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**Proceedings of the Redfish Zonal Assessment
November 4- 6, 1998
Moncton New Brunswick**

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February 1999

GC
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P76
No98/20

Canada



Proceedings
Redfish Zonal Assessment
November 4- 6, Moncton New Brunswick

Abstract

The zonal advisory process (ZAP) of the Northwest Atlantic Stocks of redfish was held in Moncton, New Brunswick from November 4 to 6, 1998. The objective of the meeting was to review the assessments of Redfish in Units 1, 2, and 3 and in NAFO¹ Division 3O, and to report on the status of all four redfish stocks. The agenda for the meeting is given in Appendix I. Attendees to the meeting are listed in Appendix II.

Résumé

Le processus d'évaluation zonale des stocks de sébaste de l'Atlantique nord-ouest a eu lieu à Moncton, Nouveau-Brunswick du 4 au 6 novembre 1998. L'objectif de la réunion était la revue des évaluations des stocks de sébaste des unités 1, 2 et 3 et de la division 3O de l'OPANO² ainsi que la production de rapports sur l'état des stocks de chacun des quatre stocks. L'ordre du jour de la réunion est présentée en Annexe I. Les noms des participants sont mentionnés à l'Annexe II.

INTRODUCTION

The chairperson welcomed the participants at the meeting. A brief introductory statement was made to describe the operation and the objectives of the meeting. Participants were also reminded about the privileged nature of the discussions at the meeting until the Stock Status Reports (SSR) are released. The agenda was reviewed and approved as distributed. It was agreed that a single SSR would be produced for all four stocks. Draft text of the section on each stock unit would be reviewed before the meeting adjourned, and, if possible, the text of the introductory section would be drafted and reviewed as well.

In the following proceedings, summaries of the four stock assessments are provided. These summaries include the main conclusions, in bullet form, from which the SSR was drafted. The summaries are then followed by the major points of the discussions of the

¹ North Atlantic Fisheries Organisation.

² Organisation des Pêches de l'Atlantique Nord-Ouest.

status of each stock. These are not *verbatim* transcriptions of comments, questions, and replies, but fairly detailed summaries of the discussions.

Before the review of the first stock, there were questions about the joint DFO Science – Industry High Priority Project on redfish. It was reported that although all field work from that project has been completed, all analyses have not been completed. Consequently, some of the documents reporting on results will not be ready for review until early 1999. There will be a meeting of all DFO and industry participants sometime in late winter or early spring of 1999 to review result together, and discuss their implications for stock structure and assessments. At least until that meeting, however, we will continue to operate with current stock definitions. All were in agreement with these arrangements.

REVIEW OF ASSESSMENTS

UNIT 1

Main Conclusions

- Abundance appears to have remained stable from 1994 to 1998, at the lowest level in the time series.
- The 1980 year-class continues to dominate survey catches. The 1988 year-class appeared promising in the early 1990s, but is poorly represented in recent surveys. The 1996 year-class now appears the most abundant since 1988, but is not nearly as strong as the 1988 year-class appeared at the same ages. Whatever its strength, the year-class will not reach commercial size until about 2005, even if it continues to remain strong.
- Indices were available from several industry surveys, as well as a DFO research vessel surveys. All indices showed similar trends over time, although the absolute values of the indices differed greatly. The differences among surveys suggest that timing and magnitude of migrations vertically in the water column, and/or out of the Gulf, may have changed.
- Catches reaching the current cap of 1000 t, which was set for industry surveys, would not subject the stock to high exploitation.

Summary of Discussions

After presentation of the information on Unit 1 redfish by B. Morin, discussion revolved around the information base for the resource as well as further analyses that could possibly be carried out.

It appears that the 1000 t "experimental" TAC for 1998 will not be taken.

Industry representatives inquired as to whether distribution in relation to temperature had been investigated as some fishing skippers believe there is a relationship, particularly for larger redfish. No detailed analyses have been carried out although generally it appears that the redfish prefer temperatures in the range of 5-5.5 °C. Information on environmental conditions in the northern Gulf in 1997 and the first half of 1998 were not available during the meeting. Further information on redfish distribution in relation to temperature should emerge from the Workshop scheduled for early in 1999 when results of the Special Redfish Project will be presented and discussed.

It was emphasized that in addition to spatial considerations in relation to temperature, vertical distribution is also important since observations made in 4RS during acoustic surveys in the early 1980's suggested that redfish actively avoid temperatures >6 °C and will move up off the bottom when these higher temperatures are encountered. This movement could result in low catches when using a bottom trawl. It was agreed that overall, better integration of environmental information with the biological information is important and it was therefore recommended that for future redfish assessment meetings, an oceanographer be invited to attend and present information on oceanographic conditions in the depths important for redfish. Species experts should endeavor to work more closely with oceanographers in analyses of the data.

