

Titles and Abstracts of Other Contributions to the Special Session on Squids

Editorial Note

There were 27 contributions to the Special Session on Squids in September 1984, of which 15 scientific papers and a bibliography are included in this issue of *NAFO Scientific Council Studies*. Of the remaining 11 contributions, one paper has been accepted for publication in the *Journal of Northwest Atlantic Fishery Science*, suitable manuscripts were not received from the authors of seven contributions, and completed manuscripts were not received for three contributions which were initially documented as summaries only. The titles, available abstracts (revised), and documented sources of these 11 contributions are given below.

Validation and Application of an Ageing Technique for Short-finned Squid (*Illex illecebrosus*)

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Abstract

A technique has been developed which simplifies the ageing of short-finned squid (*Illex illecebrosus*) through microstructural examination of the statoliths. The spatial pattern of growth increments was studied with the use of light and scanning electron microscopy. Daily growth increments in statoliths were validated by employing chemical "time" markers (strontium and tetracycline) and laboratory-reared animals of known age. Increment formation continued through periods of food deprivation and minimal temperature fluctuations.

(This contribution has been accepted for publication in *Journal of Northwest Atlantic Fishery Science*, Vol. 6, No. 2 (in press).)

Yield Analysis for the Long-finned Squid (*Loligo pealei* (Lesueur))

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Abstract

A modified version of yield-per-recruit analysis was used to estimate potential yields in the *Loligo pealei* fishery off the northeastern United States. The model accepts monthly values of growth and fishing, spawning and natural mortalities and assumes two cohorts per year-class as being associated with spawning peaks. Two patterns of exploitation were examined by simulating dominance of the international fishery (offshore winter fishery coupled with the domestic inshore summer fishery) and the domestic fishery alone through variation of the monthly pattern of fishing mortality. Parameter estimates were derived from survey catch-per-tow and commercial catch data.

Simulated yield-per-recruit was significantly higher from a domestic fishery than from an international fishery under most assumptions of mortality which were examined. Yield-per-recruit results were coupled with a stock-recruitment function to examine the sensitivity of equilibrium yields that were associated with various levels of fishing mortality to the degree of compensation. Maximum equilibrium yield, from the Beverton and Holt stock recruitment relationship with moderate compensation, were estimated to be 27,900 tons for an international fishery and 33,200 tons for a domestic fishery.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/97, Serial No. N894, 29 p.)

Predation by Atlantic Cod (*Gadus morhua*) on Short-finned Squid (*Illex illecebrosus*) off Eastern Newfoundland and in the Northeastern Gulf of St. Lawrence

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Abstract

In years of high abundance, the short-finned squid (*Illex illecebrosus*) was a common prey of Atlantic cod (*Gadus morhua*) in summer and autumn in both inshore and offshore waters of eastern Newfoundland and northeastern Gulf of St. Lawrence. The frequency of occurrence of squid in cod stomachs and the number of squid per stomach increased with cod length. The intensity of predation by cod on squid was low when compared with peak predation on capelin (*Mallotus villosus*) and sand lance (*Ammodytes* sp.). Nevertheless, the annual immigration of squid in years of high abundance provided an increase in total food availability, especially for large cod.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/108, Serial No. N905, 16 p.)

Distribution of Maturing *Illex illecebrosus* Relative to the Shelf-Slope Water Front off the Northeastern United States

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Abstract

The analysis involved a preliminary attempt to determine if there was an association between the offshore distribution of *Illex illecebrosus* in the autumn and the shelf water-slope water frontal zone. Information on the location of maturing squid was obtained from catch-per-haul data (standardized to kg per minute), as reported by United States Fishery Observers on foreign trawlers. Location of the frontal zone was determined from satellite infrared imagery data and oceanographic analysis charts. Squid appeared to have been abundant within 10 nautical miles of the frontal zone.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/109, Serial No. N906, 18 p.)

Variation in Length-weight Relationships, Condition, and Feeding Spectrum of Short-finned Squid (*Illex illecebrosus*) at Holyrood, Newfoundland

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Abstract

The relationship of growth in weight to length for *Illex illecebrosus* was examined with the use of total weight and mantle weight data, which were collected in 1966 and 1971. For relationships involving both total weight and mantle weight, slopes were generally significantly greater for males than females, and, for lengths usually encountered in the commercial fishery, weight-at-length was greater for males than females. Seasonal effects were examined by using 1971 and 1979 data for each sex and 1978 data for females. Regular monthly increase in weight-at-length, or condition, was evident for all but the 1979 females. Annual effects were examined for each sex and month using 8 years of data from the 1964-81 period. For yearly relationships which did not differ significantly in slopes, analysis of covariance showed that adjusted means were significantly different among years for both sexes and all months. Such annual variation in squid condition may reflect variation in degree of suitability of the physical or biotic environment. It could not be demonstrated that variation in squid condition was related to prey abundance.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/112, Serial No. N909, 13 p.)

