PROJECT REPORT

GROUNDFISH PROGRAM

Gadoids Section

Biology of Arctic cod

W. H. Lear

1. PROJECT DESCRIPTION

Collection of biological data on Arctic cod during regular groundfish surveys. Analysis of meristics data from Arctic cod to determine the number and distribution of stocks in the Region.

Note: Minimal resources are allocated to Arctic cod research. Such studies will likely continue on a "low-key" basis.

2. LONG TERM OBJECTIVE(S)

To understand the population biology of Arctic cod in the Newfoundland-Labrador area especially in light of its recent apparent increase in abundance and southern extension of its range in the area. To determine if there is a single stock or several stocks in the area in anticipation of a potential need to manage a fishery on this species.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Research vessel surveys (opportunistic sampling) and statistical analysis of meristic characters.

5. EXPECTED KEY RESULTS (1986-89)

1986

- Primary publication on stock discrimination of Arctic cod.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Collection of biological data on Arctic cod during regular groundfish surveys. Process current biological data on Arctic cod.

Collected basic biological information on survey cruises during 1985. Data routinely processed as collected. Produced two NAFO Research Documents regarding trawlable biomass estimates of Arctic cod in 2G, 2H, and 2J, 3K, and 3L.

2) Produce primary publication on stock discrimination of Arctic cod.

Results completed. Manuscript written and reviewed internally for eventual revision by author.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Collection of biological data on Arctic cod during regular groundfish surveys and possible eastern Arctic survey in 1986. Process current biological data on Arctic cod.

2) Produce primary publication on stock discrimination of Arctic cod.

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

Lear, W. H., and J. W. Baird. 1985. Minimum estimates of abundance of Arctic cod (Boreogadus saida) in NAFO Divisions 2J, 3K, and 3L from research vessel surveys. NAFO SCR Doc. 85/42, Ser. No. N992. 14p.

Lear, W. H., and W. R. Bowering. 1985. Minimum trawlable biomass estimates of Arctic cod (Boreogadus saida) in NAFO Divisions 2G and 2H from post-stratified groundfish surveys. NAFO SCR Doc. 85/41, Ser. No. N991. 8p.

iv) popular and miscellaneous

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10. REVIEW AND EVALUATION

a) Program Head

Approved without comment.

b) Management Committee

Should the eastern Arctic survey cruise be approved for 1986, acoustic methodologies should be explored in addition to normal activities.

PROJECT REPORT

GROUNDFISH PROGRAM

Gadoids Section

Nematode parasites in cod

J.H.C. Pippy (FAFP) and C. A. Bishop

1. PROJECT DESCRIPTION

The project will examine the distribution, abundance, annual variability and host-parasite relationships of nematode parasites in cod from stocks in NAFO Div. 2J, 3K, 3L, 3N and 3O and Subdiv. 3Ps.

2. LONG-TERM OBJECTIVE(S)

To monitor levels of distribution and abundance over time of nematode parasites in cod.

3. TIMEFRAME

Project to commence in 1986; indeterminate.

4. STRATEGIES

Examination of cod specimens collected as part of weight analysis studies. Existing data bases will also be used.

At the recommendation of the Newfoundland Working Group on Fish Nematodes, Dr. J.H.C. Pippy, Program Head (FAFP) has been seconded for six months (commencing January, 1986) to develop a co-ordinated regional approach to activities relating to the problem of nematodes in fish flesh. The following terms of reference will apply for the special assignment:

1. To advise the Working Group on Fish Nematodes on current activities related to the nematode problem and of possible avenues for future work in the Region.
2. To prepare a critical review of current directions of research at other institutions and to keep up to date with that research.
3. To prepare an inventory of investigators with expertise beneficial to the solution of the nematode problem.
4. To coordinate the various biological, technological, and economic research activities conducted by the various branches within the Region to minimize overlap and maximize the use of available resources.
5. To consider and propose directions for future research to the Newfoundland Working Group on Fish Nematodes and to design or assist in the design of those recommended by the group and approved by the respective directors.
6. To assist, wherever possible, departmental investigators involved in work related to the distribution and abundance, detection and removal, public health, and economic aspects of the nematode problem in fish.
7. To develop or assist in the development of terms of reference for contracts to do work on the fish nematode problem.
8. To act as scientific authority on all contracts issued by the branches for work on the fish nematode problem.
9. To solicit suitable post doctoral fellows for work on specialized areas of the nematode problem and to supervise successful candidates.
10. To establish and maintain contact with researchers and other personnel (involved with activities related to the nematode problem) in other Regions.
11. To act as a DFO point of contract with the fishing industry on matters related to the nematode problem in fish.

12. To act as a DFO point of contact with the public and the news media on issues related to the nematode problem in fish.

13. To prepare, if required, a public information handout on the nematode problem in fish.

5. EXPECTED KEY RESULTS (1986-89)

1986

- To develop a co-ordinated regional approach to activities relating to the problem of nematodes in fish flesh.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

Not applicable; reader is referred to preliminary publication:

Wells, R. J.H.C. Pippy and C. A. Bishop. 1985. Nematodes in cod collected from NAFO Divisions 2J, 3K, 3L and 3Ps in autumn, 1983. CAFSAC Res. Doc. 85/79. 14p.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1. To develop a co-ordinated regional approach to activities relating to the problem of nematodes in fish flesh.

2. To investigate the feasibility of using raw data collected by individual major fish producers on the occurrence of nematodes in fillets and napes from different geographic localities.

3. To examine cod specimens (fillets and napes) collected for weight analysis studies during research vessel cruises in NAFO Div. 2J, 3K, 3L, 3N and 3O, and Subdiv. 3Ps during 1985.

4. To identify nematode specimens collected and conduct data analysis with the objective of providing a report to CAFSAC.

8. BACKGROUND

a) Highlights

Formation of Newfoundland Working Group on Fish Nematodes.

Special assignment (six months, commencing January, 1986) of J.H.C. Pippy to develop a co-ordinated regional approach to activities relating to the problem of nematodes in fish flesh.

b) Selected involvements

i) collaborative research

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

N/A

b) Management Committee

This is a new project developed in consultation with the Newfoundland Working Group on Fish Nematodes and the Regional Director General. The project is to be given high priority in 1986 and goals may need to be revised during the year to reflect further initiatives.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Biology and assessment of American plaice and yellowtail

T. K. Pitt, W. B. Brodie and S. J. Walsh

1. PROJECT DESCRIPTION

Study of the life history and biology of American plaice and yellowtail flounder in the Newfoundland-Labrador area and provision of advice on stock status for fisheries management. Stock assessment methodology studies are continuing.

