343	709-772-4105	orrd@dfo-mpo.gc.ca
Parmiter, Dale	DFO – SOE	709-772-8892	709-772-6100	parmiterdg@dfo-mpo.gc.ca
Parsons, Don	DFO – SOE	709-772-2093	709-772-4105	parsonsd@dfo-mpo.gc.ca
Pearcey, Dawn	DFO, Ottawa	613-991-0218	613-990-7051	pearceyd@dfo-mpo.gc.ca
Perry, Geoff	DFO – SOE	709-772-8963	709-772-4188	perryg@dfo-mpo.gc.ca
Perry, Jacqueline	DFO – FMB	709-772-4911	709-772-3628	perryj@dfo-mpo.gc.ca
Rumbolt, Annette	DFO, Grand Falls	709-292-5167	709-292-5203	rumbolta2@dfo-mpo.gc.ca
Sandeman, E.J.		709-437-5495	-	sandy.sandeman@nf.sympatico.ca
Seward, Elaine	DFO – SOE	709-772-4562	709-772-4105	sewardel@dfo-mpo.gc.ca
Snarby, Ulf S.	Harvester	902-354-3305	902-354-3031	snarby@lpv.eastlink.ca

Stack, Leonard	Harvester	709-368-1924	709-368-5759	astack@avint.net
Sullivan, Darren	DFO – SOE	709-772-4622	709-772-4105	sullivanda@dfo-mpo.gc.ca
Sutton, Steve	DFO – SOE	709-772-4877	709-772-4105	suttons@dfo-mpo.gc.ca
Taylor, Dave	DFO – SOE	709-772-2077	709-772-4105	taylordm@dfo-mpo.gc.ca
Vardy, Dave	DFA	709-737-4311	709-737-8023	dvardy@roadrunner.nf.net
Veitch, Pat	DFO – SOE	709-772-7796	709-772-4105	veitchp@dfo-mpo.gc.ca
Walsh, Rosalind	Northern Coalition	709-722-4404		rwalsh@nfld.net
Ward, Jerry	Baffin Fisheries Coalition	709-834-0514	709-834-1667	jvward@roadrunner.nf.net

APPENDIX III – BRIEFING NOTES

ISSUE:

Stock Status Report for Divisions OB to 3K northern shrimp (*Pandalus borealis*).

BACKGROUND:

- The status of this resource was reviewed at a regional assessment meeting in St. John's, NF in March 2002.

CURRENT STATUS:

SFA 6 (Hawke Channel + Div. 3K)

- Shrimp biomass and abundance indices from research vessel surveys increased over the 1997 – 2001 period, while commercial catch rates remain stable at a high level since 1995.

- The 1996 year-class is weak but the 1997 - 1999 year-classes are strong.

- Any negative effect of the weak 1996 year-class, on the spawning stock, should be buffered by the residual female biomass and recruitment from the 1997 year-class.

- Predation mortality is unknown. The abundance of known fish predators (e.g. cod, redfish, skate and American plaice) remains low in the offshore. However, the harp seal population has increased.

- Warmer conditions, which have persisted since 1996, could negatively impact distribution, growth, survival, sex change and future catch rates.

- Recent catches have had no observable impact on the resource. Removals at the current level will not likely increase the exploitation rate.

SFA 5 (Hopedale and Cartwright Channels)

- Survey biomass and abundance indices for 2001 were substantially higher than observed for the 1997 – 1999 period. Commercial catch rates have increased since the early 1990's.

- The 1997 and 1998 year-classes appeared strong in 2001.

- The female spawning stock biomass index has almost doubled since 1999.

- Predation mortality is unknown. The abundance of known fish predators (e.g. cod, redfish, skate and American plaice) remains low in the offshore. However, the harp seal population has increased.

- A positive correlation between ice cover and commercial catch rates, 6 years later, has been observed. Ice coverage during the 1996 – 2001 period has been below normal. Catch rates could decline gradually or remain stable over the next several years.

