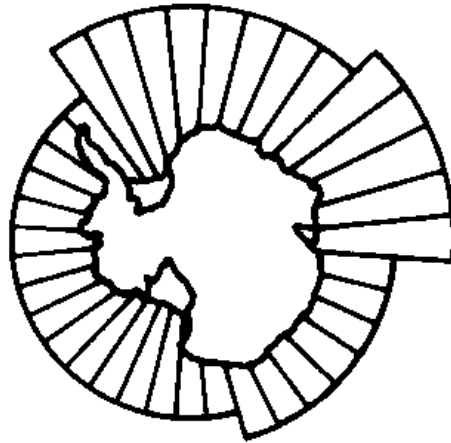


**COMMISSION FOR THE CONSERVATION
OF ANTARCTIC MARINE LIVING RESOURCES**

SCHEME OF INTERNATIONAL SCIENTIFIC OBSERVATION



**SCIENTIFIC OBSERVERS
MANUAL**

**(OBSERVATION GUIDELINES
AND REFERENCE MATERIALS)**

2011

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AUSTRALIA

- COMMISSION FOR THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES
- COMMISSION POUR LA CONSERVATION DE LA FAUNE ET LA FLORE MARINES DE L'ANTARCTIQUE
- КОМИССИЯ ПО СОХРАНЕНИЮ МОРСКИХ ЖИВЫХ РЕСУРСОВ АНТАРКТИКИ
- COMISIÓN PARA LA CONSERVACIÓN DE LOS RECURSOS VIVOS MARINOS ANTÁRTICOS

This manual is produced in the official languages of the Commission (English, French, Russian and Spanish) and may be downloaded from the CCAMLR website (www.ccamlr.org). Hard copies are available from the CCAMLR Secretariat at the address below.

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INTRODUCTION

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), at its 1992 Meeting, adopted a Scheme of International Scientific Observation as required under Article XXIV of the Convention. The scheme is designed to gather and validate scientific information essential for assessing the status of populations of Antarctic marine living resources and for assessing the impact of fishing on those populations and populations of related and dependent species.

Information from the observer program is a fundamental part of the CCAMLR management approach. The scheme provides independent scientific data that are crucial input data for the assessment of target and by-catch fish species. It also allows the implementation and effectiveness of management measures to reduce incidental mortality associated with fisheries to be monitored. Fisheries in the CCAMLR region take place in areas where few national research surveys are undertaken and therefore the data from the scheme are also invaluable in understanding the ecosystem of the Southern Ocean.

In order to assist CCAMLR Members and their observers in planning observation programs and recording data, the CCAMLR Secretariat, in consultation with the Scientific Committee and its working groups, has developed this *Scientific Observers Manual*. The manual contains a number of guidelines for scientific observations and reference materials.

The components of the scheme that are most frequently updated, i.e. the observer cruise report and logbook forms and instructions are not included in this manual but are available in electronic format on the CCAMLR website (www.ccamlr.org) or by contacting the Secretariat.

PART I
PLANNING SCIENTIFIC OBSERVATIONS

SECTION 1

**TEXT OF THE CCAMLR SCHEME OF
INTERNATIONAL SCIENTIFIC OBSERVATION¹**

- A. Each Member of the Commission may designate observers referred to in Article XXIV of the Convention.
- (a) The Commission will specify activities of scientific observers on board vessels. These activities are described in Annex I and may be modified taking into account advice from the Scientific Committee. Additional scientific activities may be agreed between the Receiving and Designating Member States provided these do not conflict with, or detract from, the activities specified by the Commission.
 - (b) The Member wishing to place scientific observers on board a vessel of another Member shall be referred to as the 'Designating Member' and the Member who accepts a scientific observer on board its vessel shall be referred to as the 'Receiving Member'. Scientific observers in this scheme shall be nationals of the Designating Member and shall conduct themselves in accordance with the customs and order existing on the vessel on which they are operating.
 - (c) Members shall designate adequately qualified scientific observers who shall be familiar with the harvesting and scientific research activities to be observed, the provisions of the Convention and the measures adopted under it and who are adequately educated and trained to carry out competently the duties of scientific observers as required by the Commission.
 - (d) Scientific observers shall be able to communicate in the language of the Flag State of the vessels on which they carry out their activities.
 - (e) Scientific observers shall each carry a document issued by the Designating Member in a form approved by the Commission identifying them as CCAMLR scientific observers.
 - (f) Scientific Observers shall submit to the Commission through the Designating Member, not later than one month after the completion of the observer trip or after the return of the observer to his/her home country, all observer logbooks and reports of each observation assignment undertaken, using the observation formats approved by the Scientific Committee as they appear in the *Scientific Observers Manual*. The Secretariat shall send a copy of the scientific observer's

¹ As adopted at CCAMLR-XI (paragraph 6.11) and amended at CCAMLR-XVI (paragraph 8.21) and CCAMLR-XXVII (paragraph 13.68).

report to the Receiving Member within 14 days of receipt. The language of the scientific observer's report shall be in one of the Commission's official languages, as agreed upon in the bilateral agreement between the Designating and Receiving Members.

- (g) The Designating Member, in consultation with the scientific observer, shall be responsible for providing clarification about data collected, observations made, and incidents that may have occurred during deployment.
- (h) Upon review of the observer's report, the Receiving Member shall advise the Secretariat and the Designating Member of any discrepancies as soon as they are identified. In the event of such notification, the Designating and Receiving Members will make every effort to resolve the issue. If the Designating and Receiving Members notify the Secretariat that they are unable to resolve such issues, the Secretariat will note any unresolved discrepancy.

B. In order to promote the objectives of the Convention, Members agree to take on board their vessels engaged in scientific research or harvesting of marine living resources designated scientific observers, who shall operate in accordance with bilateral arrangements concluded.

Such a bilateral arrangement shall include the following principles:

- (a) The scientific observers shall be given the status of ship's officers. Accommodation and meals for scientific observers on board shall be of a standard commensurate with this status.
- (b) Receiving Members shall ensure that their vessel operators cooperate fully with the scientific observers to enable them to carry out the tasks assigned to them by the Commission. This will include allowing scientific observers access to data, equipment and those operations of the vessel necessary to fulfil their duties as required by the Commission.
- (c) Receiving Members shall ensure that their vessel operators cooperate fully with scientific observers to enable the observers to carry out their data collection duties as specified in the *Scientific Observers Manual* without impediment or influence. Arrangements shall be made for messages to be sent and received on behalf of scientific observers using the vessel's communication equipment and operator. Reasonable costs of such communications shall normally be borne by the Designating Member. After notifying the Master, scientific observers shall be allowed such access as is necessary to undertake observation duties, including the vessel's navigation equipment and personnel to determine the vessel's position, course and speed.
- (d) Receiving Members shall take appropriate action with respect to their vessels to ensure safe working conditions, the protection, security and welfare of scientific observers in the performance of their duties, and to provide them with medical care and safeguard their freedom and dignity in adherence to all pertinent international maritime regulations.

- (e) For transfers at sea, Members shall: (i) ensure that their vessel operators conduct transfers of observers under safe conditions and with the agreement of the observers (ii) conduct the transfer in a manner which maximises the safety of observers and crew during the procedure, and (iii) provide experienced crew members to assist observers during any transfer which is made.
- (f) Arrangements involving the transportation and boarding of scientific observers shall be organised so as to minimise interference with harvesting and research operations.
- (g) Scientific observers shall provide to the relevant masters copies of such records, prepared by the scientific observers, as the masters may wish to retain.
- (h) Designating Members shall ensure that their scientific observers carry insurance satisfactory to the Parties concerned.
- (i) Transportation of scientific observers to and from boarding points shall be the responsibility of the Designating Member.
- (j) Unless otherwise agreed, the equipment, clothing and salary and any related allowances of a scientific observer shall normally be borne by the Designating Member. The vessel of the Receiving Member shall bear the cost of on-board accommodation and meals of the scientific observer.
- (k) The bilateral arrangement shall address such other matters as deemed appropriate by both the Designating and Receiving Members, such as liability and confidentiality.

C. For each observer deployed, the Designating Members shall provide the following information to the Secretariat prior to the deployment of the observer:

- (a) date of signing the arrangement;
- (b) name and flag of the vessel receiving the observer;
- (c) Member designating the observer;
- (d) area of fishing (CCAMLR statistical area, subarea, division);
- (e) type of data to be collected by the observer and submitted to the Secretariat (e.g. by catch, target species, biological data);
- (f) expected dates of the start and end of the observation program;
- (g) expected date of returning the observer to his/her home country.

D. In order to maintain the objectivity and scientific integrity of the data, Designating Members, Receiving Members, the vessels on which scientific observers are deployed and the scientific observers themselves, shall uphold and promote the following provisions:

- (a) A scientific observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation shall not:
- (i) contravene the requirements established in the laws and regulations of the Receiving Member or violate general rules of behaviour and safety that apply to all vessel personnel, provided such rules do not interfere with the duties of the observer under this Scheme, as stipulated in the bilateral arrangement between the Designating and the Receiving Members;
 - (ii) inhibit the proper functioning and fishing activities of the vessel;
 - (iii) solicit or accept, directly or indirectly, any gratuity, gift, favour, loan, or anything of monetary value from anyone who conducts fishing or fish processing activities that are regulated by CCAMLR, or who has interests that may be substantially affected by the performance or non-performance of the official duties of scientific observers, with the exception of meals, accommodations, or salary when provided by the vessel;
 - (iv) have been convicted of a serious criminal offense for five years prior to appointment as an observer;
 - (v) engage in any illegal actions or any other activities that would reflect negatively on his/her image as a professional scientist, on other scientific observers, on the integrity of data collection, or on CCAMLR as a whole;
 - (vi) have any financial interest in, or relationship with, any vessel or business harvesting or processing products from a CCAMLR fishery.
- (b) The owner, Master, agent, and crew of a vessel on which a scientific observer is deployed shall not:
- (i) offer a scientific observer, either directly or indirectly, any gratuity, gift, favour, loan, or anything of monetary value, except for meals, accommodations or salary when provided by the vessel;
 - (ii) intimidate, or interfere with the duties of a scientific observer;
 - (iii) interfere with or bias the sampling procedure employed by a scientific observer;
 - (iv) tamper with, destroy, or discard a scientific observer's collected samples, equipment, records, photographic film, papers, or effects without the express consent of the observer;
 - (v) prohibit, impede, threaten, or coerce, an observer from/into collecting samples, making observations, or otherwise performing the observer's duties; or
 - (vi) harass a scientific observer.

