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Solicited Comments on Proposal for Second Ageing Workshop on Shrimp

Compiled by

NAFO Secretariat

1. Possible Need for Further Workshop on Ageing Shrimp

One of the conclusions from the Shrimp Ageing Workshop in 1981 was that more thorough investigations of biological characteristics were necessary before age structure and growth of shrimp could be fully understood (*NAFO Sci. Coun. Studies*, No. 6, page 97). It was agreed at the workshop that research should continue in this direction and that another workshop be held in 2-3 years to review progress. At the January 1984 Meeting of the Scientific Council, the Standing Committee on Fishery Science (STACFIS) reviewed the proposals from the first workshop in 1981 and recommended *that the participants of the 1981 Workshop be contacted to see if there has been sufficient progress to warrant another session and that a report of the survey be made available to STACFIS at the June 1984 Meeting.*

During February-April 1984, a letter containing the proposal (Appendix I) was sent to the particpants in the 1981 Shrimp Ageing Workshop and to others as information became available on their interest in ageing shrimp:

Canada:	R. J. Cormier, J. Fréchette, D. G. Parsons, Louise Savard
Denmark:	D. M. Carlsson
France:	H. Dupouy, J. P. Minet
Greenland:	K. Lehmann
Iceland:	I. Hallgrimsson, U. Skúladóttir
Norway:	T. Jakobsen
USA:	S. H. Clark, P. Jackson, A. Jearld, D. Sampson, L. J. Watson, J. P. Anderson

2. Relevant Extracts from Responses

a) Canada (D. G. Parsons, St. John's, Nfld)

Investigations into the problems involved with age and growth in shrimp have been continued by the Research Branch in St. John's in response to the recommendations of the first Shrimp Ageing Workshop. One area we have been interested in lately is the sampling of shrimp from the stomachs of predators such as cod and Greenland halibut. Length frequencies of shrimp taken from predator stomachs often contain more details on the sizes of the youngest age groups than do samples from trawls. Standardization of predator sampling could provide data which have potential for predicting recruitment (at least qualitatively) and problems of availability and selectivity also could be addressed.

Biological consultants currently are analysing plankton samples for shrimp larvae and, hopefully in the near future, we will have good information on nursery areas, larval growth, and size at settling. I also have had some experience with Daniel Pauly's ELEFAN programs and have tried the methodology on northern shrimp. Participants may be interested in the results.

We currently are using electronic calipers for length measurements in routine research sampling and hope to have software for biological sampling sometime in 1984. This information might be useful to others interested in streamlining the collection of data.

As far as participation outside the group is concerned, I am convinced that there are a number of people who would improve the workshop through their participation. A few that immediately come to mind are:

- Daniel Pauly (Phillipines), created the ELEFAN series
- R. Weinberg (FRG), studies on larval growth
- R. G. Rinaldo (USA), ageing of shrimp in the Gulf of Maine
- Chris Mathews (Kuwait), penaeid shrimp in Mexico and Kuwait

Other participants of the previous workshop, undoubtedly, will add to the list and it might be useful to form a committee to organize the workshop and solicit outside expertise.

b) Canada (J. Fréchette, Ste-Foy, Quebec)

The first workshop was, I think, very useful for all participants in that the principal difficulties in ageing shrimp were noted. The concensus was that some solution to the ageing problem was necessary before initiating future work on growth and mortality. The main object of the second workshop should be to find or propose some solutions to the ageing problem.

At the last workshop, I proposed a method to separate age-classes using both mathematical methodology and reproductive events. This was intensively discussed but a consensus was not reached. We have now refined the analysis and, I think, we should be ready by 1985 to present a scheme for age-class interpretation from the population structure. We hope that this scheme developed for the northwestern Gulf of St. Lawrence (Sept-Iles) stocks will at least be applicable for the stocks throughout the Gulf. Also, we can contribute to some extent to other topics, specifically maturation, spawning and size of 0-group, with new information available.

As far as organization is concerned, the format of the previous workshop should be followed (i.e. the request for data in tabular and graphical form and not necessarily for formal papers). Past experiences have shown that it was very useful for participants to analyze the same sets of data, using different methods. Such a format involves limiting the number of participants, and special facilities (ready access to computer and statistical software, especially special programs such as NORMSEP) must be available.

I do not wish to become directly involved in organization of the second workshop, but I would be happy to give advice based on the experience gained in organizing the 1981 workshop in Quebec. Perhaps the next workshop could be held at an European laboratory, which has been intensively involved in collecting and analyzing biological data on *Pandalus borealis* from the Davis Strait stock.

Other scientists involved in this type of specific research should be invited to attend the next workshop, including possibly those from the ICES Pandalid Working Group. Also Louise Savard, Quebec Region, Department of Fisheries and Oceans, is now working on the molting cycle of *P. borealis* and should be considered a potential participant.

c) France (H. Dupouy, J. P. Minet)

Previous meeting in 1981 was very useful to us, especially for standardization of sampling methods and precise determination of sexes and maturity stages. However, determination of ages was not totally resolved and large discrepancies were noted between the results of the "Icelandic deviation method" and the "modal group separation method".

The need for another workshop exists, especially to look at any new approaches to the problem, starting for example, with the results of tagging experiments and knowledge of life cycle (hatching period, duration of planktonic life, frequency of molting, etc.). However, our data since 1981 are insufficient to provide answers to these problems, because the samples are mainly from commercial catches.