2. LONG-TERM OBJECTIVE(S)

To provide biological information on American plaice and yellowtail in the Newfoundland-Labrador area toward provision of management advice.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Collect and analyze biological data from research vessel and commercial catches. Evaluate alternative methods for stock assessment.

5. EXPECTED KEY RESULTS (1986-89)

1986 to 1989 (inclusive)

- Conduct annual assessments of American plaice and yellowtail stocks under catch quota regulation.

1986

- Complete American plaice bulletin.

1987

- Publish American plaice bulletin.

1988 and 1989

- Produce primary publications on distribution, growth and maturity of adult plaice and yellowtail.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Continue the collecting, processing, and analysis of data related to the biology of plaice and yellowtail with specific emphasis on adult growth (Walsh) and distribution. (Brodie)

Data collected on most groundfish cruises in 1985. Considerable amount of information, particularly for plaice, collected on seasonal surveys in Div. 3L. Work on distribution limited to analysis of historic research vessel survey data inside versus outside the 200 mile limit. Work on growth was restricted to juvenile flatfish, with further discussions with Section Head on adult growth being held on types of analyses to be undertaken.

2) Conduct assessments of plaice and yellowtail. Continue evaluation of input parameters where required. Update/modify assessment-related computer programs as required. Examine the possibility of assessing Grand Bank plaice stock by Division (3L, 3N). (Brodie)

Assessments on all plaice (2+3K, 3M, 3LNO, 3Ps) and yellowtail (3LNO) stocks were presented to either

CAFSAC or NAFO. Evaluation of input parameters is done on an annual basis. In 1985, an attempt to use the multiplicative model for plaice catch/effort data was abandoned due to the shortness of the series of suitably-formatted NAFO data. Separate analysis (SPA) was attempted for 3L and 3N plaice, but the results were not presented at NAFO due to the difficulties encountered in calibrating the analysis.

3) Continue work on American plaice Bulletin. (Pitt)

Several sections (Introduction, Stock Discrimination, Maturity, Management) written and some typed. Sections on feeding and distribution are still outstanding because compilation of data still pending.

4) Assist in analysis of flatfish otolith collection schemes with J. Baird of Gadoids Section. (Brodie)

In conjunction with J. Baird, a technique to test the impact on assessments of various collection strategies has been devised, but not yet implemented.

Additional Accomplishments

5) Assisted in the analyses of fisheries resources and fishing activity relative to the 200 mile limit on the Grand Banks. (Brodie)

6) Assisted in the analyses of fisheries in the St. Pierre Bank area in relation to boundary dispute. (Brodie)

7) Assisted in the design of juvenile flatfish surveys. (Brodie)

8) Prepared a document with R. Wells on the distribution of trawl catches from research vessel surveys. (Brodie)

9) Assisted in the preparation of figures for the May, 1985 CAFSAC Groundfish Subcommittee report. (Brodie)

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Collect and process data on distribution and population dynamics of adult American plaice and yellowtail and analyze such data for primary publication with special emphasis on seasonal variability. (Brodie).

2) Collect and process data on adult growth and sexual maturity of American plaice and yellowtail and analyze such data for primary publication. (Walsh)

3) Conduct assessments of plaice and yellowtail stocks under catch quota regulation. (Brodie).

4) Complete American plaice bulletin. (Pitt)

5) Complete the analysis of otolith collection schemes to determine the impact on assessments; with J. Baird, Gadoids Section. (Brodie)

6) Assist in analysis of seasonal survey data. (Brodie)

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

Member/Convener CAFSAC Commercial Statistics Working Group. (Brodie).
Member Groundfish Seasonal Survey Working Group (Brodie).
Presented paper, acted as rapporteur at NAFO Symposium on Survey Design and Evaluation (Brodie).
Chairman Groundfish Subcommittee CAFSAC to June/85, member AGAC Working Group (Pitt).

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

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iii) scientific and technical

Brodie, W. B. 1985. An assessment update of the American plaice stock in NAFO Divisions 3LNO. NAFO SCR Doc. 85/51, Ser. No. N1000. 28p.

Brodie, W. 1985. An assessment of the yellowtail flounder stock in NAFO Div. 3L, 3N, and 3O. NAFO SCR Doc. 85/50, Ser. No. N999. 20p.

Brodie, W. B. 1985. An assessment of American plaice in NAFO Subarea 2 and Division 3K. CAFSAC Res. Doc. 85/55. 15p.

Brodie, W. B. 1985. An assessment of American plaice in NAFO Subdivision 3Ps. CAFSAC Res. Doc. 85/54. 13p.

Brodie, W. B., and R. Wells. 1985. The distribution of trawl catches of cod and American plaice from research vessel surveys in NAFO Divisions3L, 3M and 3N. NAFO SCR Doc. 85/106, Ser. No. N1082. 14p.

Brodie, W. B. 1985. Review of methods and data used in analysing multispecies fisheries interactions, p.55-59. In R.Mahon [ed.] Towards the inclusion of fishery interactions in management advice. Can. Tech. Rep. Fish. Aquat. Sci. No. 1347.

iv) popular and miscellaneous

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10. REVIEW AND EVALUATION

a) Program Head

Dr. Pitt has made very satisfactory progress on the American plaice bulletin and is planning to have a manuscript ready for internal review by March 31, 1986. After that date, even though he will be retired from the Public Service, he plans to follow the publication of the bulletin to completion.

Mr. Brodie should concentrate on analyses of distribution of American plaice and yellowtail incorporating seasonal survey data where appropriate. Mr. Walsh should concentrate on analyses of growth rates of adult American plaice and yellowtail, also incorporating seasonal survey data.

b) Management Committee

Approved without additional comment.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Biology and assessment of Greenland halibut and witch flounder

W. R. Bowering and W. B. Brodie

1. PROJECT DESCRIPTION

Study of the life history and biology of Greenland halibut and witch flounder as a background to the provision of advice on the appropriate fisheries management measures based on annual assessments of stock status.

2. LONG-TERM OBJECTIVE(S)

To provide biological information that will improve the ability to carry out assessments and, hence, improve fisheries management advice.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Collect and analyze information from commercial and research vessel sources. The delineation of stock boundaries is an important facet and meristics, parasites and tagging information is being used. Additionally, food and feeding, distribution and sexual maturity relationships are being studied.

5. EXPECTED KEY RESULTS (1986-89)

1986-1989 (inclusive)

- Conduct annual assessments of three witch and two G. halibut stocks.

1986

- First Groundfish survey in NAFO Div. 0+1 (if ship time available)
- Produce technical report on Atlantic halibut.