Considerable discussion related to overall redfish movements took place. Fishermen have found that fish can move fairly quickly along the slope edges such that schools may "disappear" and "appear" in a matter of days. In this context, the value of any index fishery utilizing only one vessel was questioned since during the commercial fishery good communication between vessels was necessary in order to maintain contact with schools.

It was suggested that in looking at the various sources of data, it might be concluded that fairly large-scale movements might now begin as early as late summer. Thus it would appear that the movements are beginning earlier now than prior to the late 1980's. If this is the case, then the current timing of the DFO survey (August) may be inappropriate for obtaining reliable estimates of biomass. It was pointed out however, that the surveys conducted in July and August caught very different size distributions of fish. Therefore the apparent movement may in fact only represent distributional differences between different sizes of fish. This needs further clarification, but further information on redfish movements should also emerge from the Redfish Workshop. Close comparisons of fish sizes taken during the different surveys should be made, both overall as well as by area so as to better understand how the fish may be distributing at the different time periods.

It was noted that the changes in movement range and timing occurred around 1987 and that this was about the same time as changes were seen in cod behavior.

The index fishery conducted in September caught almost no fish. Whereas a bottom trawl had been used during the earlier fisheries, a midwater trawl was used for the September work. Industry suggested that September might have been too early for using this gear. Also, if the fish were tight to the bottom, they would not be detected on the sounder. It was noted however, that there were also declines in catch rates in the sentinel survey

(directed for cod) in the fall and this work used bottom trawls. It was pointed out that the current "experimental" TAC of 1000 t could not be put in any context since the biomass estimates from the various surveys could not be related to total redfish biomass since catchability was unknown. Nonetheless, it was agreed that catches in the range of 1000 t should not prove harmful to the resource.

Discussions of the resource status focussed on the continuing lack of any good recruitment. It was generally agreed that the resource remains at a low level, but fishermen are concerned that since they are no longer on the water, they are losing touch with what is happening with the resource. It is clear that there are a number of questions concerning the resource beyond its current status that need to be addressed. These include the issues of distribution and movements. Future work should be focussed on these issues and while details were not discussed, additional work in the field was considered necessary.

UNIT 2

Main Conclusions

- Estimates from both DFO and industry surveys indicate that exploitable biomass has remained stable throughout the mid-1990s.
- The 1988 year-class is the first strong year-class since that of 1980, and has just reached minimum legal size. This year-class is expected to support the commercial fisheries in the next few years, although it is unknown if the year-class can sustain commercial harvests for as long as the 1980 year-class did.
- The current TAC of 10,000 t is estimated to represent a relative exploitation rate (TAC / survey biomass estimate) of about 6%, which is sustainable for this stock.

Summary of Discussion

Fishing in 3Ps (mainly in unit areas d and g) industry reported catch rates averaging 2.5 t/hr in 1998 compared to 1.1 and 1.4 t/hr in 1997 and 1996. The harvesters present reported that their catches in 1998 were mainly of fish 31-35 cm total length (65%) with equal quantities 26-30 and 36-40 cm. None were less than 26 cm. Their fishery over the past three years was conducted in a consistent manner, using four sister ships fishing with midwater trawls in January-April. Mesh size was 105 mm.

One participant from the industry reported finding that the catches in the last few weeks contain a component of smaller fish close to the minimum size, suggesting that the fishery is starting to shift over to fish of the 1988 year class. Another industry participant reported picking up some small fish, 15-16 cm, in 3Ps in 1998 for the first time in several years. Industry also noted that parasite problems still occur in fish from 3Ps but only occasionally for a week or two, not as persistently as before.

There was substantial discussion of survey results. Serious concern was expressed that no DFO summer survey was conducted in 1998 due to financial problems. DFO participants stated that they expect to reinstitute this survey in 1999. Two GEAC surveys were conducted, one in December 1997 and one in August 1998. It is planned to have a time series of these, one survey per year. The GEAC surveys had the same stratified random design and area of coverage as the DFO summer surveys, but the trawls were different. The GEAC net had a 90 mm codend with no liner whereas the DFO survey trawl had a 40 mm codend mesh and a 12 mm liner. The importance of the DFO survey was emphasized because it gives an indication of recruitment. The question was raised of using a liner in the GEAC survey but it was considered advisable to keep this as a survey of the population of commercial sizes.