- (c) Deployment limitations. Designating Members shall seek, to the extent possible, to avoid having a scientific observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation undertake multiple consecutive trips on the same vessel.
- (d) Confidentiality. Designating Members shall require that a scientific observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation shall not:
 - (i) disclose verbal, written, or other evidence or observations made on-board a vessel, or observations made in a processing facility, including data or commercially sensitive vessel-specific fishing, processing, and marketing information, to any person except to the Secretariat and as provided for in the bilateral arrangement;
 - (ii) take data or observer logbooks from one vessel onto another, except that if an observer is unable to submit data before being redeployed on another vessel, the scientific observer shall take reasonable steps to safeguard the data and observer logbooks.
- E.
 - (a) When the Designating Member receives information regarding actions of the scientific observer that may contravene the provisions of this Scheme, the Designating Member shall take prompt and appropriate action, in accordance with its domestic law. The Designating Member will notify the Receiving Member and the Commission of any appropriate action taken.
 - (b) When the Receiving Member receives information regarding actions of the vessel owner, Master, agent, or crew that may contravene the provisions of this Scheme, the Receiving Member shall take prompt and appropriate action, in accordance with its domestic law. The Receiving Member will notify the Designating Member and the Commission of any appropriate action taken.
- F. Members who have designated scientific observers will take the initiative in implementing assignments identified by the Commission.
- G. The scope of functions and tasks described in Annex I should not be interpreted to suggest in any way the number of required observers which will be accepted on board a vessel.

**FUNCTIONS AND TASKS OF INTERNATIONAL SCIENTIFIC OBSERVERS
ON BOARD VESSELS ENGAGED IN SCIENTIFIC RESEARCH OR
HARVESTING OF MARINE LIVING RESOURCES**

1. The function of scientific observers on board vessels engaged in scientific research or harvesting of marine living resources is to observe and report on the operation of fishing activities in the Convention Area with the objectives and principles of the Convention for the Conservation of Antarctic Marine Living Resources in mind.
2. In fulfilling this function, scientific observers will undertake the following tasks, using the observation formats approved by the Scientific Committee:
 - (i) record details of the vessel's operation (e.g. partition of time between searching, fishing, transit etc., and details of hauls);
 - (ii) take samples of catches to determine biological characteristics;
 - (iii) record biological data by species caught;
 - (iv) record by-catches, their quantity and other biological data;
 - (v) record entanglement and incidental mortality of birds and mammals;
 - (vi) record the procedure by which declared catch weight is measured and collect data relating to the conversion factor between green weight and final product in the event that catch is recorded on the basis of weight of processed product;
 - (vii) prepare reports of their observations using the observation formats approved by the Scientific Committee and submit them to CCAMLR through the Designating Member;
 - (viii) assist, if requested, the captain of the vessel in the catch recording and reporting procedures;
 - (ix) undertake other tasks as may be decided by mutual agreement of the parties involved;
 - (x)² collect and report factual data on sightings of fishing vessels in the Convention Area, including vessel type identification, position and activity;
 - (xi)³ collect information on fishing gear loss and garbage disposal by fishing vessels at sea.

² Added in accordance with CCAMLR-XVII (paragraph 8.16). The Commission decided to review the effectiveness and the need to continue this activity after a two-year trial period (CCAMLR-XVII, paragraph 8.17).

³ Added in accordance with CCAMLR-XVIII (paragraph 8.21).

SECTION 2

LIST OF CURRENT RESEARCH PRIORITIES IDENTIFIED BY THE SCIENTIFIC COMMITTEE FOR CONDUCTING SCIENTIFIC OBSERVATIONS ON COMMERCIAL FISHING VESSELS

The list below represents priority research tasks which have been defined and are kept under periodical review by the Scientific Committee. Scientific observers are not required to conduct the full set of tasks defined below. The list of tasks actually undertaken by an observer should conform with the scientific objectives of bilateral arrangements between Members designating and receiving scientific observers, and depends on the type of the vessel, the number of observers involved and their professional skills. The priorities in this section will also change as new research requirements arise, such as benthic organisms in vulnerable marine ecosystems and where single-year focused research is undertaken (e.g. the Year-of-the-Skate).

1. Fishery for *Champscephalus gunnari*:
 - (i) representative length-frequency distributions
 - (ii) observations on sex and maturity stage
 - (iii) collection of otoliths for age determination
 - (iv) observations of the by-catch of other species
 - (v) the incidental mortality of predators (birds and seals).

2. Longline fishery for *Dissostichus eleginoides* and *D. mawsoni*:
 - (i) representative length-frequency distributions;
 - (ii) observations on sex and maturity stage;
 - (iii) collection of otoliths and scales for age determination;
 - (iv) loss rate of fish from hooks during longline hauling; catching performance of different hook sizes and types; observations on the condition of fish on capture (for tagging experiments);
 - (v) monitoring of total incidental mortality of seabirds by species, sex and age;
 - (vi) assessment of seabird mortality per unit of fishing effort and relative vulnerability of different species;
 - (vii) collection of bird bands and notification of other study markings;
 - (viii) evaluation of the efficacy of mitigation measures;
 - (ix) investigation of the practicalities of the implementation of different mitigation measures;
 - (x) weighing a sample of longline weights while the vessel is alongside the wharf.

3. Fishery for *Euphausia superba*, including by-catch of fish:
 - (i) understanding the differences in selectivity between different gear configurations;
 - (ii) determining the level of by-catch of fish, including fish larvae;
 - (iii) determining the level of warp strikes and incidental mortality of seabirds and seals;
 - (iv) collection of high-quality length-frequency distribution data from all regions.

4. Fishery for *Paralomis* spp. (stone crabs):
 - (i) observations of fishing operations
 - (ii) collection of haul-by-haul catch and effort data
 - (iii) representative length-frequency distributions
 - (iv) representative sex and maturity stage distributions
 - (v) collection of samples of ovaries and eggs
 - (vi) representative length-frequency distributions by sex and maturity stages from catches of bottom trawls (bottom trawl surveys).

SECTION 3

RECORDING AND REPORTING RESULTS OF SCIENTIFIC OBSERVATIONS ON COMMERCIAL FISHING VESSELS

GENERAL

Scientific observers designated in accordance with the CCAMLR Scheme of International Scientific Observation are required to complete scientific observer logbooks and cruise reports.

2. The scientific observer logbooks contain a set of forms to record the vessel's fishing operations, target species, by-catch, incidental mortality of seabirds and marine mammals and interactions with vulnerable marine ecosystems.

3. The scientific observer logbooks for longline and trawl fisheries contain the following forms:

Longline:

Form L1	Vessel and Observation Program Details
Form L2	Longline and Streamer Line Descriptions
Form L3	Daily Work Schedule of Observer
Form L4	Daily Setting Observations
Form L4-IMAF	Seabird Activity for Day Setting Only
Form L5	Daily Hauling Observations
Form L5-IMAF	Incidental Mortality of Seabirds and Marine Mammals
Form L5-VME	VME Taxa Recording
Form L6	Biological Data Collection
Form L7	Conversion Factors
Form L8	Waste Disposal
Form L9	Sightings of Unidentified or IUU Vessels
Form L10	TDR-Bottle Test
Form L11	Tagging
Form L12	Tag Recapture

Trawl:

Finfish

Form T1	Vessel and Observation Program Details
Form T2	Fishing Gear
Form T3	Trawl Details
Form T4	Biological Data Collection
Form T5	Conversion Factors
Form T6	Incidental Mortality of Seabirds and Marine Mammals
Form T7	Waste Disposal
Form T8	Sightings of Unidentified or IUU vessels
Form T9	Skate and Ray Discards
Form T10	Tag Recapture
Form T11	Trawl Warp Strike Protocol

Krill fishing

Form K1	Vessel and Observation Program Details
Form K2	Fishing Gear
Form K3	Trawl Details
Form K4	Krill Biological Data Collection
Form K5	Finfish By-catch
Form K6	Krill Fishing Strategy Questionnaire
Form K7	Incidental Mortality of Seabirds and Marine Mammals
Form K8	Waste Disposal
Form K9	Sightings of Unidentified or IUU Vessels
Form K10	Change of Fishing Ground
Form K11	Trawl Warp Strike Protocol
Form K12	Fish Sampling

Details of the contents and requirement for completion of these forms are included with the electronic version of the forms (and are not repeated here).

4. On completion of the observation program, the observer should submit completed scientific observer logbooks, cruise reports, samples of fishing gear (e.g. hooks or jigs) and biological samples to the technical coordinator of the scientific observer program of the country which nominated the observer. It is the responsibility of the technical coordinator to forward these documents to CCAMLR electronically, together with information on the final destination of collected samples.
5. A set of electronic observer logbook forms are available from the CCAMLR website (www.ccamlr.org) or by contacting the Secretariat (ccamlr@ccamlr.org)
6. It is the responsibility of each observer to ensure that they have access to these forms and all pertinent reference materials from Parts II and III of this manual.

THE FUNCTIONS AND TASKS OF SCIENTIFIC OBSERVERS

7. The list of current research priorities identified by the Scientific Committee for scientific observations on commercial fishing vessels is given in Part I, Section 2.
8. The tasks undertaken by an observer should conform with the scientific objectives of bilateral arrangements between designating Members and Members receiving the scientific observer, and depend on the type of vessel on which observation is undertaken, the number of observers involved and their professional skills.
9. Whenever possible, two scientific observers should be present on each vessel. This allows greater coverage of all fishing operations as well as collection of data relating to incidental mortality and by-catch.