Distribution and Peculiarities of Allometric Growth of Larval *Illex* in the Northwest Atlantic

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Abstract

Illex larvae inhabit the epipelagial shelf waters, the continental slope and the Gulf Stream where temperatures range from 11.2° to 20.1°C and salinities from 34.50 to 36.56. The largest recorded aggregations were over the continental slope in the Middle Atlantic Bight (35° to 38° N) and in the northern periphery of the Gulf Stream.

From *Illex illecebrosus* spawning, which presumably occurs in late autumn and winter between Florida and about 40° N, larvae are transported northeastward by the Gulf Stream. Analysis of larval collections from the region between Cape Hatteras and the Grand Bank shows that the development of larvae can be divided into three stages: (a) newly-hatched larvae 1.1–1.5 mm mantle length (ML) with two pairs of developing arms; (b) 1.6–5.0 mm ML larvae with unsplit proboscis which is equal to or longer than the arms; and (c) 4.6–8.8 mm ML larvae with split proboscis, rapid development of catching apparatus, and formation of habits of an active predator.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/115, Serial No. N912, 25 p.)

Life Cycle and Mechanism of Abundance Fluctuations in *Illex illecebrosus*

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(A summary of this contribution, with no abstract, was distributed in mimeographed form as NAFO SCR Doc., 84/116, Serial No. N913, 7 p.)

On Feeding of Two Squid Species in the Northwest Atlantic

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Abstract

Studies on feeding of short-finned (*Illex illecebrosus*) and long-finned (*Loligo pealei*) squids were conducted on materials which were collected on the Scotian Shelf and Georges Bank areas during May–November 1976. Analysis of 2,604 *I. illecebrosus* and 578 *L. pealei* stomachs showed that the food composition of both species was dominated by fish and squid. Cannibalism was more typical of *Illex* and fish constituted the prevalent items of the diet of *Loligo*. In all areas and depths, coefficients of stomach fullness was 1.5–2.0 times higher for larger *Illex* than smaller specimens, although feeding intensity of both groups was low. The feeding intensity of juvenile *Loligo* was higher than that of mature specimens.

(This contribution was distributed in mimeographed form as NAFO SCR Doc. 84/117, Serial No. N914, 12 p.)

Reproductive Biology and Scale of Maturity Stages of the Reproductive System of Male Squid (*Illex illecebrosus*)

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(A summary of this contribution, with no abstract, was distributed in mimeographed form as NAFO SCR Doc. 84/119, Serial No. N916, 3 p.)

Reproductive Biology and Scale of Maturity Stages of the Reproductive System of Female Squid (*Illex illecebrosus*)

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(A summary of this contribution, with no abstract, was distributed in mimeographed form as NAFO SCR Doc. 84/120, Serial No. N917, 4 p.)

Summary of Planktonic Cephalopods, Including *Illex illecebrosus*, from Kaiyo-Maru Cruise 8201, with Recommendations for Future Sampling

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(This contribution, with no abstract, was distributed in mimeographed form as NAFO SCR Doc. 84/124, Serial No. N933, 7 p.)

NOTICE

Recent Advances in Understanding Recruitment in Marine Fishes of the Northwest Atlantic with Particular Emphasis on Georges Bank Herring and Flemish Cap Cod and Redfish Stocks

Special Session of the Scientific Council on Recruitment Studies
Dartmouth, Nova Scotia, Canada, 3–5 September 1986

Specific Topics

1. Brief synopsis of research to date and current knowledge of recruitment process for selected stocks (one invited paper for each region)
2. Evaluation of sampling methods with major focus on first year life stages
 - a) Sampling designs, gear and its efficiency relative to behavior
 - b) Methods of collection and processing samples, measurement conventions
 - c) Ageing methods and their accuracy
3. Estimation of key biological aspects of the recruitment process (focus on interannual variations)
 - a) Fecundity and spawning
 - b) Distribution and dispersal (eggs, larvae, juveniles)
 - c) Abundance at age/size (accuracy of growth and mortality rates)
 - d) Recruitment and spawning stock estimates and their accuracy
4. Examination of recruitment variability vs potential controlling factors
 - a) Patterns of physical environment vs spawning and recruitment events
 - b) Possible biological factors (time series recruitment vs food, predators, spawning stock, disease, parasites)
5. Critique of hypotheses on factors controlling recruitment variability and implications for future research.

Deadlines

Authors are requested to send titles and brief descriptions of their potential contribution to the Convener by **1 March 1986**. Papers will be selected on the basis of their relevance to the topics indicated above. Authors of selected contributions will be informed by **15 April 1986**.