It was suggested that there was a lot of similarity between the results of the GEAC survey in 1997-98 and DFO summer surveys in 1994-97, all showing a biomass of about 200,000 t, but less similarity with the results of the spring survey in 3Ps. Caution was expressed against such direct comparisons of results because of differences in gears, survey designs, and areas covered. In the case of the spring survey in 3Ps, this is a bottom trawl survey at a time when the commercial fishery is being conducted by midwater trawl, and the two are sampling different parts of the population. Summer surveys using bottom trawls are likely to be more representative of the overall population because at that time the commercial fishery finds greatest success using bottom trawls. It was agreed that the GEAC surveys gave estimates of abundance that were quite consistent with those from previous DFO summer surveys, although with a higher variation, and gave reassurance that the basis of last year's advice appeared to be sound. It was decided to calculate biomass estimates from the GEAC surveys for fish greater than 22 cm to improve the basis of comparison.

The occurrence of large quantities of small redfish on the southeast corner of Banquereau Bank, in water too shallow to be sampled in the GEAC surveys, have been reported by commercial fishermen. It was noted that the Gulf sentinel surveys included 3Pn and these data are relevant to the status of Unit 2. The results of these will be reviewed in next year's analysis.

It was agreed the fishery has been supported largely by the 1980 year class, and the year-class will still contribute for some years to come. However, the big question is the size of the 1988 year class, now beginning to enter the fishery. As it does we will get an idea of its size relative to the 1980 year class. The next year class of any significance after the 1988 is that of 1994. During the 1997 DFO survey, the 1994 year class was found to be distributed mainly in 3Pn, in contrast to the 1988 year class which occurred in surveys in all Divisions. This restricted distribution provides a note of caution.

The question was raised whether there had been any changes in size or age at maturity over time. The available data show only the situation in the last few years. It was emphasized that males mature at about 21 cm whereas females mature at 27-28 cm, so choice of a minimum size is quite arbitrary. However, there is no basis to reduce it below the present 22 cm.

UNIT 3

Main Conclusions

- Estimates from both DFO and industry surveys, although highly variable among years, suggest that exploitable biomass has remained stable in recent years.
- Fishing success had declined considerably in the eastern portions of Unit 3 during 1998 whereas RV surveys suggested stability. This could not be explained and was cause for concern. Industry and science will be working together to better understand these differences.
- Redfish in Unit 3 appear less dominated by occasional exceptional year-classes, and recent surveys find small redfish to be somewhat more common than in the early 1990s.
- The 1998 fishery, although very successful, was concentrated into a small portion of western 4X. This is also cause for concern and suggests extra caution be exercised in the management of this resource.
- The current TAC of 10,000 t would represent an exploitation rate of approximately 15% of survey biomass, which would be high for redfish. However, catches have been well below the quota since 1993, and the survey biomass estimate underestimates total exploitable biomass due to incomplete coverage of the depth range of redfish and as a result of diurnal variation in catchability.
- Need for a Unit 3 redfish industry survey was discussed. Expanding the ITQ survey to take redfish samples from all tows and to include all of Unit 3 was suggested as a practical approach

Summary of Discussions

R. Branton presented the available data for Unit 3 redfish . After the presentation, a discussion of the shift of the area of landing (more in western 4X in 1998) took place. There were concerns that the water temperature may have changed where the fishing took place, but it was reported that although it was colder on the Scotian Shelf it was not so much so in the west. With regard to depth of fishing, it was reported that fishing occurred in water of more than 50 fathoms in the basins. A participant suggested that the shift of effort from east to west might be due to the increase in size, better catch rates and a decrease in the bycatch of spiny dogfish.

There were questions regarding the comparability of surveys and the commercial fishery. It was also noted that RV surveys are a 24 hour operation and the ITQ surveys are daylight only, whereas for the fishery, 24 operations only occur in some places and at some times. The ITQ survey does not include the 4W portion of the management unit or the shelf slope. The ITQ survey did not take length frequency samples for all tows as was the case for other more valuable species. The RV biomass estimates currently did not include the deep tows (>200fm) from the shelf slope (conducted there since 1995). Need for a Unit 3 redfish industry survey was discussed. Expanding the ITQ survey to take redfish samples from all tows and to include all of Unit 3 was suggested as a practical approach.