OPERATIONAL PROCEDURE

10. Observers must complete every field of their daily data sheets accurately; this will entail observations during all parts of the fishing operation. It should be remembered that the usefulness of an observer's work relies on his/her recording the duration of observation periods, the actual time at which events occur and on precise knowledge of fishing operations (e.g. the number of baited hooks set, the number of hooks hauled and the observed number of hooks hauled).

11. It is important to be able to distinguish between data collected by observers and by crew. For this reason, data derived from the crew should not be included unless verified by the observer (e.g. the setting positions from the track plotter). Data reported by the crew should be clearly indicated as crew-supplied data on scientific observer logbook forms. There are also fields on the relevant forms to indicate which observer collected particular data. It is important that these are completed accurately to allow data validation.

SPECIAL DEFINITIONS AND TERMS

12. Specific terminology is used throughout the scientific observer logbook forms to describe the various fishing processes. The event of fishing with one longline once is called a single longline **set**. This single set is made up of three phases: **setting** the line (paying out the line with baited hooks attached), fishing (the time between setting and hauling, frequently referred to as 'soak' time) and **hauling** the line (taking the line back into the vessel, and removing fish from hooks). For the trawl fishery, a **trawl** refers to the act of setting, towing and hauling the gear. For vessels using the continuous fishing system for krill, a single 'trawl' may last for several days and therefore, for observation and catch reporting purposes, a trawl is defined as a two-hour period of continuous fishing.

13. A **streamer line** refers to any bird-scaring device which consists of a pole and long section of line with streamers attached. This is positioned over the stern during longline setting. This type of gear has also been described in other publications as 'tori pole', 'bird line' or 'pole and line'. The CCAMLR streamer line is the design adopted by CCAMLR and described in Conservation Measure 25-02 (www.ccamlr.org).

TIME ZONE

14. It is very important that each observer maintains a constant time frame during the cruise. Because vessels move around the ocean through varying time zones, and because local time zones vary due to the imposition of daylight saving etc., observers are required to nominate the time zone they will use when completing their logs. It is usually most convenient to use the time zone that the vessel is using, irrespective of whether the vessel is actually in that time zone. The time zone used must be specified on the 'Vessel and Observation Program Details' form, and must be specified in the number of hours by which this time zone differs from GMT (refer to map of World Time Zones in Part III, Section 2). For instance, the time zone for South Georgia Island would be specified as GMT-3 hrs.

UNITS

15. If units of measurement are specified beside a data field, care should be taken to record the information in those units, and also in the format indicated. If this is not possible, the field should be highlighted and the units used documented to enable conversion to be carried out later.

GENERAL FORMATS

16. The following formats are used throughout the log:

Field	Format	Explanation
Date	ddmmyy	d = day, m = month, y = year
Time	hhmm	h = hour, m = minute
Latitude and longitude	-dd.mmm	degrees and decimal minutes (-ve for degrees west)

OBSERVATIONAL GUIDELINES AND SPECIES IDENTIFICATION

17. A set of guidelines for scientific observation in the CAMLR Convention Area is given in Part II of this manual. For identification of seabirds, observers may refer to the seabird identification plates contained in the book *Fish the Sea Not the Sky* (CCAMLR, 1996), *Identification of Seabirds of the Southern Ocean* (Onley and Bartle, 1999), or any of the many species identification handbooks which are available. For identification of whales and seals, see other available publications, e.g. Volume II of the *FAO/CCAMLR Species Identification Sheets for the CCAMLR Convention Area* (Fischer and Hureau, 1985). *The Complete Guide to Antarctic Wildlife* (Shirihai, 2002) provides a very comprehensive overview and identification guide to most of the marine mammals and seabirds that observers are likely to encounter in the CAMLR Convention Area.

PART II
GUIDELINES FOR SCIENTIFIC OBSERVERS

SECTION 1
STANDARD MEASUREMENTS FOR KRILL, FISH,
CRABS AND SQUID

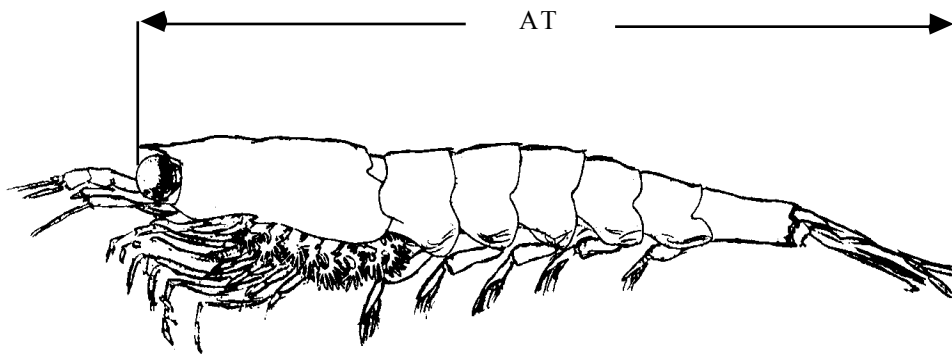


Figure 1: Measurement of total body length (AT) of krill caught during commercial fishing operations: front of eye to tip of telson, to the nearest millimetre below.

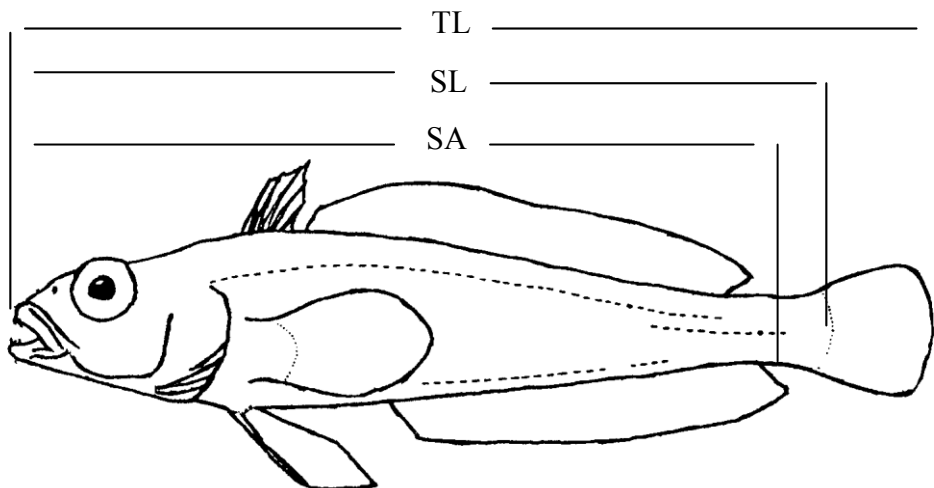


Figure 2: Standard body length measurements of fish: TL – total length is from the most anterior part of the snout to the most posterior part of the caudal fin when this fin is extended along the length of the body; SL – standard length is from the most anterior part of the snout to the end of the vertebral column (usually marked by a vertical groove in the caudal peduncle when it is flexed); SA – snout to anus length is from the anterior part of the snout to the anus.

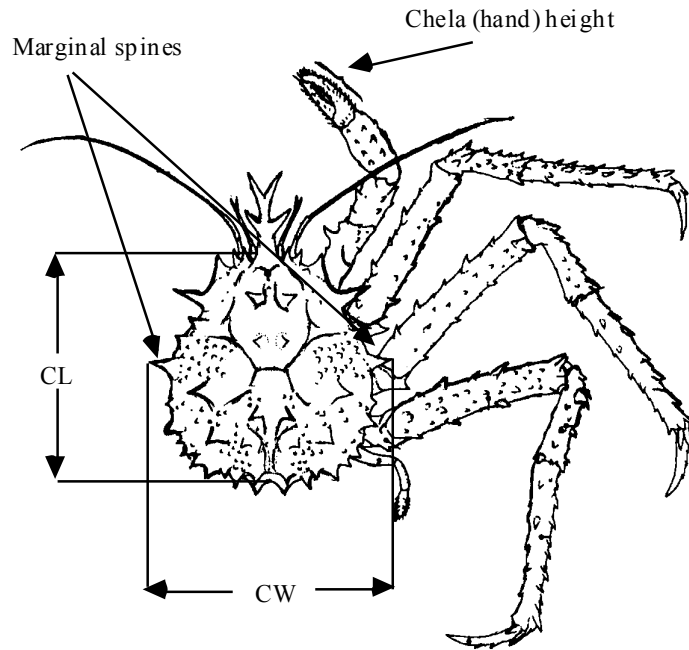


Figure 3: Standard carapace measurements of crab: CL – carapace length is from the posterior edge of the eye socket to median posterior carapace; CW – carapace width is the largest width across the carapace, including marginal spines.

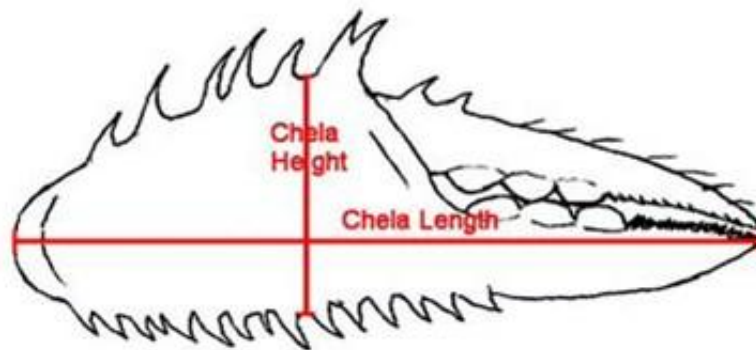


Figure 4: Standard chela length measurements for crabs: CH – chela height; CL – chela length.