1987

- Present results of NAFO 0+1 survey to NAFO Scientific Council

1988

- Provide results of annual variation of Greenland halibut predation on the northern shrimp resource.

1989

- Detailed analysis of food and feeding data of Greenland halibut in Newfoundland area.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Conduct stock assessment of Greenland halibut in Subarea 2 and Div. 3KL. In addition to the usual data used in the assessment, an evaluation of length frequency data collected during shrimp surveys in NAFO Div. 2HJ during 1979-83 will be carried out. A cursory look at these data suggests that they provide a much more useful index of recruitment than that which can be obtained from standard groundfish surveys in Div. 2J3K. An attempt will, therefore, be made to relate these indices to those of groundfish surveys and see how both relate to commercial catches. (Bowering and Brodie)

An assessment of Greenland halibut was presented to NAFO in June 1985 for SA2+3KL. The length frequencies from shrimp surveys were evaluated and presented as well. The data were convincing enough for NAFO to recommend a moderate increase in the 1986 TAC. It was felt that expanding the data set to age frequencies, however, would be more definitive and valuable in assessing the year class strengths in future.

2) Conduct stock assessments on three witch flounder stocks: (Bowering and Brodie)

(1) Witch in Div. 2J3KL (CAFSAC).
(2) Witch in Div. 3NO (NAFO).
(3) Witch in Subdiv. 3Ps (CAFSAC).

Assessments of these stocks were conducted and presented as working papers to NAFO and CAFSAC accordingly during 1985 and subsequently upgraded to research documents.

3) As a result of bilateral negotiations with the Soviet Union, Soviet research data on Greenland halibut from Subarea 0 should be available to me by early 1985. These data will be re-coded and transferred to tape. These data will then be presented to NAFO in the form of a joint research document providing information on distribution, biomass, and possibly age and growth of Greenland halibut in Subarea 0 since 1977. (Bowering)

Most of these data have now been received from the Soviet Union and are now in the process of being recoded as time permits.

4) Examine the database on witch flounder in Div. 2J3KL for changes in abundance, age range, growth rates, and maturity patterns and evaluate these in relation to changes in exploitation. (Bowering)

This goal could not be fulfilled due to a diversion of effort towards Atlantic halibut.

5) Examine Greenland halibut stomachs collected during the 1984 shrimp survey in Div. 2HJ. The results will be compared with those of the 1982 survey to test for annual variation in predation of Greenland halibut on shrimp. During the review period, however, only the physical examination of the stomachs may be possible. (Bowering)

The physical examination of the stomachs collected during the 1984 survey was completed and is

awaiting further processing.

6) Re-analyze data on Greenland halibut morphometrics. This, however, will depend entirely on the acceptance of Misra's new model for publication. (Bowering with R. Misra)

Misra's new model has recently been accepted and published, however, further analyses have not yet been conducted.

7) Provide a preliminary analysis of Greenland halibut food and feeding data from Div. 2J3K. (Bowering)

This preliminary analysis was completed and submitted to the NAFO September 1985 meeting as a research document. At my request it was deferred until the June, 1986 meeting for discussion in STACFIS by a much larger audience of fisheries science expertise.

8) Publish paper on predation of Greenland halibut and cod on shrimp in the Labrador Channels. (Bowering, Parsons and Lilly)

Since this paper was first presented to NAFO and subsequently the internal review, there has been a considerable increase in the database. A cursory look at the new information suggests that some of the conclusions drawn in the original paper are different from those likely to be drawn with the added information. It was the consensus of the three authors therefore to withdraw this paper in its present form and wait until such time as the new data can be added to the analysis.

Additional Accomplishments

9) A manuscript by Bowering and Parsons on diel variations in catches of Greenland halibut submitted to the North American Journal of Fisheries Management has now been accepted for publication and will appear in the summer issue in 1986.

10) A biological review of Atlantic halibut was conducted during 1985 as a result of requests from Fisheries Operations Branch. The first draft of the report has now been completed and submitted to the Program Head of Groundfish.

11) Considering the favorable response of NAFO to the use of Greenland halibut recruitment data from shrimp surveys and the recommendation for collecting ageing data as well as length frequency data, complete stratified age samples of Greenland halibut were collected from Divisions 2H, 2J, and 3K during the 1985 shrimp cruise totalling about 5,000 otolith pairs.

12) In order to expand the food and feeding series of Greenland halibut in the shrimp surveys for examining annual variation in Greenland halibut predation on shrimp, a sample of about 2,500 Greenland halibut stomachs was collected during the 1985 cruise. It was originally intended to collect for two years only, however, it was felt that a third year's collection would be particularly useful in the event of an anomalous year.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Conduct stock assessment of Greenland halibut in NAFO Subarea 2 and Div. 3KL. At the recommendation of NAFO, ageing samples of Greenland halibut were collected for 1985 with some information on ageing available for 1984 from the shrimp cruises. The age structures will be analysed and compared to length frequency data in order to more accurately determine recruitment indices used for stock projections. (Bowering & Brodie)

2) Conduct stock assessments on three witch flounder stocks; (Bowering & Brodie)

   a) Witch in Div. 2J3KL (CAFSAC)
   b) Witch in Div. 3NO (NAFO)
   c) Witch in Subdiv. 3Ps (CAFSAC)

3) Complete the transfer of data from the Soviet Union on Greenland halibut and by the end of the review period have all Soviet data in machine readable form. I shall propose to Dr. Chumakov that a joint publication be available for presentation at the 1987 NAFO Symposium. (Bowering)

4) Re-analyze data on Greenland halibut morphometrics. (Bowering)

5) Bring the results of Greenland halibut food and feeding data from the 1984 shrimp cruise into machine readable form. Complete the physical examinations of stomachs collected during the 1985 shrimp cruise. (Bowering)

6) Produce biological review on Atlantic halibut as a Technical Report. (Bowering)

7) Examine the database on witch flounder in NAFO Div. 2J3KL for changes in abundance, age range, growth rates, and maturity patterns to evaluate these in relation to changes in exploitation. (Bowering)

8) Conduct Greenland halibut and round nose grenadier cruise in NAFO Subarea 0+1 provided vessel time is made available. (Bowering)

9) Conduct groundfish cruise in NAFO Div. 2GH provided vessel time is made available. (Bowering)

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

Dr. R.K. Misra, Scotia-Fundy Region in developing morphometric model
Dr. A.K. Chumakov, Soviet Union in preparing a joing paper on Greenland halibut

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

Chairman, Standing Committee on Fishery Science (NAFO) Assessment Working Group, June, 1985. This group reviewed stock assessments for all species except cod.