Industry asked about the relation between the Gulf of Maine and Unit 3. It was reported that the same species (*S. fasciatus*) is fished there by U.S. fishermen (250 t in 1997, using 155 mm mesh codends) but we don't know the detailed stock structure. There have been positive signs from U.S. surveys regarding the status of Gulf of Maine redfish (part of which is in the Unit 3 management unit) since 1996. It was also noted that the peaks in the U.S. survey are composed of small redfish (modes at 20 and 25 cm)

An industry participant stressed that industry was picking up several signals which were cause for concern, including:

- Daily catch level decrease in some areas : 25,000 pounds to 5-6000 pounds.
- Effort shifted from area to another.
- Area fished one year = catch rate decrease next year.
- The conclusion is that Unit 3 redfish are in trouble.
- The signs are particularly concerning because the total biomass estimate is 67,000 t but TAC the same than in Unit 2, which has a much larger estimated biomass.

R. Branton was asked to summarize the RV survey biomass into 3 areas, namely: east of the Bowtie, Bowtie and west of the Bowtie. Graphs were prepared for the period 1989-98 and presented to the group. Biomass estimates for the east and west of the Bowtie although variable between years showed no obvious trend, whereas biomass estimates for the Bowtie had increased considerably after 1994.

Other industry participants also noted some positive signs in other areas:

- There was a closure in one area that affected the fishery : fish were not there after the opening
- There was an overall increase in size composition, with some fishers having their best fishery in 1998.

It was noted that the closure was in small areas only thus it is not an important factor, and that some past participants had shifted their fishing to other species.

DFO representatives summarized previously collected comments from fishermen as indicating that those with experience only in the west of Unit 3 fishers were generally happy with the 1998 fishery, whereas those with experience in the east were very concerned with their poor success in the east and as a result had moved their efforts west. In any case both groups were very concerned over now having all of their effort concentrated into one very small area. Some operators were suggesting that redfish fishing (<130mm codend) be expanded into the deeper portions of the Bay of Fundy (north of 43° 30'). These phenomena were contained in the assessment analyses. In the general discussion which followed, it was noted that this is a new fishery, so we should not put too much importance on the CPUE.

It was agreed that except for the U.S survey results there is no evident (obvious) pulse of recent recruitment as was seen in other areas to the east. There was however some difference of opinion on whether there is consistent recruitment at a moderate level or no recruitment at all.

Much discussion focused on the new situation with 75 % of the 1998 catch coming from the west. This led many industry participants to stress that because of the reduction of the CPUE we should be careful with Unit 3. Also more gear conflict happened in 1998 and the bycatch increased.

It was also noted that the survey is an underestimate of biomass. Exploitation rate increased in 1998 but the absolute value of the exploitation rate remains uncertain. The pattern of exploitation has changed, and it is more appropriate to use RV survey fine scale level (not 5 years average).

DIVISION 30 (Southern Grand Bank)

Main Conclusions

- Survey results for this stock are highly variable, and a probably large but unquantified biomass of older, larger redfish inhabits the water column along the continental shelf, where research and commercial trawling is difficult.
- Therefore, it is not possible to describe overall trends in total stock size, or to estimate current exploitation rates.
- The fishery in 1998 appeared to target a large newly recruiting year-class just above the 22 cm legal size limit. Older fish remain common in commercial catches, but are more dispersed in the water column, yielding lower commercial catch rates.
- The Canadian fishery in this Division is still in the learning phase, and there is some foreign harvest of this stock. Although absolute biomass is uncertain, catches at the level of the 10,000 TAC are unlikely to inflict a fishing mortality above $F_{0.1}$.

Summary of Discussions

The assessment biologist was complemented for having the results of the 1998 survey included in this assessment, although the survey was completed only a few weeks before the meeting. In response to questions about the survey series, the consequences of changes from the Engels to the Campelen nets and foot gears, including the calibration fishing tests, were discussed in some detail. The changes in foot gear were thought to have particular impact on catches of small fish, and it was thought likely that, as with Unit 1, larger redfish are under-represented in the survey catches, relative to their abundance. The under-representation of older, larger redfish would have been especially true prior to 1991, when the maximum depth surveyed was increased from 200 m to 750 m.

Industry reported that all of their fishing activity was in the southwestern part of 30, with most of their catch in 30c and 30e. Industry reported that in 1998 the CPUE averaged 1,555 kg per hr. For size composition 8.8% were between 18-21 cm, 54% between 22-25 cm, 29% between 26-30, and the balance was over 30 cm; with on average 430 fish per 100 kg of catch. The fishery primarily was prosecuted between late May and August. Both industry and researchers reported that catches in waters deeper than 350 m had many more large fish, with substantial numbers >40 cm. However, fishing is hard in these areas, with very little ground suitable for bottom or even pelagic gears.