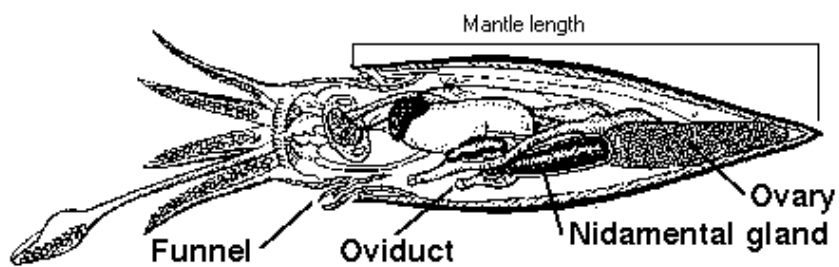


Figure 5: Location of the nidamental gland and the measurement position for mantle length.

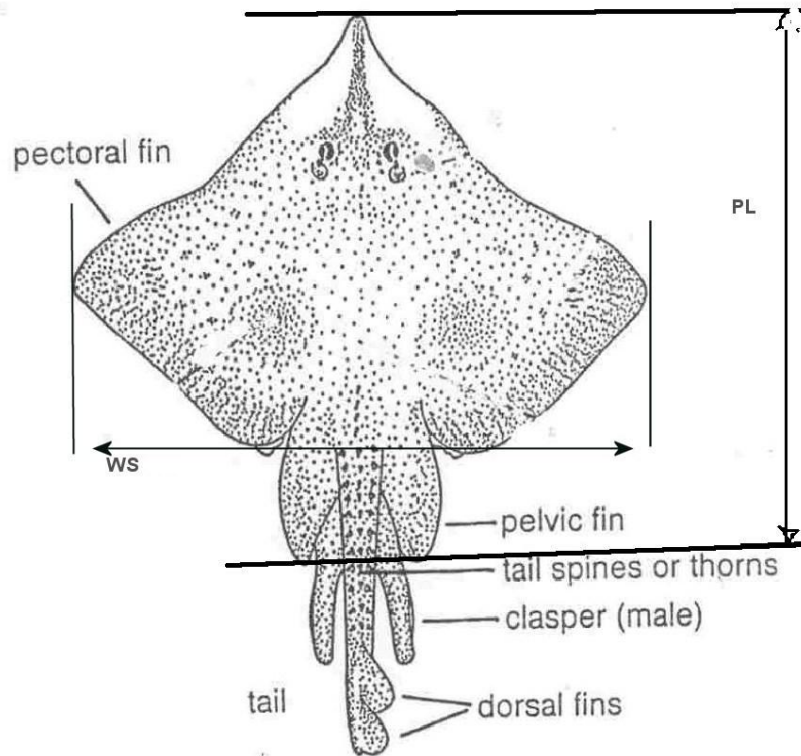


Figure 6: Standard measurements for skates and rays: PL – pelvic length; WS – wing span.

SECTION 2

ASSESSMENT OF KRILL SIZE COMPOSITION

Taking measurements from a large number of specimens is not a difficult task, however, certain rules must be observed in order to provide a balance between achieving a representative sample and the time taken to measure sufficient krill.

2. To obtain accurate data on krill size composition from a net haul, it is necessary to measure at least 200 krill, and in order to characterise the krill size distribution in the fishing grounds, it is necessary to measure 200 krill from five randomly selected hauls during each 20-day period (or from one sample per day for five days of the continuous fishing methods). A new 20-day period will commence if the vessel moves operation >50 n miles or moves between SSMUs.
3. In order to select the krill to be measured, a randomly collected 5 kg sample should be taken from the codend or the fish pond and should be divided into subsamples (in half, in half again and so on to provide a subsample containing about 500 krill).
4. The standard measurement of krill (AT) is from the front of the eye to the tip of the telson, the thin, tapered triangular plate at the end of the abdomen.
5. Measurements should be made to the nearest millimetre and observers should document the exact method of measurement that they used in the observer cruise report.

SECTION 3

KRILL FEEDING OBSERVATIONS

Krill is a filter-feeder whose primary food is phytoplankton. Once inside the krill's body, the cell contents of algae colour the compartments of the digestive system green. The colour change of the liver is most striking, usually bright green in actively feeding krill. The contents of the intestinal tract of live, transparent krill are clearly visible.

2. The feeding state of krill caught by a vessel will influence the product type that can be produced and is therefore a potentially important factor in the decision-making process in fishing operations.
3. Krill colouration should be determined for each krill that is measured to assess whether they have been feeding based on whether the organs within the carapace, including the liver, are 'green'. The following points should be borne in mind when assessing krill colouration:
 - (i) only live or fresh krill should be used
 - (ii) krill specimens should have no mechanical damage.

SECTION 4

SEX AND MATURITY STAGES OF KRILL

Krill display distinct features of sexual dimorphism which make it possible to distinguish males from females after krill have entered the final (adult) phase of maturation. In addition to these differences in overall morphology, there are differences in the external sexual characteristics that assist in the determination of sex and maturity stage.

2. As the maturation process progresses to the adult stages, female krill have a proportionately thinner abdomen and a proportionally longer carapace than males. In addition to having a shorter carapace, adult males also have distinctly larger eyes than female krill.
3. Using these relative differences is straightforward with experience and can be confirmed using the external sexual features.
4. Krill should be allocated to one of the following maturity/stage classes:
 1. Juvenile
 2. Adult male
 3. Adult female
 4. Gravid female

with the use of the following key:

Step 1. Presence of the petasma

This organ in its various forms (stages of development) appears in males from approximately 28 mm in length. Beginning from this size, all specimens being sorted which do not have a petasma (modified endopods of the first pair of pleopods, see Figure 7A) are females. The petasma is usually folded back and tucked inside the plate of the swimming leg next to the lobes.

Step 2. Presence of the thelycum

Adult female krill can be identified by the presence of the thelycum, which is often reddish in colour (Figure 7B). In the case of gravid females, the carapace is highly swollen relative to non-gravid females.

Step 3.

Juveniles are easily identified as having no external sexual characteristics, either petasma or thelycum and are usually less than 28 mm.

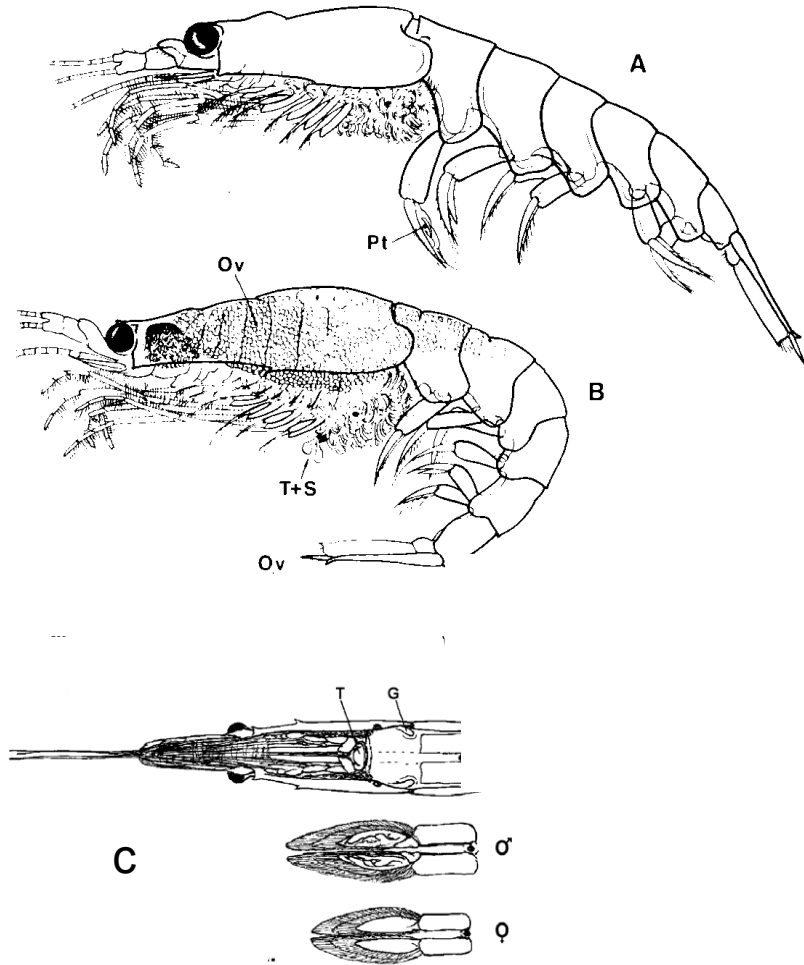


Figure 7: *Euphausia superba*. A – mature male showing the location of the petasma (Pt) on the first pleopod; B – mature female, showing swollen ovaries (Ov) and the thelycum with spermatophores (T+S); and C – ventral view of female krill (with posterior-most gills and endopods (lower parts of the first pleopods) removed for clarity) showing the thelycum (T) and the location of the base of last gills (G) with an inset of first pleopod of a male krill showing the petasma and the first pleopod of a female or juvenile (adapted from *BIOMASS Handbook*, No. 11 (Makarov and Denys, 1980) and material from the British Antarctic Survey).

SECTION 5

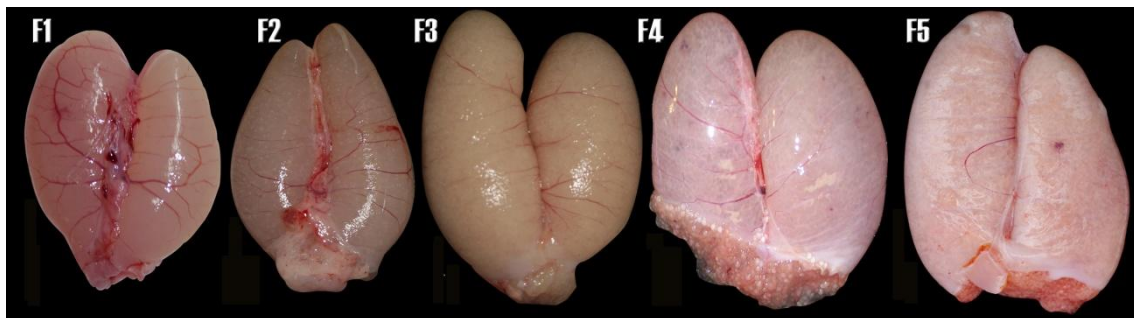
MATURITY STAGES OF ANTARCTIC FISH

Maturity stages for nototheniids and channichthyids based on ovarian and testis cycles in *Notothenia coriiceps*, *Champscephalus gunnari*, *Chaenocephalus aceratus* and *Pseudochaenichthys georgianus* (from Kock and Kellerman, 1991).