Elected Chairman, Standing Committee on Fishery Science (STACFIS) of NAFO for 1986-87.

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

Bowering, W. R. 1985. Witch flounder on St.Pierre Bank (NAFO Subdivision 3Ps). CAFSAC Res. Doc. 85/34. 8p.

Bowering, W. R. 1985. The witch flounder fishery in NAFO Divisions 3NO. NAFO SCR Doc. 85/44, Ser. No. N994. 5p.

Bowering, W. R., and W. B. Brodie. 1985. The status of the Greenland halibut (Reinhardtius hippoglossoides) stock in NAFO Subarea 2 and Divisions 3KL. NAFO SCR Doc. 85/43, Ser. No. N993. 20p.

Bowering, W. R., and G. R. Lilly. 1985. Diet of Greenland halibut off southern Labrador and northeastern Newfoundland (Div. 2J+3K) in autumn of 1981-82, emphasizing predation on capelin. NAFO SCR Doc. 85/109, Ser. No. N1085. 16p.

Bowering, W. R. 1985. Witch flounder in the eastern Newfoundland area, NAFO Divisions 2J3KL. CAFSAC Res. Doc. 85/38. 14p.

iv) popular and miscellaneous

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10. REVIEW AND EVALUATION

a) Program Head

Groundfish Program will be supporting a request for survey time in Subarea 0+1 in 1986 to collect data for Greenland halibut and roundnose grenadier. Overall, project is proceeding satisfactorily.

b) Management Committee

Committee noted that the project is proceeding in a satisfactory manner with a good effort on biological aspects of the species as well as stock assessment.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Bioeconomic modelling

W. B. Brodie

1. PROJECT DESCRIPTION

In conjunction with Economics Branch, a model of the Grand Bank flatfish fishery will be developed which will incorporate biological data on stock status and stock parameters, fishery related data on catch/effort and by-catch and economic data from the harvesting, processing and marketing sectors. This model will be used to investigate response of these fisheries to various management strategies.

2. LONG-TERM OBJECTIVE(S)

To develop a model, including biological and economic factors, to be used in providing management advice on flatfish species on Grand Bank.

3. TIMEFRAME

Terminated in December, 1985.

4. STRATEGIES

Canadian commercial, foreign commercial and research data bases will be analysed and an extensive economic data-base created and analysed as input to the bioeconomic model. Once the model is built, it will be used to test effect of various management strategies on the Grand Banks flatfish fisheries.

5. EXPECTED KEY RESULTS (1986-89)

- Not applicable.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Will depend on what course of action is decided upon with regard to the fate of the current exercise.

To my knowledge, this project will not be carried out as designed. As no decision had been made regarding the future of the project in general, there was no work carried out on this model in 1985.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Project terminated in December, 1985.

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

Member of a working group of MEES formed to study technological interactions in mixed species fisheries. Group met June 10, 1985 to establish a work-plan.

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

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10. REVIEW AND EVALUATION

a) Program Head

No progress has been made in 1985 on this project. It appears as if the entire project has reached a dead-end and the Groundfish Program does not intend any work on this in 1986. In fact the intention is to terminate the project at the end of 1985.

b) Management Committee

Management Committee regretfully accepts the Program Head's intention to terminate the project due to a lack of progress in the joint biological-economic analysis.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Biology of wolffish

W. B. Brodie

1. PROJECT DESCRIPTION

Study of the life history and biology of wolffish to increase basic biological knowledge of this important by-catch fishery.

Note: Minimal resources are allocated to wolffish research. Such studies will likely continue on a low-key basis.

2. LONG-TERM OBJECTIVE(S)

To provide basic information on such factors as stock differentiation and abundance that will improve existing knowledge of wolffish biology.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Historical research vessel survey data are being examined and any existing information from the commercial data base will be evaluated. These will be supplemented by data collected from research vessel surveys where necessary.

5. EXPECTED KEY RESULTS (1986-89)

No key results put forward as project pursued on low priority opportunistic basis; research results will be published sporadically, as time permits.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Collect basic biological data on length, sex, maturity, and age and growth for spotted and striped wolffish where possible.

   Collections obtained where possible on groundfish research vessel surveys in 1985. Otoliths collected from spotted and striped wolffish only and size of otolith samples reduced in 1985.

2) Conduct inventory of existing age and growth material, investigate feasibility of ageing wolffish and and initiate some ageing work if feasible.

   As advised by Management Committee in PRE 1984, early 1950's annual reports and black books were checked for previous work on wolffish ageing. However, no information on this subject was found and no further work on ageing was attempted. Inventory of otoliths was completed for several research vessel trips from recent years, but overall inventory is incomplete.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Collect basic biological data on wolffish from research vessel cruises.

2) Complete inventory of existing age and growth material.

3) Investigate feasibility of ageing wolffish and initiate some ageing work and validation studies, if ageing proves feasible.

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

Prepared a brief review of an unsolicited research proposal from MUN dealing with wolffish biology.

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

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10. REVIEW AND EVALUATION

a) Program Head

Approved without comment.

b) Management Committee

Further discussions with Dr. Templeman encouraged to identify historical ageing data and methods.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Biology of juvenile flatfish

S. J. Walsh

1. PROJECT DESCRIPTION

Determination of indices of year-class strength which can be used in flatfish assessments to predict the number of juvenile fish which will recruit to the fishery in future years. In evaluating a total allowable catch, an accurate assessment is needed of the number of young fish which will recruit to the fishery for which the TAC is being set. The main areas of focus are distribution, abundance, and biology of juvenile flatfish with emphasis on the southern Grand Bank yellowtail population.

2. LONG TERM OBJECTIVE(S)

1) Provide information on the general biology and dynamics of juvenile flatfish: length at age; weight at age; distribution, as it relates to adult population; maturity; food and feeding behavior; and predation by other species.

2) Establishment of a time series of biomass estimates of both pre-recruits and adult flatfish population, with emphasis on yellowtail for stock assessment of NAFO Div. 3LNO.

3) Evaluate functional relationships which can be clearly defined between an index of year-class strength (from research surveys) at some age below that at which recruitment to the fishery occurs and the estimated number of fish in the sea at the age of recruitment in the year for which the TAC is being set.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

The random stratification scheme used in regular groundfish surveys has been modified to arrive at biomass estimates of pre-recruits and adult flatfish occupying the Grand Bank, NAFO Div. 3LNO, inside the 50 fath contour. The WEBBER[1] Sampling Design enables the researcher to arrive at biomass estimates of flatfish by day and by night, along with a total biomass estimate of pre-recruits and the adult population.