There was some discussion of the extensive sampling that industry does itself, both on the boats and at port, although there is little observer coverage unless a vessel is fishing for the French under contract. The at-sea sampling can be linked exactly to the particular site fished. Industry would like to see more use made of this sampling data in future assessments.

Industry was asked about the change in catch rates from 96 to 97 to 98, where rates were high, then low, then high. Industry explained that the changes were largely market driven, with also some problems with small fish in 1997. Several lines of evidence suggest that the small fish problem may be passing, as a cohort recruits, as well as moving geographically. However, there has been debate for 20 years with how much more yield the smaller redfish in 3O will produce. Canadian experience with this fishery is too limited to provide an answer at this time. It was agreed that a lot of learning is necessary to fish profitably in this area, and fishing is hard. There is a widespread belief in both industry and research that there is a large reservoir of large fish in deep waters of 3O, but they may be so sparsely distributed that it will never be economical to exploit them. Industry reported that at present they concentrate their fishing where they are confident of finding fish of the sizes appropriate for market, and sometimes just take smaller fish to finish up a trip.

Industry also reported that they have conducted many talks with Russians who used to fish this stock. The Russians believe that there is a strong effect of water temperature. The Canadian fleet also sees a temperature effect in this fishery, but not in other redfish fisheries. Science agreed with that observation, and thought that the effect of incursions of Gulf Stream waters along the slope worked to bring the fish out of the canyons and concentrate them.

The size composition of the survey and commercial catches was discussed in detail, because last year a difference in these size compositions was an important component of the conclusions of stock status. This year the size compositions are quite similar. It was agreed that the change this year is in the commercial compositions, which is catching a larger proportion of smaller fish. That change may reflect that the small fish seen in the surveys each year have now reached legal and marketable size, so the industry is no longer avoiding them.

When developing the consensus view of stock status, the high uncertainty about the state of the stock was the prominent factor. However, it was agreed that the surveys indicate that there continues to be in excess of 100,000 t of redfish in the area, and the fishery supported catches in the neighborhood of 15,000 t for a long period. The major source of concern is the absence of evidence of additional recruits coming in behind the stock now being fished.

APPENDIX I

ORDRE DU JOUR

Revue zonale des évaluations de sébaste
Salle Miramichi,
Centre des pêches du golfe, Moncton
4-6 novembre 1998

AGENDA

Zonal Redfish Assessments Review
Miramichi room,
Gulf Fisheries Center, Moncton
4-6 November 1998

Mercredi	4/11/98	Wednesday
Café et muffins	9h30	Muffins and coffee
Mot de bienvenue	10h00	Greetings
Sébaste de l'unité 1	10h15	Unit 1 Redfish
Diner	12h00	Lunch
Sébaste de l'unité 1	13h00	Unit 1 Redfish
Pause	15h00	Break
Sébaste de l'unité 2	15h30	Unit 2 Redfish
Jeudi	5/11/98	Thursday
Sébaste de l'unité 2	9h00	Unit 2 Redfish
Pause	10h00	Break
Sébaste de l'unité 3	10h30	Unit 3 Redfish
Diner	12h00	Lunch
Sébaste de l'unité 3	13h00	Unit 3 Redfish
Pause	15h00	Break
Sébaste de l'unité 30	15h30	Unit 30 Redfish
Vendredi	6/11/98	Friday
Sébaste de l'unité 30	9h00	Unit 30 Redfish
Pause	10h00	Break
Corrections	10h30	Reruns
Diner	12h00	Lunch
Corrections / révision du rapport final	13h00	Reruns / Final report review
Pause	15h00	Break
Revision du rapport final	15h30	Final report review

APPENDIX II – Attendees / Participants

D. Bruce Atkinson	DFO – St. John's
David Bolivar	SeaFreeze Foods, Halifax
Robert Branton	DFO – Dartmouth
David Decker	FFAW – Corner Brook
Paul DeLaney	Madelipêche, QUE
Dave Gillis	Province of P.E.I.
Ralph Halliday	DFO – Dartmouth
Réjean Hébert	DFO – Moncton
Frank Hennessey	FRCC
Brad Hughes	AMP Fisheries, St. John's
Keith Lohnes	Clearwater/ Poseidon Princess, NS
Bernard Morin	DFO – Mont-Joli
Michael O'Conner	National Sea Products, Halifax
Don Power	DFO – St. John's
Jake Rice – Chairman	DFO – CSAS (Ottawa)
Rex Simmons	AMP Fisheries, St. John's
Bill Smith	Fishery Products International, St. John's
Maureen Yeadon	FRCC