TOOTHFISH (Notothenidae) and ICEFISH (Channichthyidae)

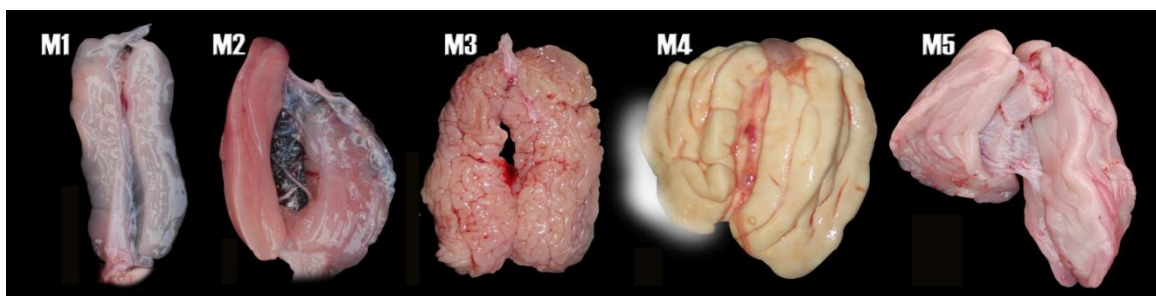
Females

Maturity stage:	Description:
1. Immature	Ovary small, firm, no eggs visible to the naked eye.
2. Maturing virgin or resting	Ovary more extended, firm, small oocytes visible, giving ovary a grainy appearance.
3. Developing	Ovary large, starting to swell the body cavity, colour varies according to species, contains oocytes of two sizes.
4. Gravid	Ovary large, filling or swelling the body cavity, when opened large ova spill out.
5. Spent	Ovary shrunken, flaccid, contains a few residual eggs and many small ova.



Males

Maturity stage:	Description:
1. Immature	Testis small, translucent, whitish, long, thin strips lying close to the vertebral column.
2. Developing or resting	Testis white, flat, convoluted, easily visible to the naked eye, about $\frac{1}{4}$ length of the body cavity.
3. Developed	Testis large, white and convoluted, no milt produced when pressed or cut.
4. Ripe	Testis large, opalescent white, drops of milt produced when pressed or cut.
5. Spent	Testis shrunk, flabby, dirty white in colour.



LANTERN FISH (Myctophidae)

Based on observations of *Electrona antarctica*
(from Anon., 1983)

Females

Maturity stage:	Description:
1. Immature	Ovaries small and transparent, membrane thin. Maturity index no higher than 1.5%. Oocytes small and transparent having a diameter from 0.25 to 0.3 mm; visible to the naked eye. Oocytes the size of protoplasm and oogonia are visible in histological preparations.
2. Developing	Initially and repeatedly maturing fish. Ovaries more extended, yellowish in colour, membrane thin and semi-transparent. Opaque ovarian cells visible – diameter 0.3 to 0.7 mm. Maturity index from 1.5 to 7%.
3. Mature	Ovaries maximum size, yellow in colour, opaque. Maturity index 11 to 14%. As oil droplets and protein granules blend, oocytes become transparent and ovaries become semi-transparent. The larger oocytes have a diameter of 1 to 1.2 mm. Apart from the larger and often semi-transparent cells, opaque cells with a diameter of up to 0.5 mm are visible.
4. Gravid	Gravid stage.
5. Spent	Appears similar to maturity stage 3, the difference here being a wrinkled and somewhat thicker membrane and also the presence of remaining mature water-filled oocytes in the ovarian cavity.

ANTARCTIC SKATES AND RAYS (Rajidae)

Maturity data are needed to determine the *length-at-maturity*, and for all skates from which vertebrae and thorns are collected, to determine the *age-at-maturity*. Males can be staged externally, without dissection, internal examination is required to determine their maturity stage of females (from Francis, 2003).

Males

Maturity stage:	Description:
1. Immature	Claspers short (not extending beyond pelvic fins) and uncalcified.
2. Maturing	Claspers extend beyond pelvic fins but are soft and uncalcified (rarely, some calcification may have begun).
3. Mature	Claspers extend well beyond pelvic fins and are hard, rigid and calcified.

Females

In small immature females, the ovary may be completely embedded in the epigonal organ and therefore invisible. The epigonal organ is a white to pink, soft, and easily torn organ (similar in consistency to the liver but softer). It runs much of the length of the body cavity, appearing as a strap on each side of the backbone.

Maturity stage:	Description:
1. Immature	Ovary invisible or contains only small (pinhead-sized) ova that have no trace of yellow or orange yolk. Uteri thread-like. No uterine egg cases.
2. Maturing	Ovary contains small to medium (up to marble-sized) white to orange ova. Uteri may have visible swellings at anterior or posterior ends. No uterine egg cases.
3. Mature	Ovary contains some large (greater than marble-sized) yellow or orange ova, in addition to small and medium ova. Uteri enlarged (>1 cm wide) and <i>may</i> contain egg cases. The presence of uterine egg cases guarantees that the female is mature, but females without uterine egg cases are still mature if they have some large ovarian eggs.

Note: This maturity scale, originally developed for New Zealand skates, has been used for *Raja georgiana* and *Bathyraja eatonii* with good results, but has not been specifically tested on Antarctic skate species.

SECTION 6

MATURITY STAGES OF STONE CRABS, *PARALOMIS* SPP.

Females

Maturity Stage:	Description:
1. Eggs uneyed	Eggs orange to yellow in colour, no eye spots.
2. Eggs eyed	Eggs orange to yellow in colour with distinctive, black eye spots.
3. Eggs dead	Eggs entirely white, black or brown.
4. Empty egg cases	Eggs absent but egg cases still attached to pleopods.
5. Non-ovigerous	Eggs absent, no reproductive tissue attached to pleopods.

SECTION 7

MATURITY STAGES OF SQUID

Squid maturity stage codes (Lipinski, 1979)

Maturity stage	Female	Male
I. Juvenile	Sexual organs very hard to find with the naked eye. The oviducts and nidamental glands appear (if at all) as very fine transparent strips. Ovary translucent and membranous.	Sexual organs very hard to find with the naked eye. Spermatophoric complex appears (if at all) as a transparent or translucent spot. Testes transparent, membranous.
II. Immature	Sexual organs translucent or whitish. Oviducts and nidamental glands form clearly visible translucent or whitish strips. Meander of the oviducts visible, nidamental glands small; all viscera behind them easily observable. The ovary clearly visible, in most cases immature ova invisible.	Sexual organs translucent or whitish; separate parts of the spermatophoric complex clearly visible; testes small and their structure invisible.
III. Preparatory	The sexual organs are not translucent. Meander of the oviducts extended. Nidamental glands enlarged, covering some internal organs. Immature ova clearly visible.	Sexual organs not translucent; vas deferens whitish or white, spermatophoric organ with white streak; testes in most cases white or pink, their structure invisible.
IV. Maturing	Nidamental glands large, covering the kidneys and distal part of the digestive gland; oviductal glands fleshy and swollen. Plenty of eggs in the oviducts; meander hardly noticeable. Eggs not translucent and pressed together, at least in the proximal part of the oviduct.	Vas deferens white, meandering, enlarged; spermatophoric sac long with structureless whitish particles inside, but without formed spermatophores; testes firm and their structure visible.
V. Mature	As above, but the eggs are translucent, at least in the proximal part of the oviduct. Cut open, the nidamental glands secrete a viscous substance.	As above, except that spermatophores are present in the spermatophoric sac.

SECTION 8

REMOVAL AND STORAGE OF OTOLITHS

INTRODUCTION

Otoliths are small calcareous concretions in the inner ear of fish. They are involved in maintaining the fish's balance and orientation in the water, and in sound detection. Because they increase in size as the fish grows, their structure displays bands reflecting fast or slow growth in a manner analogous to tree-rings. These bands are used by biologists to estimate the age of the fish. The use of otoliths is especially important when scales, the other important hard part used for ageing, are either absent (as in Channichthyids) or lost from the fish by the time it is brought on deck (*Electrona carlsbergi*). The structure and shape of otoliths varies greatly between species and can be used to confirm species identification.

OTOLITH REMOVAL

2. The inner ear on each side has three otoliths, but two of these are usually very small and only one of each set (the sagitta) is usually useful or even visible. The inner ear apparatus is found usually nestling in a pouch-like extension of the cranium (the otic bulla) in the postero ventral part of the skull. The best technique for speedy and reliable otolith removal depends on the size of the fish.

Nototheniids and Channichthyids

3. Equipment – a large knife with a rigid blade, fine-point forceps.

4. Technique – place the fish belly-down on a firm table and make a vertical cut through the head (at a right angle to the spine) at the position indicated in Figure 8. The exact position has to be learnt by trial and error, as each species is slightly different. The aim is to make the cut either just in front of, or just behind, the otoliths, so that these can be picked out. An error of a few millimetres can mean that the otoliths themselves are sliced in half. Cut at least half-way down through the head, so that the front of the head can be bent forward and down to expose the cranium. The vertical section of the head that is exposed should resemble Figure 9B (assuming you have cut behind the otoliths and are looking towards the fish's snout). The otoliths are to be found in the small depressions in the floor of the cranium (otic bulla). They are easily recognisable by their bright white opaque colour, in contrast to the creamy colour of the brain tissue and the translucent bone. They are usually still encased in the inner ear membranes, and can be picked out with the forceps. If you cannot find them, try making another cut a little in front of, or behind, the first one.