A 24 hour diel study will look at variability in catches of juvenile flatfish, in particular, yellowtail. Data will be collected from cod stomachs to determine the amount of predation by cod on flatfish. Information on age/length/weight of pre-recruits will also be collected.

[1]An acronym named for researchers who design this double biomass sampling scheme: S. J. Walsh, W. Brodie, J. Baird, and J. Rice of Northwest Atlantic Fisheries Centre in St. John's.

5. EXPECTED KEY RESULTS (1986-89)

1986

- Publish a paper on ovogenesis of Flemish Cap cod.
- Complete analysis of age and growth of juvenile yellowtail and plaice.

1987

- Analysis of food and feeding of juvenile flatfish.

1988

- Evaluation of year-class indices of juvenile flatfish based on 4 year time series, 1985-88.

1989

- Analysis of age and growth of commercial size American plaice and yellowtail in NAFO Div. 3L.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) To collect, process and analyze information on juvenile flatfish (especially yellowtail) populations on the southern Grand Bank. Emphasis on distribution, relative abundance and general biological characteristics of both yellowtail and plaice. This will constitute year one of a time series

The WEBBER Sampling Design was initiated on a juvenile flatfish survey in September of this year. Nine and one-half days, out of a possible twenty day trip, fishing resulted in 81 fishing sets. Frozen samples of flatfish are presently being analyzed. It is expected that the first biomass estimate of juvenile yellowtail, as well as a biomass estimate of the adult population will be made.

2) To complete analysis of diel movements of yellowtail and plaice on the southern Grand Banks (Primary publication).

The planned 24 hour diel study was aborted due to mechanical problems aboard the research vessel. Tabulation of data from the 1985 survey may be sufficient enough to evaluate diel movements in flatfish. As of to date, this data is still being prepared for entering in the EDP system. Data from 1980, 1981, and 1982 juvenile surveys in conjunction with data from regular groundfish surveys have been already analyzed.

3) Providing enough data are available, emphasis will be placed on investigating age and growth of 1, 2, and 3 year-old yellowtail and plaice. Data from 1981 and 1982 surveys will be used in conjunction with 1985 data.

A frozen sample of 1400 flatfish was collected on the September 1985 survey. As of to date, these samples have been partially analyzed. Data are being collected on age, whole body weight, lengths, and maturities. Analysis will begin as soon as data are available. Data will be analyzed in conjunction with data from regular surveys.

4) To publish results of gametogenesis of Flemish Cap cod.

A sample of 80 gonads from the 1985 survey was collected and histological slide preparations are completed. An iced sample of 15 cod was brought back for 35 mm camera shots of gonads. All histological analysis of 1981, 1982, 1983, and 1985 samples have been completed. A total of 150 photomicroscopic pictures have been taken of histological slides. Once the data on age, and condition factors are incorporated the results can be submitted for publication.

Additional Accomplishments

5) Up to present time, 952 cod gonads, 464 plaice gonads, 258 yellowtail gonads, and 188 turbot gonads, of both sexes, have been collected as part of a side project on determination of seasonal gametogenic cycles of these species. Eventually, age and length at first maturity will be evaluated using histological techniques. Fifty-eight percent of samples have been processed and twenty-five percent have been analyzed. Completion of this project will depend on monies for technical support.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Biomass assessment of juvenile yellowtail and adult yellowtail in NAFO Div. 3LNO. Difference in biomass estimates of day vs night will be estimated.

2) Publish study on Flemish Cap cod ovogenesis if data from Gadoid Section become available. (Primary Status)

3) If a 1986 24 hour diel study is not deemed necessary, I will publish results of study of diel movements of juvenile flatfish in primary literature.

4) Analysis of age and growth data on juvenile flatfish (intended primary publication or research document in 1986).

5) Evaluation of ovogenesis of Greenland halibut. (Secondary Publication)

6) Investigate age and growth of plaice and yellowtail on the Grand Banks. This will be a long-term project as recommended by Secton Head in 1984 PRE report.

8. BACKGROUND

a) Highlights

Again this project's success has been hampered by the poor operation of the research vessel WILFRED TEMPLEMAN which was successful in fishing 9½ days out of a possible 20 days.

Progress on Flemish Cap ovogenesis delayed (data not available).

b) Selected involvements

i) collaborative research (excluding universities)

Project supervisor on gametogenesis of Northern Grand Bank cod in conjunction with J. Kiceniuk of Experimental Ecology.

Joint project collaboration with R. Wells on Flemish Cap cod ovogenesis.

Joint project collaboration with R. Bowering on Greenland halibut ovogenesis.

ii) university liaison

Joint project with R. Khan on parasite infection of gall bladder of juvenile flatfish as a stock discriminator.

Supervision for Honor's student at MUN Biology Dept.

iii) contracts administered

-

iv) communications

-

v) other

Presented seminar on juvenile flatfish research at NAFC.

Expanding data base at request of NAFC internal reviewers for a paper on "Patterns of Covariation in Reproductive Traits in Marine Fish". Data base has been expanded from 15 species, up to approximately 75 species. Continuing data collection is necessary.

Internal reviewer of manuscript for Technical Report Series.

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

Approved without comment except to emphasize once again the importance of obtaining W. TEMPLEMAN in the August-September period now that the standard series has commenced.

b) Management Committee

Approved without additional comment.

PROJECT REPORT

GROUNDFISH PROGRAM

Flatfish Section

Biology of spiny dogfish

S. J. Walsh

1. PROJECT DESCRIPTION

Creation of data base on general biology of spiny dogfish from the Newfoundland inshore fishery for future management considerations should they arise. The main areas of focus are: age and growth, food and feeding, and reproductive biology.

Note: Minimal resources are allocated to spiny dogfish research. Such studies will likely continue on a low-key basis.

2. LONG-TERM OBJECTIVE(S)

1) Compile a data base on spiny dogfish.

2) To compare demographic parameters of dogfish in the 1940's (Templeman's 1944 paper) with those of the present.

3. TIMEFRAME

Expected report completion, 1986; future of project to be decided at that time.

4. STRATEGIES

To analyze existing historical database and collect additional data from the commercial fishery and research surveys.

5. EXPECTED KEY RESULTS (1986-89)

1986

- Writing of MSc Thesis on covariation of life history strategies in sharks.

1987

- Defense of MSc Thesis.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Age determination of dogfish spine collections from 1979-84.

All spines have been aged. A sample of 100 spines have been sent to Nammack Consultants in the United States for age-validation.

2) Examination of food and feeding of dogfish, based on collections during 1979-84.

Completed.

