

## CRAB RESOURCES

4.1 Fishing for crabs in Subarea 48.3 during the 1992/93 season was undertaken by one US vessel, the *Pro Surveyor*, between 10 July and 12 November 1992. The catch was 299 tonnes (272 000 individuals).

4.2 Two species (*Paralomis spinosissima* and *P. formosa*) were caught with *P. spinosissima* being the targeted species. A description of the fishery is contained in SC-CAMLR-XI, Annex 5, paragraphs 6.1 to 6.7.

4.3 The Scientific Committee has recognised that in spite of the detailed information provided by the US fishery, very little life history, ecological or demographic data on *Paralomis* spp. are available (Annex 5, Appendix E, paragraphs 2.1 to 2.11) and that large uncertainties are associated with estimating the standing stock of the above species (SC-CAMLR-XI, paragraph 4.15). Consequently, the Commission has adopted a precautionary approach to the development of this fishery and Conservation Measure 60/XI was established as an interim management approach pending the development of a longterm management plan for the fishery (CCAMLR-XI, paragraph 9.52).

4.4 As a means to developing a longterm management plan for the crab fishery a workshop should be held to begin this process and to advise on data to be reported from the fishery (CCAMLR-XI, paragraphs 9.48 to 9.50).

### WORKSHOP ON THE LONGTERM MANAGEMENT OF THE ANTARCTIC CRAB FISHERY

4.5 A workshop (Convener, Dr Holt) was held at the Southwest Fisheries Science Centre, La Jolla, USA from 26 to 28 April 1993. Its terms of reference are set out in SC-CAMLR-XI, paragraph 4.17. The Workshop report has been reviewed by WG-FSA and is attached as Appendix E of Annex 5.

### POPULATION CHARACTERISTICS

4.6 The Scientific Committee endorsed the summary of research topics, data needs and their respective priorities for acquisition identified by the Workshop (Annex 5, Appendix E, Table 1).

4.7 The Scientific Committee agreed that host-parasite interactions in crab stocks subject to fishing should be more extensively modelled in order to assess more effectively the potential impact on demographic characteristics and stock yield(s) (Annex 5, Appendix E, paragraph 2.20 and 6.78).

#### STOCK ASSESSMENT

4.8 The Scientific Committee endorsed WG-FSA's and the Workshop's deliberations on various methods to assess the *Paralomis* fishery (Annex 5, paragraphs 6.79 and 6.82; Annex 5, Appendix E, paragraphs 3.1 to 3.21 and Table 2).

4.9 The Scientific Committee agreed that it would not be appropriate at this time to estimate a TAC for the 1993/94 fishery using the four production models tabled at WG-FSA (WG-FSA-93/23). Further development along these lines was encouraged.

#### DEVELOPING LONGTERM APPROACHES TO MANAGEMENT OF THE CRAB FISHERY

4.10 Interim management approaches (e.g., Conservation Measure 60/XI), currently being employed while a longterm approach is being developed, include both direct and indirect controls on harvesting. The Scientific Committee agreed that these should continue to be applied in management of the crab fishery and further measures may be deemed necessary in the course of development of a longterm management plan.

4.11 It was agreed that stock assessments based on depletion as well as production methods would constitute an integral component of such development and these should be considered in more detail (Annex 5, paragraphs 6.91 and 6.92).

4.12 The Scientific Committee specifically recommended that the following additional measures identified by the Workshop and endorsed by WG-FSA should have a high priority for investigation:

- (i) the use of time-release or biodegradable devices to reduce the effects of "ghost" fishing resulting from pot loss, should be considered;
- (ii) the adoption of a minimum mesh size and/or the incorporation of an escape port (usually a metal ring set into the side of the pot) in pots following research on mesh or

port selectivity. This will serve to select only crabs of harvestable size more effectively in addition to reducing the number of potential discards. It will, however, reduce the ability to monitor parasitic infection; and

- (iii) the use of pots with finer mesh or escape ports in order to obtain more representative length frequency information from harvested stocks.