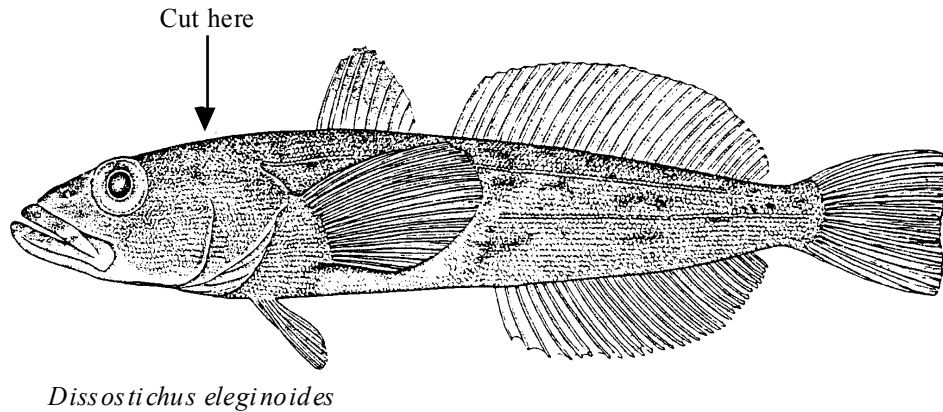


Figure 8: Positions to make incisions for otolith removal.

5. An alternative technique is to remove the roof of the cranium and look for the otoliths below the brain. This technique is slower than the first one, but is useful for inexperienced people to help them learn the precise position of the otic bulla. In this method, make a shallow vertical cut with the knife at the posterior extremity of the head, but sufficiently deep to reach the brain cavity. Then continue this cut forward so as to slice off the top of the cranium and expose the brain. The otoliths can be found in the very bottom of the brain case below the hind part of the brain (Figure 9A).

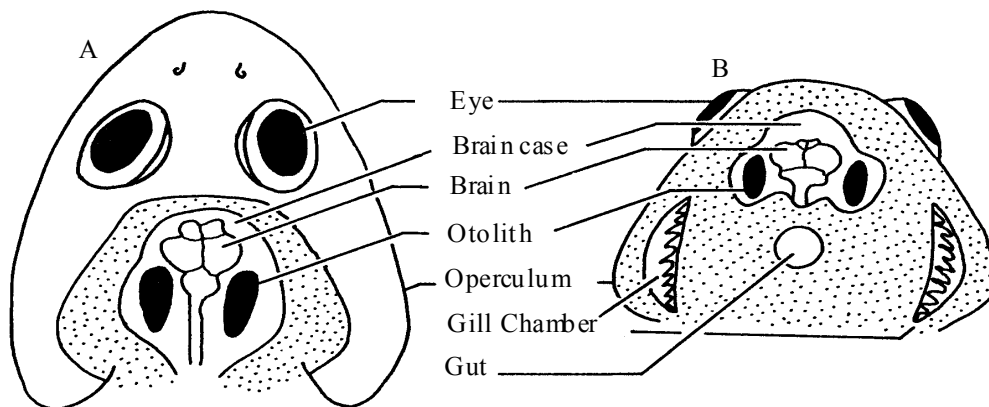


Figure 9: Positions of otoliths in the head: (A) dorsal view; (B) vertical section through head.

Myctophids

6. Equipment – jeweller’s fine-point forceps, small scalpel.

7. Technique – lay the fish on its side and lift the operculum. With the scalpel, carefully cut away the top end of the front-most gill arch, where it attaches to the underside of the cranium, and the surrounding tissue. This should expose the bone of the otic bulla, through which the relatively large white sagittal otolith can be seen. This bone is very thin and can be easily pierced with the forceps, and the otolith removed. Repeat the operation on the other side of the fish.

DATA RECORDING AND OTOLITH STORAGE

8. Otoliths are best stored dry; small manilla envelopes, about 50 × 75 mm, with a gummed flap are ideal. Plastic or other non-porous bags are not recommended, as they do not allow the contents to dry out. If any tissue remains on the otolith, it will rot and tend to damage the otolith if it cannot dry out. In any case, rub the otoliths between the fingers to remove as much tissue as possible before placing in the envelopes. Small otoliths should first be put in a small capsule (empty gelatin capsules, as used in the pharmaceutical industry, are best) to prevent them being lost in the cracks of the envelope or damaged.

9. On the outside of the envelope record the information as shown below. A rubber stamp for printing the headings is very useful to avoid excessive writing, and batches of envelopes should be prepared beforehand. Take care when writing on the envelope not to damage the otoliths (labelling before inserting the otoliths is a good idea).

Sample number	_____		
Haul number	_____		
Species	_____		
TL	_____	SL	_____
Weight	_____	Sex	_____
Otolith/Scale	_____		
Serial number	_____	Date	_____

10. Keep the otoliths in their packets in a dry place and safe from having heavy weights being put on them, or other damage.

SECTION 9

COLLECTION AND STORAGE OF SCALES

INTRODUCTION

During development, scales first appear in the dermis as tiny aggregations of cells, most often forming first on the caudal peduncle and spreading from there. Such an aggregation soon forms a scale platelet, the focus of the definitive scale. These platelets make their first appearance at different sizes of individual in different fishes; a typical size at which scales first appear is about 20 mm for most species. Soon ridges are deposited on the outward surface of the growing scale. The rate of deposition undergoes seasonal changes which cause the patterns of circuli formation that are characteristic of annuli.

2. The scales lie in pockets in the skin of the fish and are divided into two areas: an embedded area covered with striations and concentric rings (circuli), and an exposed area which is unstriated.
3. Scales vary in shape depending on the contours of the fish, and tests should be carried out to determine the most suitable site from which to sample them. This site would have the fewest replacement scales, and the scales should exhibit the maximum number of annuli.

COLLECTION

4. Scrape the mucus and loose scales from the fish with a knife before taking the sample. Clean the knife. This is to ensure that each sample of scales is from only one fish. Lift off scales from the side of the fish with a clean knife blade.
5. A large number of scales (at least 20) should be taken from each fish. (This is because many scales are replacement scales and consequently lack detail in the central region.) The best location on the fish body for taking scales is usually underneath the pectoral fin.

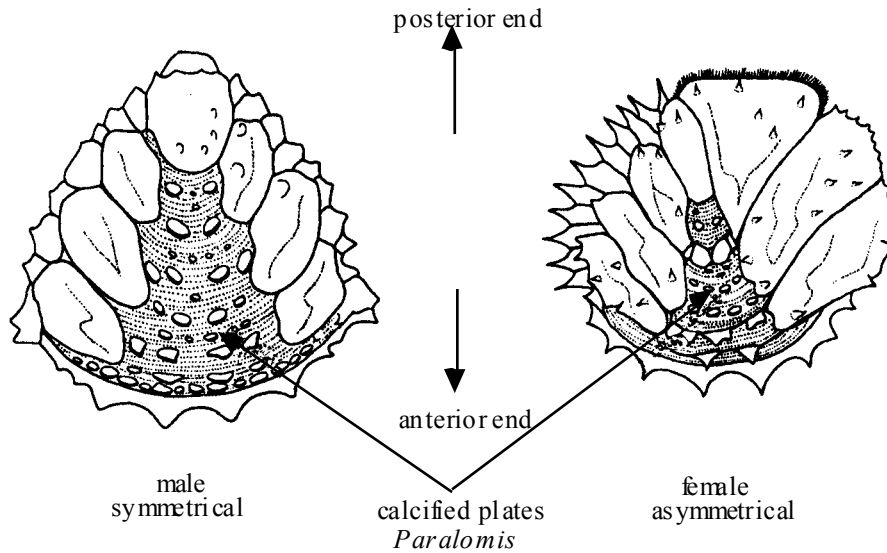
DATA RECORDING AND STORAGE OF SCALES

6. Scales should be air-dried and stored in labelled paper envelopes. Plastic or other non porous bags are not recommended, as they do not allow the contents to dry out.
7. On the outside of the envelope record the same information as shown for otoliths in Section 8.

SECTION 10

**SEX AND RELATIVE AGE DETERMINATION
OF STONE CRABS, *PARALOMIS* SPP.**

Ventral view of abdomen of stone crabs, *Paralomis* spp.



Carapace condition/relative age of Antarctic crabs.

Relative age code	Carapace condition	Description
1.	Soft	Carapace flexible and generally lightly coloured.
2.	New hard	Carapace hard, no fouling organisms on exterior of carapace.
3.	Old	Carapace hard, fouling organisms present on exterior of carapace.
4.	Very old	Carapace hard, fouling organisms present, tips of spines and joints discoloured (often black).

SECTION 11

OBSERVATION OF BY-CATCH OF FISH IN KRILL CATCHES

INTRODUCTION

In order to quantify the by-catch of fish of a range of sizes, the following sorting method uses a standard sub-sampling approach that allows the user to re-sort smaller samples to ensure that small/larval fish, that may go undetected in larger samples, are recorded appropriately.

METHOD

2. Select a haul or a two-hour period for continuous fishing:
 - (i) Ensure all large fish removed from conveyor during this haul/time period are retained for subsequent weighing and identification.
 - (ii) Take a 25 kg sample, remove all fish and record the total mass of each fish species.
 - (iii) Take a 10 kg sub-sample from the remaining krill sample.
 - (iv) Sort carefully through the 10 kg sub-sample and remove and record the total mass of each fish species.
 - (v) Take two 1 kg sub-samples from the remaining krill sample.
 - (vi) Sort through each of these 1 kg sub-samples and remove and record the total mass of any remaining fish species (paying particular attention to larval fish that may be transparent).
3. Digital photographs should be taken:
 - (i) where there is uncertainty about identification of a fish;
 - (ii) in order to verify the identification of important species (i.e. a species that makes up more than 80% by mass or number of fish in a sample where >50 fish are recorded).