3) Finish the last academic course needed for MSc requirements (Winter 1985).

Completed.

4) To collect samples from inshore fishermen and research surveys for detailed analysis of biological parameters.

No samples collected from inshore fishermen due to lack of fishing.

Additional Accomplishments

5) Literature review of data on demographic parameters of 151 species of sharks including geographical distribution, habitat preference, and behavioural patterns.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Re-read spines for ageing to ensure accuracy of age validation.

2) Analyze data on reproduction of dogfish.

3) Complete literature review of data on demographic parameters of 151 species to include 350 species.

4) Start writing MSc Thesis incorporating literature data and data collected on spiny dogfish.

8. BACKGROUND

a) Highlights

Samples of dogfish from inshore fishery were unobtainable this year.

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

M.Sc. thesis program on covariation of life history strategies in sharks.

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

Data source for this project has disappeared since no fishery now exists. Therefore the project will terminate in 1986 with writing up of data for MSc thesis. In future a "watching brief" will be included as an objective in Juvenile Flatfish Report.

b) Management Committee

Project to be re-evaluated in 1986 when M.Sc. thesis is completed.

PROJECT REPORT

GROUNDFISH PROGRAM

Redfish Section

Biology and assessment of redfish

D. B. Atkinson and I. Ni (to March 25, 1985; transferred to Marine Mammals Section)

1. PROJECT DESCRIPTION

This is a continuing project to collect, process, and analyze basic biological data on the various redfish stocks in the Newfoundland-Labrador area. The status of the various stocks has to be assessed annually and the parameters used in the models are based on biological data collected from research vessel cruises and commercial sampling. Stock assessment methodology is also continually being evaluated with a view to possible improvements.

2. LONG-TERM OBJECTIVE(S)

Provide the basis for best possible biological advice for the rational exploitation of redfish stocks.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Data on length, age, sex, maturity, meristic and morphological characters, food and feeding, etc. are collected from research vessel cruises and commercial sampling on which studies on growth and maturity changes, feeding interrelationships, stock dynamics, etc. are based.

5. EXPECTED KEY RESULTS (1986-89)

1986 to 1989 (inclusive)

- Conduct annual assessments of the five redfish stocks under quota regulation.

1986

- Complete the analysis of the historical syphrion data and prepare report for industry.

1987

- Publication on diel movements of redfish.

1988

- Complete redfish age validation study based upon 1956 and 1958 yearclasses in Gulf.

1989

- Paper on redfish food and feeding.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Conduct assessments of five redfish stocks (2+3K, 3LN, 3M, 3O, 3P). (Atkinson and NI)

Assessments were prepared and presented to CAFSAC and NAFO by Atkinson (NI moved to Marine Mammals in April).

2) Prepare a document on diel movements for publication. (Atkinson)

Analysis of the data was delayed due to shortage of computer funds. Additional funding was approved August 08 and further analyses of data has commenced. Preliminary analyses of acoustics data suggests that these movements are more complex than suggested by analyses of trawl data in that the diel movements may be dependent on a number of factors such as fish density, depth and others.

3) Further examine the historical food and feeding data to fully comprehend the extent of missing data, then analyze as appropriate. Any publication coming from this will await completion of the 3L seasonal surveys as then the recent food and feeding data may be included. (Atkinson)

   A number of errors have been noted in the original coding of these data. These errors are traceable (eg. vessel, time, location, etc.) but the f/f data themselves cannot be checked because I. Rees has the original data sheets. Letters have been sent in order to try and obtain these data.

4) Analyze the Sphyrion lumpi data; produce publication. (Atkinson)

   The data have been coded and punched and are being edited at present.

5) To reconstruct the catch-rate series of the various redfish stocks incorporating the corrected Maritimes data. (NI)

   This project was completed by Atkinson. The process of extracting c/f data was fully automated with the writing of appropriate software.

6) Until the early 1980's the numbers at age caught in the commercial redfish fisheries in 3P and 2+3K were determined by different personnel using unknown criteria. The catch and weights at age for these stocks will be reexamined with the objective of having full documentation of the procedures used for future reference. (NI)

   Not completed due to NI's departure on April 01.

7) The present criteria for constructing the commercial catch at age as above is area and month. Once goal 6 is completed, the numbers caught at age will be recalculated using depth as the main criterion (since redfish are stratified by depth). The two grouping procedures will then be compared and evaluated. (NI)

   Not completed due to NI's departure on April 01. Deferred until 1987.

8) To prepare a document on the study of subcaudal melanophores in pre-extrusion larvae of the redfish species. Some additional collections of specimens will be necessary. (NI)

   Results contradicted work of Templeman (1980) so further samples were collected in order to verify findings. The database may still not be sufficient to resolve the differences. No oceanic samples were collected because investigator has moved to a new position and is simply writing-up data already collected.

9) To prepare a document verifying the distribution of various redfish species based on gas bladder musculature. (NI)

   Paper in preparation. Delays were encountered because another 1,123 specimens were added to the database before analysis. No oceanic samples were collected because investigator has moved to a new position and is simply writing-up data already collected.

10) Commence collection of redfish scales in addition to otoliths to examine ageing of 1) young fish by the two methods and 2) validation of otoliths versus scales for ageing. (Because redfish are slowgrowing and longlived, this will be a very long-term study). (Atkinson)

    Collections of scales from NAFO Div. 3M and 3P have been initiated. Materials for scale preparation have been acquired and reading will commence this winter.

11) Evaluate document on reproducibility of redfish age determinations (produced under contract by C. Gavaris) for publication. (Atkinson)

    This document has been examined and is definitely of value for in-house examination of variability between and within readers. However, its potential as an external publication is doubtful. Work commenced on resolution of some of the differences noted between the two readers in the paper.

Additional Accomplishments

12) Prepared a Technical Report describing the distribution of 44 oddfish species in the Gulf of St. Lawrence - currently undergoing internal review. (Atkinson)

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Conduct assessments of five redfish stocks (2+3K, 3LN, 3M, 3O, 3P) (Atkinson & new biologist).

2) Carry on analyses of diel data. The time of completion and production of documentation will depend upon the complexity of these movements as indicated acoustically and the acquisition of the in-house computer since it is cost prohibitive through Service Bureau (Atkinson).

3) Further analyses of historical food and feeding data pending results of communications with I. Rees. If the raw data are not forthcoming, the coded data will not be examined further due to the uncertainty regarding correct coding. Analyses of stomachs collected during the 3L seasonal surveys will commence (Atkinson).

4) Analyse the Shyrion lumpi data. These cover the period 1955-65 and their worth, in a publication, (especially if the data show no change from Templeman, and Squires, 1960) is questionable. A further study of external parasites is planned commencing in 1986 to relate the historical to the present. (Atkinson).