In conclusion, if any of the scientists involved in shrimp ageing problems have new data of major importance to resolve the difficulties, another workshop could be planned for 1985, but it might be more convenient to have it in 1986.

Personally, we are not now involved in research on shrimp and do not anticipate attending a future workshop on that topic, but our laboratory in St. Pierre should be very interested in the matter.

d) USA (S. H. Clark, A. Jearld, Woods Hole, Mass.)

We both feel that another workshop in 1985 or 1986 would be useful, although our progress in this area has been limited. We are currently examining life history aspects for the Gulf of Maine stock through analysis of commercial and research vessel survey data. By early next year, we could make some worthwhile contributions to such a workshop but any earlier than that would be premature.

e) USA (D. B. Sampson, Boothbay Harbor, Maine)

Although we may not be able to contribute to any new information on the subject of ageing *Pandalus borealis*, our laboratory would be interested in participating in such a workshop if other participants have any new information.

At present, our shrimp research activities consist of (i) commercial shrimp fishery monitoring, and (iii) physiological studies of larval *P. borealis*. We plan to conduct laboratory studies of energy partitioning in *P. borealis* for all stages of the life cycle. These studies should produce data pertinent to techniques for ageing shrimp but the results will not be available for several years.

f) Norway (Ø. Ulltang)

We have no new data that would be relevant to the scope of another session of the Shrimp Ageing Workshop.

g) USA (L. J. Watson, Kodiak, Alaska)

As Peter Jackson is no longer affiliated with the Alaska Department of Fish and Game Shrimp Research section, I am currently responsible for the program at its present level. Although we have had no new investigations on shrimp ageing topics, we have continued to collect basic length frequency information for the Gulf of Alaska shrimp stocks. I would be most interested in attending any upcoming workshops and would like to continue receiving any information on these topics. It may be possible in the future to modify our research goals to include basic life history work in light of prevailing severely depressed stock conditions in the Gulf of Alaska.

h) USA (P. J. Anderson, Kodiak, Alaska)

I have prepared a brief presentation of the salient matters that should be discussed in any future shrimp ageing workshop. Unfortunately, due to circumstances beyond my control, I was not able to attend the first ageing workshop. Therefore, I am basing my comments on the material contained in the NAFO Scientific Council Studies No. 6 and subsequent discussions with my colleagues.

I feel any future workshop should deal with the definition of the unit stock from which size samples are drawn for age determiantion. It has been demonstrated that Pandalid shrimp are diel vertical migrators, as such they are subject to horizontal current displacement and dispersion. I'm sure most of the investigators who could track size-modes sucessfully felt there was an implicit definition of their stock. However, I still feel it is worth considering those cases where following size-modes was not successful and possible explanations. Our experience has shown that some areas contain shrimp whose size-modes can easily be tracked annually and other areas where this cannot be accomplished. We feel those areas where size-groups are easily tracked, are characterized by, either geographic or current (gyre) induced isolating mechanisms. Also differing degrees of vertical movement, mainly small males undergoing more extreme vertical migrations as opposed to lesser migrations of larger females, may lead to segregation of size-sex groups. Variability and the degree of dispersion would have to be considered, to insure the complete sampling of the stock. The discussion of the experiences of various researchers and their methods for addressing this problem would give us a better appreciation for its significance and future data needs.

From 1974-1976 our research facility used a pre-recruit sampling device (13 mm stretch measure) along with our regular trawl gear during shrimp surveys. We found that during the fall sampling period 0-age group shrimp were well represented in these special samples. This allowed verification of our age designation of the initial dominant size-modes from our survey catches. In 1981, we used benthic sleds to capture recently settled *P. borealis* and *P. goniurus* after monitoring their development in the plankton through the spring and summer. These studies further corraborated our initial age designations of small size groups.

In our continuous monitoring of some western Alaska shrimp stocks from 1972 to the present, we have not been able to detect the formation of bimodal size groups within an age class. While it is true that rates of sex transition vary extremely between year-classes, some transforming completely in one year while others may gradually transform over as many as four, this did not effect our ability to separate size-modes when sex groups were combined. Additionally, we found no significant difference between average sizes of primaparous and multiparous females of the same assumed age-class.

Assuming that we are left with size-mode analysis for our primary ageing method, I would like to see the scope of future workshops broadened to include problems in mortality estimation.

i) Denmark (D. M. Carlsson, København N)

The first workshop on ageing of shrimp was very useful in giving a review of the knowledge on ageing of shrimp at that time and in defining what were the most important outstanding questions in using shrimp sampling in shrimp stock assessment.

At my institute we are currently sampling shrimp from Greenland waters. At the present time we are not able to bring new information on the methods of analysis of the samples and will probably not be able to do so in 1985 either, while the situation might be different in 1986. If other scientists have obtained new information on these problems, we see no problem that a second workshop is arranged in 1985, and we would certainly attend such a workshop.

The problems concerning the analysis of shrimp samples fall in two major groups, namely technical-mathematical problems in the splitting of length-frequency distributions, and - what I find more important - knowledge on the biology of shrimp that is a necessary basis for using the mathematical methods. If other scientists than those participating in the first workshop should be invited to the next, it might be useful to consider both aspects.