All digital photographs should include the vessel name, haul number, sample number and date. The photographs should be verified by national experts or submitted via the Secretariat for validation.

4. Where time allows within the same haul/two-hour period, repeat the process with a new 25 kg sample.

SECTION 12

OBSERVATIONS OF INTERACTIONS OF SEABIRDS AND MARINE MAMMALS WITH FISHING OPERATIONS

OBJECTIVES OF OBSERVATIONS

Scientific observations of seabirds and marine mammals are carried out on board fishing vessels with the following objectives:

- (i) to document and quantify seabird and marine mammal catch rates and determine the specific identity, age and sex of all seabirds caught;
- (ii) to assess the relative vulnerability of different seabird and marine mammal species;
- (iii) to monitor the mortality of seabirds and marine mammals per unit of fishing effort;
- (iv) to document all aspects of a vessel's fishing strategy, methods and equipment which have an impact on seabirds and marine mammals;
- (v) to assess the effectiveness of CCAMLR measures aimed at reducing the incidental mortality of seabirds and marine mammals;
- (vi) to ascertain what, in terms of a vessel's fishing operations, contributes to the seabird and marine mammal by-catch rates observed, and to collect data relevant to factors that influence seabird by-catch rates;
- (vii) to estimate the abundance of seabirds and marine mammals and record their interactions with fishing operations;
- (viii) to document data on catch rates of fish, wherever this is relevant to the assessment of seabird and marine mammal interactions;
- (ix) to collect and retain biological samples.

2. A complete set of these seabird and marine mammal-related data can only be collected where two observers are present on a vessel, and, where this is the case, consideration of an appropriate observation strategy will be unnecessary. The observer who undertakes the fish-related observations, which will principally occur during line hauling, can also accomplish some aspects of seabird and marine mammal data collection for this period. Similarly, all data required on line setting can be collected by the seabird and marine mammal observer.

3. As regards collection of seabirds and marine mammal data, the highest priorities for a single scientific observer are as follows:

Record mortality, injury and entanglement of seabirds and marine mammals

The level of observation will vary between fisheries and on the tasking of observers. In all situations observers should maximise the level of coverage of trawl hauls and longline hooks hauled. It is essential that the proportion of fishing effort observed is recorded to allow estimation of total incidental mortality.

Trawl warp strikes

Conduct at least one warp-strike observation per 24-hour period.

Record interaction of marine mammals with fishing vessels and gear

Once per haul-observation period, record any interactions with the vessel that do not result in mortality, injury or entanglement.

Description of implementation of mitigation measures

Provide details of line weighting and streamer design and measurements (L2 data). This can be done once every seven days (in conjunction with TDR and bottle tests (L10 data)). For vessels fishing under an exemption for night-setting, one test per 24 hour period and four tests on a single longline once per seven-day period are required.

OBSERVATIONS OF SEABIRDS AND MARINE MAMMALS

During setting

4. Longline-setting observations should be carried out only when vessels are setting during daylight (i.e. where there is an exemption from night setting). All observations should be made from a position on the ship that provides a clear view of the line entering the water. This is normally at the stern directly above the point at which the longline leaves the ship. Data-recording tasks to be carried out during longline setting include observations of the abundance of seabirds, and their interaction with fishing operations.

5. Estimates of seabird abundance should be carried out at 30-minute intervals throughout setting, within the area to 500 m astern and 250 m on each side, i.e. a 500 × 500 m square. An object should be dropped overboard and traced, at a given ship speed, to the point 500 m astern or, alternatively, a known distance between longline buoys should be used, in order to define the count area accurately. One efficient count procedure is to first count the total number of birds present, and then to count again for each species starting with the least abundant first. A description of weather and sea conditions prevailing during each count should be given.

6. Interactions of seabirds with fishing operations – Every interaction with seabirds which occurs during line setting should be recorded. Obviously an observer's opportunities to undertake this work may be limited by the requirement that vessels set only at night.

7. For each event it is desirable to record the following:

- (i) time;
- (ii) distance astern;
- (iii) species;
- (iv) surface attempt or dive attempt to take baits;
- (v) attempt success, i.e. whether or not baits are actually taken;

- (vi) outcome of successful attempt – was a seabird *hooked*, *not hooked*, or is this uncertain? (Line hauling observations of seabirds on hooks should be checked later to see whether these correlate to all seabirds observed hooked during line setting);
- (vii) the cause of each event (e.g. weather conditions, ship speed at the time being too slow or too fast, streamer line not correctly set);
- (viii) as they occur, any changes in circumstances that affect, or could affect, seabird activity (e.g. time of ship course change, weather factors, sea conditions, vessel speed, moonlight, offal discharge).

During hauling

8. Because it will be necessary to collect biological material (all dead seabirds etc.), the observer's work station for line hauling should obviously be situated with this in mind. This need for the observer to be on the hauling work deck itself may compromise their ability to document with certainty everything that is actually caught on hooks. It is possible that some by-catch may fall (or be shaken) from the hook before coming on board. Also, seabirds are occasionally caught during hauling operations, and detection of this requires a specific effort.

9. Seabirds are attracted to the line-hauling area by offal discards from the vessel's fish-processing plant and by bait that has remained on hooks throughout the set. Consequently, seabirds can be caught on hooks at this time and the probability of this occurring increases significantly when sections of the hook line have broken, permitting numerous hooks to remain on the surface amongst large numbers of seabirds.

10. Assessing seabird by-catch rates during the haul and the effectiveness of bird exclusion devices to prevent or reduce access by seabirds to the line as it is hauled can only be done accurately by observations made from the outside working deck, because on many vessels a work station on the ship's bridge or factory can obscure visibility.

11. Seabirds caught during the haul may be alive or dead, whereas those caught during setting will be dead. Seabirds caught during the set will be cold and have entirely waterlogged plumage; seabirds killed during the haul should still be warm. Each seabird caught during hauling that is not dead, or any seabird released with a hook *in situ*, should be recorded as injured if it has injuries such as a fracture of the wing bone, a leg bone or beak, more than two primary feathers on each wing that have broken feather shafts, substantial damage to the patagial tendon, an open wound with or without the presence of blood, waterlogged or hydrocarbon soiled plumage. These seabirds will be included in the total number of seabirds killed as their survival chances are very low.

12. For identification of seabirds, refer to the identification plates for seabirds given in *Fish the Sea Not the Sky* (CCAMLR, 1996) and *Identification of Seabirds of the Southern Ocean* (Onley and Bartle, 1999), or to any of the many seabird identification handbooks which are available. *The Complete Guide to Antarctic Wildlife* (Shirihai, 2002) provides a very comprehensive overview and identification guide to most of the marine mammals and seabirds that observers are likely to encounter in the CAMLR Convention Area.

13. Sampling – all seabirds that are brought on board dead are retained as intact frozen samples, all labelled with date, time taken on board, species, vessel name, observer's name and a label number which corresponds to that used on the haul data sheets. Labels should be inserted into the bird's throat through the bill before freezing. All birds should be checked for bands upon landing. It is necessary to ensure that each sample has a corresponding entry on the haul data sheet.

14. As a last resort only, if it is impossible to retain all whole specimens, then at least the head and one leg of every seabird should be retained and labelled appropriately.

15. Some albatrosses have colour markings which have been applied at the breeding colonies. Any colour-marked albatrosses sighted during the line setting operations, or at other times, should be recorded (i.e. the number of birds marked, the colour(s) of the dye, and the date and location of the sighting).

16. An instruction on handling of collected seabird samples and/or bands at the end of the observation program, and on their final destination, should be included in each observation assignment, issued and signed by the national authorities of the CCAMLR Member designating the observer.

SECTION 13

RECORDING ENCOUNTERS WITH VULNERABLE MARINE ECOSYSTEMS

When longline fishing in areas where Conservation Measure 22-06 applies, and in order to comply with the requirements of Conservation Measure 22-07 (www.ccamlr.org), the occurrence of vulnerable marine ecosystem (VME) indicator organisms should be recorded to determine when a VME has been encountered.

2. As part of this process, the following terms have been defined:

VME indicator organism means any benthic organism listed in the CCAMLR VME Taxa Classification Guide (available at www.ccamlr.org).

VME indicator unit means either one litre of VME indicator organisms that can be placed in a 10-litre container; or one kilogram of those VME indicator organisms that do not fit into a 10-litre container.

Line segment means a 1 000-hook section of line or a 1 200 m section of line, whichever is the shorter, and for pot lines it is defined as a 1 200 m section.

3. In the process of recording encounters with VMEs, there are important roles for the vessel and the observer and these are described below.

VESSEL REQUIREMENT

4. It is a requirement that the vessel retains all VME indicator organisms for each line segment in the 10-litre container (hereafter referred to as a 'bucket'). The fullness of each bucket should be recorded as 0 – empty, 1 – <5 VME units and 2 – ≥5 VME units (on the VME indicator form) and the total number of VME indicator organisms should be recorded on the C2 form.

OBSERVER REQUIREMENTS

5. The observer should sample the following buckets:

(i) Random sampling – a pre-selected random sample of about 30% of the line segments.

(ii) Required sampling – every line segment that collects ≥5 VME indicator units.

6. In order to separate the requirements of random sampling from required regular sampling, observers should, prior to line hauling, inform the crew of the individual line segments for which a bucket of VME indicator organisms should be retained. The master should also be informed of the random sample list so that the mid-point of the requested line

segments are recorded. All of these buckets examined by the observer as part of the random sample should be entered as 'R' (Random Sample) for the 'sample type' on the L5 VME logbook form.

7. In addition, buckets from which ≥ 5 VME indicator units are recovered need to be examined by the observer and entered as sample type 'T' (Trigger Sample) on the L5 VME logbook form. If a random sample happens to be >5 VME indicator units, it should still be recorded as a random sample.