5) Redo the catch at age matrices for redfish in 2+3K and 3P incorporating all available frequencies (including foreign sampling sent to NAFO). This project will be done by the incumbent of the presently vacant biologist position.

6) Carry out further studies examining the reproducibility of redfish age determinations. (To be carried out by incumbent of presently vacant biologist position).

7) Reading of scales will be started. Scales will continue to be collected for this long term project (To be carried out by incumbent of presently vacant biologist position).

8) Examine the available database (Canadian) in order to provide documentation concerning the delineation of stock status to redfish in Div. 3LN vs Div. 3NO as per NAFO request (Atkinson).

9) Prepare document on sub-caudal melanophores in pre-extrusion larvae (Ni).

10) Prepare document verifying the distribution of various redfish species based on gas bladder musculature (Ni).

8. BACKGROUND

a) Highlights

The appointment to the position of Chairman of SSS Subcommittee for 2 years may affect the completion of some of the goals during this period. It should also be noted that some of the objectives are dependent upon the filling of the presently vacant position.

b) Selected involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

Nominated Chairman of Statistics, Sampling, and Surveys Subcommittee of CAFSAC. Accepted. This is a 2 year position.

9. PUBLICATIONS

i) primary

Ni, I-H., and W. Templeman. 1985. Reproductive cycles of redfishes (Sebastes) in southern Newfoundland waters. J. Northw. Atl. Fish. Sci. 6: 57-63.

Power, D. J. and I-H. Ni. 1985 Morphometric differences between golden redfish (Sebastes marinus) and beaked redfishes (S. mentella and S. fasciatus). J. Northw. Atl. Fish. Sci. 6: 1-7.

ii) interpretive scientific

-

iii) scientific and technical

Atkinson, D. B. 1985. The redfish of NAFO Div. 3LN. NAFO SCR Doc. 85/49, Ser. No. N998. 9p.

Atkinson, D. B. 1985. The redfish of NAFO Subarea 2 and Division 3K. CAFSAC Res. Doc. 85/49. 26p.

Atkinson, D. B. 1985. The redfish of NAFO Division 3P. CAFSAC Res. Doc. 85/50. 18p.

Atkinson, D. B. 1985. The redfish of NAFO Division 3O. CAFSAC Res. Doc. 85/51. 12p.

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

Contacts with Ivor Rees as suggested in last year's review have been unsuccessful to date in resolving problems with the historical feeding data. If the most recent contact suggesting he ship the original data at our expense is not successful, then I suggest the matter be dropped. Other than this, the project is approved without comment.

b) Management Committee

Suggested that the Section Head visit Ivor Rees during next trip to Europe and attempt to resolve data problems. It would be advisable to contact Rees on the matter at first opportunity.

PROJECT REPORT

GROUNDFISH PROGRAM

Redfish Section

Biology and assessment of round-nosed grenadier

D. B. Atkinson

1. PROJECT DESCRIPTION

This project is aimed at a continual provision of sound management advice to NAFO concerning the two grenadier stocks, one in NAFO Subareas 0+1 and the other in NAFO Subareas 2+3. Biological information is generally lacking concerning this species and, at present, the role is primarily one of monitoring with very little collection of basic biological data.

NOTE: Minimal resources are allocated to grenadier research. Such studies will likely continue on a "low-key" basis.

2. LONG-TERM OBJECTIVE(S)

The long-term objective with regard to the assessments is to provide, on a continuing basis, the best possible advice for the management of these stocks. Because of the many biological questions that exist regarding this species coupled with the relative unimportance of this fishery to Canada at present, it is difficult to outline long-term objectives for further studies.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

In NAFO Subareas 2+3, length frequencies collected during research cruises having other primary objectives, will be tabulated as in the past.

5. EXPECTED KEY RESULTS (1986-89)

1986 to 1989 (inclusive)

- Conduct 2+3K grenadier assessments on an annual basis.

1987

- Prepare document if sufficient data are available for NAFO Symposium.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Conduct assessment of 2+3K grenadier.

Assessment completed and presented to NAFO.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Conduct assessment of 2+3K grenadier.

8. BACKGROUND

a) Highlights

-

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

Atkinson, D. B. 1985. The roundnose grenadier of Subareas 0+1 and 2+3. NAFO SCR Doc. 85/46, Ser. No. N995. 10p.

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

Approved without comment except to note that a cruise is requested to either SA 0+1 or SA 2+3K for 1986.

b) Management Committee

Should 0+1 cruise be approved, biomass estimates should be generated and information submitted to NAFO Symposium in 1987.

PROJECT REPORT

GROUNDFISH PROGRAM

Redfish Section

Hydroacoustics

D. B. Atkinson

1. PROJECT DESCRIPTION

The use of hydroacoustics is gaining popularity for evaluating and monitoring the abundance of various fish stocks. It has been used with considerable success for capelin in Newfoundland in recent years. Because traditional survey techniques may not give accurate indications of redfish stock status due to clumping and diel movements, hydroacoustic techniques are being investigated as a viable alternative for estimating abundance of these fish.

2. LONG-TERM OBJECTIVE(S)

The objective is to apply hydroacoustic techniques for the enumeration of redfish and other groundfish species (e.g. cod, grenadier) in an efficient and accurate manner. This will increase greatly the precision and fine tuning of assessments and, hence, their reliability. Other information concerning distribution, movements (spatial and diel) and aggregation types will assist in evaluating the reliability of more traditional survey techniques (stratified random) as well as contributing to our general biological knowledge of the species concerned.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

The fall surveys in the Gulf of St. Lawrence in conjunction with stratified random surveys will be continued in order to build up a time series that can be used to evaluate the use of this technique.

5. EXPECTED KEY RESULTS (1986-89)

1986 to 1987 (inclusive)

- Conduct surveys to prove validity of hydroacoustic technique.

1988

- If dual beam system is operational, determine target strength of redfish *in situ*.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Analyze the acoustic data collected during the 1984 survey to provide an estimate of biomass of Gulf redfish.

   These data were analyzed and a biomass estimate obtained for the survey area. No estimates of biomass are yet available from the Gulf Region's 1984 trawl survey so comparisons are not possible at present.

2) Complete the analysis of the 1981 redfish acoustic data regarding diel movements for publication.

   The diel movements of redfish are much more complicated than originally thought in that these movements may be dependent on a number of factors such as density, depth, etc. Further analysis is necessary and a completion date cannot be forecast.