4.13 The Scientific Committee recognised that the development of a management approach for the crab fishery would need to be based on the following:

- (i) the design of methods (taking into account limitations of resources available) to acquire the necessary data for assessments of:
  - (a) target species,
  - (b) the strengths of multi-species interactions;
- (ii) evaluations (using simulations where appropriate) to determine whether such methods are likely, in principle, to achieve their objectives; and
- (iii) the development of a feedback management framework within which methods and assessments will be used for providing advice to the Scientific Committee and Commission (see CCAMLR-X, paragraph 6.13). An integral part of this will be to review the methods used for data acquisition on a regular basis.

4.14 The Scientific Committee therefore recommended that an experimentally-based approach should be applied to the commercial crab fishery in order to answer specific questions about the population dynamics of *Paralomis* stocks in Subarea 48.3 in general, and of *P. spinosissima* in particular. This approach was detailed in WG-FSA-93/22 and would comprise the following three phases, to be conducted over two consecutive fishing seasons.

Phase 1 - survey of the crab distribution around South Georgia at the start of the first fishing season by fishing in designated blocks. After completion, normal fishing operations would continue until the TAC for that season was attained or the vessels voluntarily left the fishery.

Phase 2 - series of depletion experiments conducted in local areas to start at the beginning of the second fishing season. After Phase 2 normal fishing operations would be conducted.

Phase 3 - fishing effort would be redirected to the local areas depleted during Phase 2. This would occur towards the end of the second fishing season. It would commence just prior to cessation of the fishery resulting from the TAC being attained or by each vessel wishing to voluntarily leave the fishery.

4.15 The Scientific Committee noted that in order to maximise the potential output of the approach:

- (i) all phases of the experiment should be conducted by all vessels entering the fishery;
- (ii) that vessels should be required to participate independently in the experiment;
- (iii) the experiment's potential to provide useful data would grow as more vessels enter the fishery; and
- (iv) catches should be considered as part of any prevailing TAC for respective seasons.

4.16 The Scientific Committee agreed that this experimental approach offers the best alternative for obtaining the data necessary to undertake meaningful assessments, in particular, of crab stock dynamics and the fishery. It agreed that the following objectives can only be met by using this approach:

- (i) the elucidation of large-scale distribution patterns, how these change with time, and the identification of numbers and locations of centres of aggregation;
- (ii) the determination of trends in catchability/movement and how these affect length frequency distributions and estimates of local abundance;
- (iii) the determination of the effects of harvesting on the dynamics of localised populations and the importance of movement, recruitment and parasitism; and
- (iv) the comparison of the assessments of crab stocks using data from normal commercial fisheries operations compared with those derived from the more structured experimental approach.

4.17 The Scientific Committee noted that the experimental approach integrates experimental and commercial fisheries, thereby optimising available resources which are limited for stock assessment

purposes. The incorporation of experimental and “ordinary” fishing also allows vessels to fish in a rational and controlled manner.

4.18 The Scientific Committee noted the various analyses which should be possible with the data likely to arise from an experimental approach (Annex 5, paragraph 6.97).

4.19 As part of developing a longterm management plan for the crab fishery, the Scientific Committee agreed that an important objective for Phase 1 would be to collect data necessary to evaluate the efficacy of Phases 2 and 3. As such, it endorsed WG-FSA’s proposed action in this regard (Annex 5, paragraphs 6.98 and 6.99) and took particular note of the questions posed in paragraph 6.100:

- (i) Is there value in monitoring a spatial square in which no fishing (control) for each experimental depletion square occurs? Such controls could be useful for determining the magnitude of effect of the experimental fishing on stock size. How many replicates are required to be able to discriminate between depletion and control treatments if an effect of depletion occurs? How much effort needs to be expended assessing the control squares?
- (ii) What size of area surrounding experimental squares is required in which commercial fishing should be excluded in order that the experimental fishing areas are kept independent of effects that may arise from the commercial fishery? Also, what configuration of experimental, control and commercially fished areas should be employed for cost-effective experimental and commercial operations?
- (iii) What magnitude of depletion is required for adequately addressing the objectives? How long should a square be fished to ensure a significant depletion has occurred?
- (iv) Should Phases 1, 2 and 3 recur in order to maintain adequate stock assessments in a longterm management plan? If so, at what frequency?
- (v) What method should the Secretariat use to advise when Phase 3 should begin such that the TAC will not be exceeded and Phase 3 will be completed.

4.20 The Scientific Committee emphasised, however, that stock assessment independent of the fishery is important for determining the utility of data from commercial operations in assessing the status of stocks. Consequently, it recommended that surveys of crab stocks independent of commercial fishing operations using trawls or video transects should be given a high priority. The

investigation of these and various other fishery independent methods of assessing crab stocks should also be encouraged.

4.21 The Scientific Committee agreed that the following data are required for stock assessment of the crab fishery (Annex 5, paragraph 6.102; Annex 5, Appendix E, paragraphs 5.1 to 5.18):

Catch and Effort Data:

Cruise Descriptions

cruise code, vessel code, permit number, year.

Pot Descriptions

pot shape, dimensions, mesh size, funnel attitude, number of chambers, presence of an escape port.

Effort Descriptions

date, time, latitude and longitude of the start of the set, compass bearing of the set, total number of pots set, spacing of pots on the line, number of pots lost, depth, soak time, bait type.

Catch Descriptions

retained catch in numbers, by-catch of all species, incremental record number for linking with sample information.

Biological Data:

For these data, crabs are to be sampled from the line hauled just prior to noon, by collecting the entire contents of a number of pots spaced at intervals along the line so that between 35 and 50 specimens are represented in the subsample.

Cruise Descriptions

cruise code, vessel code, permit number.

Sample Descriptions

date, position at the start of the set, compass bearing of the set, line number.

Data

species, sex, length of at least 35 individuals, presence/absence of rhizocephalan parasites, record of the destination of the crab (kept, discarded, destroyed), record of the pot number from which the crab comes.

4.22 The Scientific Committee recognised that haul-by-haul data are important for the effective development of a longterm management approach for the crab fishery (Annex 5, paragraph 6.102).

4.23 The Scientific Committee drew the Commission's attention to the confidential nature of haul-by-haul data from the crab fishery. The Scientific Committee agreed that provision of haul-by-haul data would be difficult without consideration of methods to protect industrial confidentiality.

#### MANAGEMENT ADVICE

4.24 Topics of high priority for future research are identified in paragraph 4.13 and should be investigated as soon as possible.

4.25 The Scientific Committee noted that Conservation Measure 60/XI expires at the end of the Commission meeting.

4.26 The Scientific Committee recommended that a TAC of 1 600 tonnes should be imposed for the crab fishery in Statistical Area 48 for the next season. In addition, indirect controls (size, sex, gear and product storage) contained in Conservation Measure 60/XI should be continued.

4.27 The Scientific Committee also recommended that a new Conservation Measure should be adopted which had two components: a data reporting requirement and a requirement for vessels involved in the fishery to take part in an experimental fishery.

4.28 In the case of data reporting, the Scientific Committee believed that the most appropriate data would be in haul-by-haul form. However, they noted that at this stage of the fishery's development a question of industrial confidentiality arose (Annex 5, paragraphs 4.24 and 4.25).

4.29 At this early stage of the fishery, the Scientific Committee recommended that vessels operating should be required to take part in an experimental fishery. The proposed design of this experimental fishery is outlined in paragraphs 4.15 and 4.16 and detailed in WG-FSA-93/22. The Scientific Committee endorsed this design, but noted that it would be subject to review and in future seasons might be refined (see discussion in paragraph 4.21).