- Recent catches have had no observable impact on the stock. Removals at the current TAC of 15,300 t will likely result in a reduced exploitation rate in 2002.

SFA's 2 and 4 (Div. 0B and 2G)

- No research surveys were conducted in these areas during 2001.

- Commercial catch rates from large vessels (> 500 t) in SFA 4 were higher in 2000 and 2001 than they were in 1998 and 1999, while those in SFA 2 increased from 1993 – 1996 and have remained stable thereafter.

- No estimates of strengths of recruiting year-classes are available.

- Changes in areas fished within and between years and the mixed fishery for *Pandalus borealis* and *P. montagui* off Resolution Island increases uncertainty in interpretation of catch rate data for SFA 2.

- The level of exploitation is uncertain for these areas but recent catches have had no observable impact on the resource in SFA 4.

Prepared by: D. Orr, Shellfish Section, Aquatic Resources Division

Approved by: D. B. Atkinson
Regional Director, Science, Oceans and Environment (709) 772-2028

Approved by: Wayne Follett, Regional Director General (709) 772-4417

SUMMARY

Briefing note for the Regional review of snow crab resources in Divisions 2J3KLNO and 4R Subdivision 3Ps.

Background

- The regional review of snow crab resources in Divisions 2J3KLNO and 4R and Subdivision 3Ps, was held during March 5-8, 2002. The meeting included industry representatives.

- The assessment compared the 2001 fishery and research data with those of previous years to determine whether or not significant changes in stock status have occurred.

Analysis / DFO Comment

Division 2J3KLNO

- Landings increased from 6,000 t in 1987 to 59,500 t in 1999. They decreased by 23% to 46,100 t in 2000 while the TAC was reduced by 19%. They increased to 47,200 t in 2001. Inshore landings have accounted for about 16% of the total during each of the past four years.

- Commercial catch rates from offshore fleets increased in the late 1980's and have remained generally high, although they declined after 1998 in Div. 2J3K. This reflects recent high commercial biomass relative to that of the mid 1980's overall that is decreasing in the north.

- The fall bottom trawl surveys, which are executed near the end of the fishery each year, indicate that the resource is broadly distributed throughout the survey area reflecting broad utilization of available habitat, although distribution appears to be variable by depth and substrate type.

- The exploitable biomass index, which was projected from the fall survey of the previous year, decreased between 1999 and 2000 but has been generally stable from 2000 to 2002.

- The projected pre-recruit index for >94 mm new-shelled males decreased during 1997-2000 but has been generally stable from 2000 to 2002.

- The ratio of the commercial catch to the exploitable biomass index increased steadily from 1997 to 2001. It will decrease in 2002 if the catch remains unchanged from the 2001 level. Actual exploitation rates are unknown.

- Survey indices for size groups of small males are highly variable and imprecise. Therefore, recruitment prospects in the medium and long terms are uncertain.

- The abundance of mature females, which is unaffected by the fishery, declined sharply during 1995-1997 and remained low during 1998-2001.

- Current status appears generally favorable from fishery data and research data indicate little change for 2002. Uncertainty associated with each data set is high.

- Prospects beyond 2002 are uncertain.

Subdivision 3Ps

- Landings increased from 600 t when the fishery began in 1985 to 7,920 t in 2000. They remained virtually unchanged (7,840 t) in 2001. TAC's have been reached each year.

- The offshore commercial catch rate increased steadily to 1999 and has since declined, but remains above the low level of the 1980's.

- Indices from spring bottom trawl surveys in Subdivision 3Ps are unreliable. Resource status and prospects are uncertain because of the lack of fishery-independent data.

Division 4R

- Landings increased from 650 t when the fishery began in 1994 to 1,640 t in 2000 and remained virtually unchanged (1,675 t) in 2001. TAC's have not been reached in some years.

- The commercial catch rate has remained stable over the past 4 years at a lower level than in other divisions.

- Resource status and prospects are uncertain because of the lack of any fishery-independent data.

_____

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