3) Conduct further acoustic survey in 1985 in the Gulf of St. Lawrence to provide data for estimation of redfish abundance.

   A survey was run in July, 1985. These data have yet to be analyzed.

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Analyze the data collected during the 1985 survey and compare these with the 1984 data.

2) Continue analysis of the data relating to diel movements. A completion date cannot be given due to the apparent complexity of the problem.

3) Carry out another acoustic cruise in the summer of 1986.

8. BACKGROUND

a) Highlights

Again in 1985, the acoustic equipment functioned well throughout the cruise. It is hoped that onboard data analysis (i.e. almost real time) will be possible during future cruises.

b) Selected involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

Stevens, C. R., J. E. Carscadden, D. B. Atkinson, W. H. Lear, D. S. Miller, and B. S. Nakashima. 1985. A summary of hydroacoustic research in the Newfoundland Region. CAFSAC Res. Doc. 85/35. 32p.

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

Equipment functioned well again in 1985 and a biomass estimate will be possible from the survey. The investigator suggests for various reasons that the acoustic work be moved from the Gulf to Div. 3P. Program wishes some discussion of this in management committee, with the investigator present if necessary, so a decision can be taken prior to the 1986 field survey.

b) Management Committee

Request to move acoustic work from the Gulf to Div. 3P was deferred to wrap-up (see minutes in PRE-1985 report).

PROJECT REPORT

GROUNDFISH PROGRAM

Sections: Gadoids, Flatfish and Redfish

Seasonal surveys - Div. 3L

Team Leader - D. B. Atkinson; all scientific staff of Gadoids, Flatfish and Redfish Sections will be participating.

1. PROJECT DESCRIPTION

This project examines the seasonal variability in the distribution, abundance, and biological parameters of the major groundfish species on the northern Grand Bank (Div. 3L).

2. LONG-TERM OBJECTIVE(S)

The long-term objective is to quantify the effect of seasonal variability in distribution and abundance on biomass estimates of the major groundfish species in the northern Grand Bank area (Div. 3L) as well as investigate temporal variability in biological parameters.

3. TIMEFRAME

Expected Completion 1988.

4. STRATEGIES

Intensive stratified-random surveys will be conducted on a seasonal basis in the area and data on distribution, abundance, and biological parameters will be collected.

5. EXPECTED KEY RESULTS (1986-89)

1986

- Complete processing of seasonal survey data and commence data analyses.

1987

- Complete data analyses.

1988

- Produce publications

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) Conduct the 3L seasonal surveys if vessel other than WILFRED TEMPLEMAN can be made available.

Surveys were carried out with WILFRED TEMPLEMAN as follows:

November, 1984	- 67 successful sets
January, 1985	- 192 successful sets
April-May, 1985	- 258 successful sets
July-August, 1985	- 177 successful sets
October, 1985	- 233 successful sets

7. GOALS FOR NEXT REVIEW PERIOD (1986)

1) Process the seasonal survey data collected and commence analyses.

8. BACKGROUND

a) Highlights

Performance of the WILFRED TEMPLEMAN improved to such an extent that successful seasonal surveys were conducted in three seasons although the target of 300 sets per coverage was never attained. The data were used in 1985 in analysis related to stocks overlapping the 200 mile limit and intensity of sampling coverage required in stratified random surveys (NAFO Symposium).

b) Selected Involvements

i) collaborative research (excluding universities)

-

ii) university liaison

-

iii) contracts administered

-

iv) communications

-

v) other

-

9. PUBLICATIONS

i) primary

-

ii) interpretive scientific

-

iii) scientific and technical

-

iv) popular and miscellaneous

-

10. REVIEW AND EVALUATION

a) Program Head

After several abortive attempts, seasonal surveys were conducted in 1985 with some measure of success. With the completion of the winter coverage in January-February 1986, the series will be complete in this "one-shot" attempt. Those data will then be analyzed and the need for further seasonal data collection will be evaluated.

b) Management Committee

A progress report of analysis of the seasonal surveys should be presented at the 1986 PRE Exercise.

PROJECT REPORT

GROUNDFISH PROGRAM

Commercial Sampling Section

Biological sampling of commercial groundfish catches

S. C. Stevenson

1. PROJECT DESCRIPTION

This project is aimed at providing adequate biological sampling data and other relevant information for all commercial groundfish species landed in the Newfoundland region and the timely processing of all data collected so as to be readily available to the various groundfish sections for annual stock assessment work. Sampling requirements, design and methodology are continuously being assessed with a view to improving on methods and increasing overall efficiency.

2. LONG-TERM OBJECTIVE(S)

This project is of an ongoing and indeterminate nature with its long-term objective being the adequate collection and timely supply of length and age sampling data to be used in the annual assessment of over 20 groundfish stocks.

3. TIMEFRAME

Indeterminate.

4. STRATEGIES

Sampling of all sectors of the commercial groundfish fishery is carried out on a continuous basis so as to obtain adequate sampling of catches by Division, quarter, and gear using NAFO sampling requirements as a minimal level. The project is carried out with a view to optimizing sampling design through the elimination of bias and the maximization of sampling precision within the bounds of available manpower and financial resources.

5. EXPECTED KEY RESULTS (1986-89)

1986-1989 (inclusive)

- Produce annual age and length compositions of Newfoundland commercial catches.

6. GOALS/ACCOMPLISHMENTS IN PREVIOUS YEAR (1985)

1) To collect and provide adequate biological sampling data from all sectors of the Newfoundland commercial groundfish fishery for use in annual groundfish stock assessments.

a) Port sampling (offshore fishery) -

Some 418 samples consisting of approximately 157,000 length measurements and 23,000 otoliths were collected from landings of the Newfoundland offshore mobile fleet. Minimum NAFO sampling requirements were either met or surpassed for most of the offshore components during the review period. Sampling levels were somewhat lower than those achieved in 1984 primarily because 1984 sampling was supplemented by a January-March Job Creation Project and also because landings were lower during part of this period due to an offshore labour dispute.

b) Port sampling (inshore fishery) -

Some 604 samples consisting of approximately 170,000 length measurements and 13,000 otoliths were collected from the various sectors of the inshore groundfish fishery during the review period. Again, most major division/gear/quarter categories were sampled adequately in terms of NAFO minimum requirements. Inshore sampling levels remained basically the same as in 1984.

A 30 day charter of the longliner CINDY ELIZABETH to collect samples from the inshore groundfish fishery and to occupy selected hydrographic stations along the southern Labrador coast (Div. 2J) was successfully completed during July-August.

2) To cooperate with J. Baird in carrying out investigations aimed at determining optimum levels of sampling with regard to length compositions.