Completed manuscripts (typescript or good quality photocopy) must arrive at the NAFO Secretariat for mimeographing by **20 August 1986**, addressed to Assistant Executive Secretary, Northwest Atlantic Fisheries Organization, Bedford Institute of Oceanography, P. O. Box 638, Dartmouth, Nova Scotia, Canada, B2Y 3Y9.

Publication

Publication in the *Journal of Northwest Atlantic Fishery Science* or *NAFO Scientific Council Studies* will depend on the nature and quality of individual contributions.

Convener

Further information may be obtained from the NAFO Secretariat or from the **Convener**:

Dr M. D. Grosslein
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Telephone No.: (617) 548-5123

NOTICE

Biology of Demersal Resources of the North Atlantic Continental Slopes, with Emphasis on Greenland Halibut and Grenadiers

Special Session in September 1987

This theme was chosen by the Scientific Council of NAFO for a 3-day session in advance of the 1987 Annual Meeting. Details of organizational arrangements, including time and place, outline of topics to be covered, and deadlines for the submission of abstracts and completed manuscripts will be finalized at the September 1986 Meeting of the Scientific Council.

Information for Authors in Preparing Manuscripts for NAFO Scientific Publications

General Guidelines

The manuscript should be typed in English on white paper, preferably 21.5 × 28 cm (8.5 × 11 in.), on one side only. All typing should be double-spaced with at least 2.5 cm margins around the page. Avoid breaking words at the end of lines. Number all pages, including the title page, consecutively with arabic numbers in the center of the top margin. The sequence of the material should be: title page, abstract, text, references, tables, captions for figures, and figures.

Content of Manuscript

Title page

This page should contain the title, followed by the name(s) and address(es) of the author(s) including professional affiliation, and any related footnotes. Limit the title to what is documented in the manuscript, and keep it as concise as possible.

Abstract

An informative abstract must be provided, which does not exceed one double-spaced page or about 250 words, the ultimate length being dependent on the size of the manuscript. The abstract should concisely indicate the content and emphasis of the paper. It should begin with the main conclusion from the study and be supported by statements of relevant findings. It is important that the abstract accurately reflect the paper's contents, because it is often separated from the main body of the paper by abstracting and indexing services.

Text

In general, the text should be organized into Introduction, Materials and Methods, Results, Discussion, Acknowledgements and References. Authors should be guided by the organization of papers that have been published in the NAFO Journal or Studies and by such authorities as the Council of Biological Editors Style Manual (CBE, 9650 Rockville Pike, Bethesda, MD 20814, USA). The Introduction should be limited to the purpose and rationale of the study, with literature review and other information limited to what is needed to define the problem. The Materials and Methods should provide the framework for obtaining answers to the problems which concern the purpose of the study. The Results should answer the questions evolving from the purpose of the study in a comprehensive manner, avoiding any confusion between facts and inferences and the restatement of table and figure captions in the text. The Discussion should give the main

contributions from the study, with appropriate interpretation and comparison with those of other authors. Speculation should be limited to what can be supported with reasonable evidence. In the case of short papers, it is often useful to combine Results and Discussion to avoid repetition. Acknowledgements should be limited to the names of individuals who provided significant scientific and technical support, including reviews, during the preparation of the manuscript, and the names of agencies which provided financial support.

Mathematical equations and formulae must be accurately stated, with clear definitions of the various letters and symbols. If logarithmic expressions are used, the type of function (base 10 or natural logarithms) must be clearly indicated in the text or by appropriate symbols ("log₁₀" or "log" for ordinary logarithms, and "log_e" or "ln" for natural logarithms).

References

Good judgment should be used in the selection of references, which must be restricted largely to significant published literature. References to unpublished data and documents, manuscripts in preparation, and manuscripts submitted to other journals (if not yet accepted for a particular issue) must not be cited in the list of references but may be noted in the text as unpublished data or personal communications (with full mailing address of the authors). Citation of meeting documents which have limited circulation should be avoided whenever possible, except when such documents contain significant new findings for which no other published sources of the information exist.

Literature references cited in the text must be by author's surname and year of publication, e.g. (Collins, 1960). The surnames of two authors may be used in a citation, but, if more than two authors are involved the citation should be (Collins *et al.*, 1960). The citation of mimeographed manuscript reports and meeting documents should contain the abbreviation "MS", e.g. (Collins *et al.*, MS 1960). All papers referred to in the text must be cited in the References alphabetically by the author's surname and initials, followed by the initials and surnames of other authors, year of publication, full title of the paper, name of the periodical, volume and/or number, and range of pages. Abbreviations of periodicals should, if possible, follow the "World List of Aquatic Sciences and Fisheries Serials Titles", published periodically by FAO (Food and Agriculture Organization of the United Nations). References to monographs should, in addition to the author(s), year

and title, contain the name and place of the publisher and the number of pages in the volume. Reference to a paper in a book containing a collection of papers should also contain the page range of the paper, name(s) of editor(s), and actual title of the book. The accuracy of all references and their correspondence with text citations is the responsibility of the author.

Tables

All tables must be discussed or mentioned in the text. Tables should be carefully constructed so that the data presented in them are clearly understood and that they fit within either a column or page of the periodical. Each table should start on a separate page and be headed by a description which, together with the column headings, makes the table intelligible with reference to the text. Tables must be numbered consecutively in arabic numerals, which correspond with the order of presentation in the text. The required position of tables in the text should be indicated in the left margin of the relevant page. Place the tables after the list of references.

Figures

Each photograph or drawing, described in the text, must be on a separate sheet in the form of a good quality reproduction and be numbered consecutively with arabic numerals. Lettering should not be overpowering, but should be large enough to withstand reduction of the figure to page width (17 cm) or half-page (single column) width (8 cm). To avoid the use of excessive space, many kinds of illustrations are adequately intelligible if reduced to single-column width, provided that some thought is given to the design and lettering. Black-ink line drawings and/or photographs are acceptable. Over-sized line drawings should be submitted as page-size photographs or good quality photocopies on which the dimensions of the illustrations do not exceed 17 cm wide and 20 cm high, preferably smaller. The original drawings, if larger than 17 × 20 cm, should be retained by the author and forwarded only if requested by the editor or the NAFO Secretariat. The figure number should be clearly indicated on the back or in the bottom margin of each illustration. Figure captions should be typed on a separate sheet which follows the tables in paging sequence. The approximate location of each figure in the text should be indicated in the left margin of the relevant page. A complete set of original or clear illustrations must accompany the original of the manuscript and photocopied sets must be appended to the other copies for review purposes. If the paper contains photographs of animals, organs, tissues, etc., which will not photocopy

clearly, a set of such photographs must accompany each copy of the manuscript.

Computer-generated figures should be avoided if possible, because they usually reproduce poorly. Dot-matrix printers do not produce acceptable illustrations. Figures drafted with black india ink are always preferable. Color plates are very expensive to produce and should be avoided if possible. If a color plate is essential to the understanding of the text, the author will be requested to cover the cost of its reproduction.

Manuscript Submission

Journal of Northwest Atlantic Fishery Science

The Journal publishes original research papers and notes on Northwest Atlantic fisheries science with emphasis on the environmental, biological, ecological and fishery aspects of living marine resources and ecosystems. Manuscripts are considered for publication with the understanding that their content is unpublished and is not being submitted elsewhere for publication. Each manuscript is normally reviewed by two referees for appraisal as to its suitability as a primary publication before final evaluation by the editor. Manuscripts (original and **three** copies) should be addressed to:

B. E. Skud, Editor
Journal of Northwest Atlantic Fishery Science
NOAA/NMFS Research Laboratory
South Ferry Road
Narragansett, RI 02882, USA

NAFO Scientific Council Studies

The Studies publishes papers which are of topical interest and importance to the current and future activities of the Scientific Council, but which are not considered to be of sufficiently high quality to meet the standards for primary publication in the Journal. Such papers have usually been presented as research documents at Scientific Council meetings and nominated for publication by the Standing Committee on Publications. These manuscripts are not normally refereed but undergo critical scrutiny by the Studies editor and often by an expert familiar with the subject matter. Manuscripts (**one** copy only) should be addressed to:

Assistant Executive Secretary
Northwest Atlantic Fisheries Organization
Bedford Institute of Oceanography
P. O. Box 638
Dartmouth, Nova Scotia
Canada B2Y 3Y9

NAFO Scientific Council Studies

Previous Issues

- No. 1. Miscellaneous Selected Papers (101 pages, published March 1981)
- No. 2. Manual on Groundfish Surveys in the Northwest Atlantic, W. G. Doubleday, Editor (55 pages, published December 1981)
- No. 3. Miscellaneous Selected Papers (82 pages, published April 1982)
- No. 4. Special Session on Remote Sensing, September 1981 (98 pages, published September 1982)
- No. 5. Symposium on Environmental Conditions in the Northwest Atlantic During 1970-79, September 1981 (113 pages, published December 1982)
- No. 6. Miscellaneous Selected Papers (103 pages, published December 1983)
- No. 7. Miscellaneous Selected Papers (97 pages, published August 1984)
- No. 8. Miscellaneous Selected Papers (95 pages, published April 1985)

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