SECTION 14

SPECIES IDENTIFICATION GUIDES

IDENTIFICATION GUIDE TO *DISSOSTICHUS* SPP.

The Patagonian toothfish (*Dissostichus eleginoides* – CCAMLR code TOP, Figure 10) supports fisheries by CCAMLR Members off the coasts of South America and around most of the sub Antarctic islands and banks of the Atlantic and Indian Oceans. The closely related and superficially very similar Antarctic toothfish (*D. mawsoni* – CCAMLR code TOA, Figure 11) is the target of exploratory fisheries in more southern latitudes, close to the continental shelf of Antarctica.

2. Data on the specific identity of fish taken in these fisheries, especially from those that operate on the boundary between the distributions of the two species, is clearly important in order to know which species is being exploited in which area. Therefore, scientific observers are requested to take special care to identify the species correctly.

3. The following information has been developed using standard reference material (Gon and Heemstra, 1990) and information based on the experience of fishers that described the best way to separate the two species during fishing operations in the region of overlap between the species.

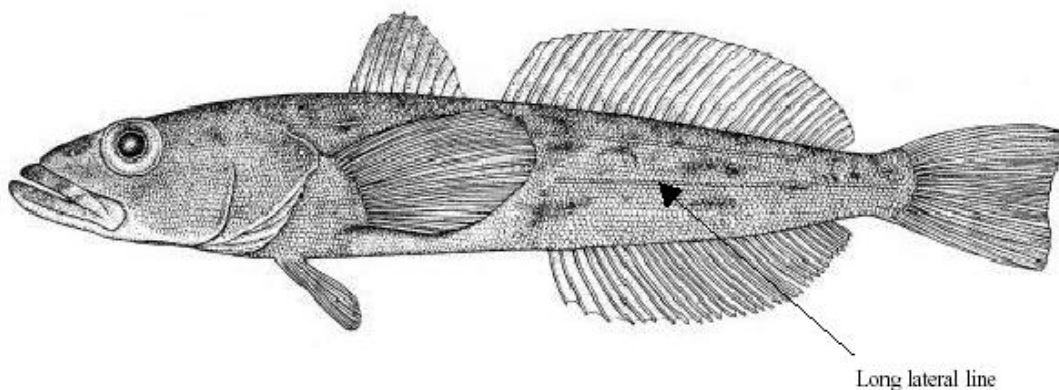


Figure 10: Patagonian toothfish (TOP) about 58 cm SL (after Fischer and Hureau, 1985).

4. Patagonian toothfish is widespread and common in sub-Antarctic waters over shelves and banks from South Georgia in the west to Macquarie Island in the east. It is also found off the coasts of Chile and Argentina and on the Campbell Plateau south of New Zealand. The southern limit is not precisely known, but it probably does not occur in water at temperatures less than 1°C; this is equivalent to about 57°S in most areas, but probably further south in the area south of New Zealand, where the Polar Front tends to be in a more southerly position. It grows to over 2 m in length and 100 kg in weight, but specimens over 1.5 m are uncommon. It is a benthic-pelagic species which feeds mainly on mesopelagic fish and squid, but also on some benthic prawns and crabs. Larval and young juvenile stages are pelagic, but older juveniles and adults are mostly caught on the bottom. Depth range is 300 to >2 000 m, with younger fish generally in shallower water.

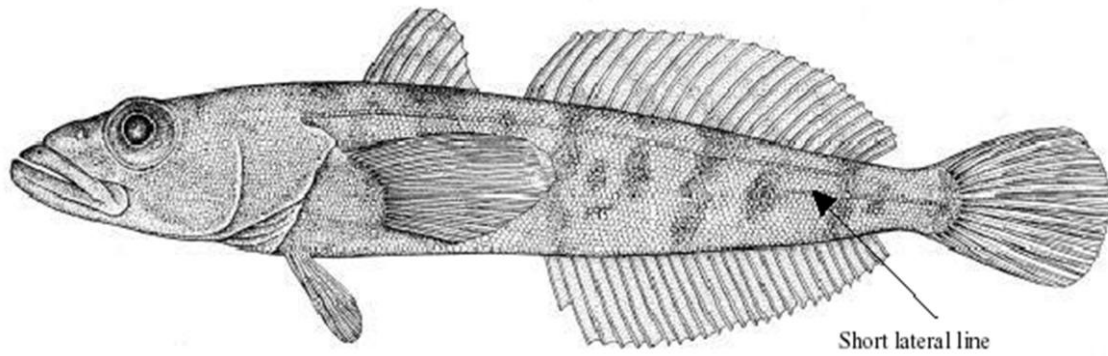


Figure 11: Antarctic toothfish (TOA) about 66 cm SL (after Fischer and Hureau, 1985).

5. Antarctic toothfish is very similar externally to Patagonian toothfish, but inhabits the higher latitudes of the Southern Ocean, over the Antarctic continental shelf, including the Antarctic Peninsula, and the deeper ocean to the north. Its northern distribution limit is not precisely known.

6. Separation of the two species during fishing operations is based on two primary features:

- (i) Dorsal fin colouration – the colour and pattern of the dorsal fins appear to be quite distinctive between the two species. Those of Patagonian toothfish are generally uniform with well-defined white tips of the dorsal and often the pectoral fins. Antarctic toothfish, in contrast, have a pattern of alternating dark and light bands across the dorsal fin which are visible when the fin is erect (Figure 12).

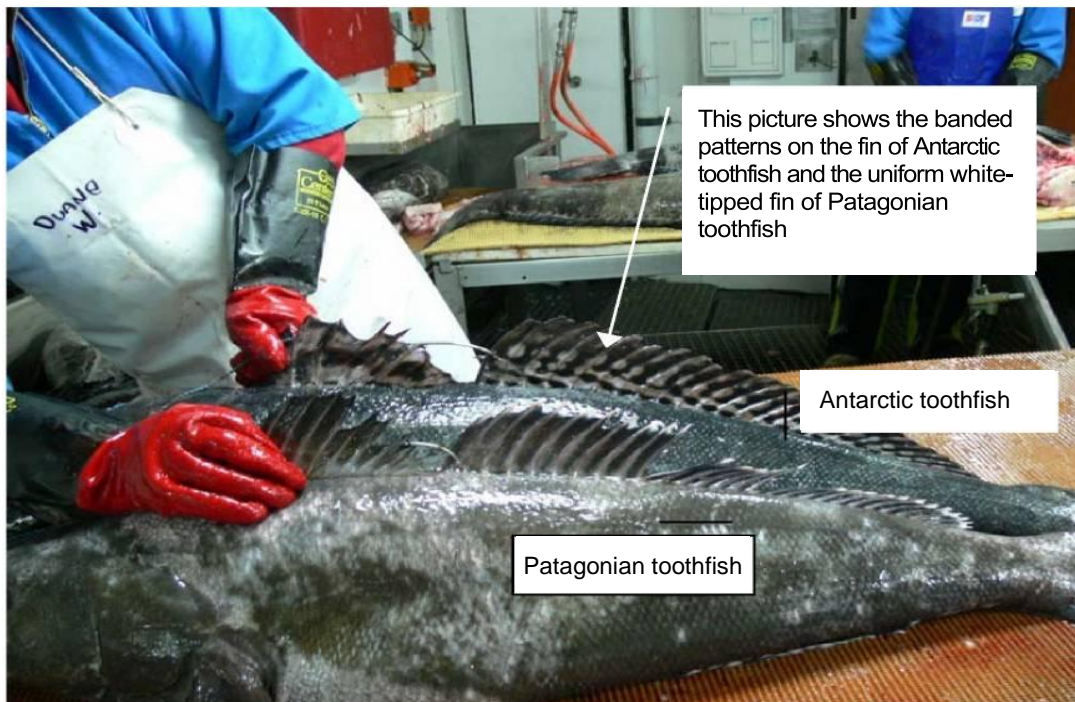


Figure 12: The dorsal fin colouration of Antarctic and Patagonian toothfish.

- (ii) Tooth structure – the teeth of Patagonian toothfish are relatively large, long and pointed compared to those of Antarctic toothfish which have much smaller teeth relative to their body size (Figure 13).

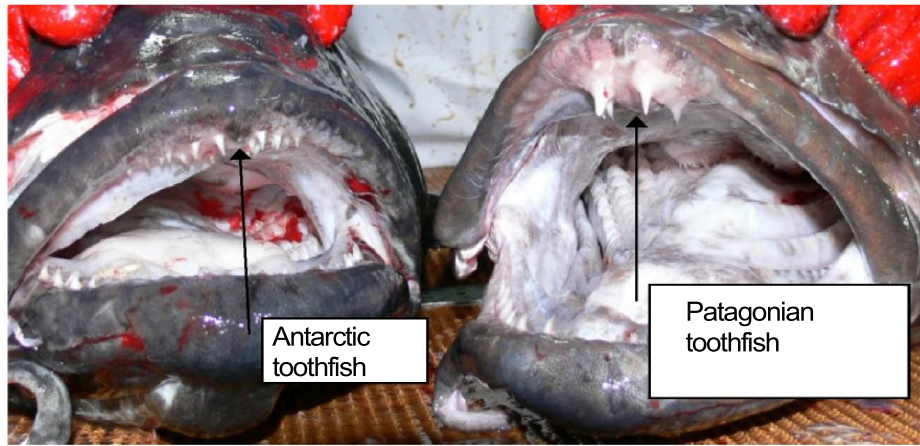


Figure 13: Tooth structure of Antarctic and Patagonian toothfish.

7. Secondary features can be used to confirm identification. These include the length of the lateral line (see Figures 10 and 11) and the structure of the otoliths which are much bigger in proportion to the body size and more elongated in Patagonian toothfish than those of Antarctic toothfish (Figures 14 and 15). Retained otoliths can also be used for subsequent identification verification and confirmation.

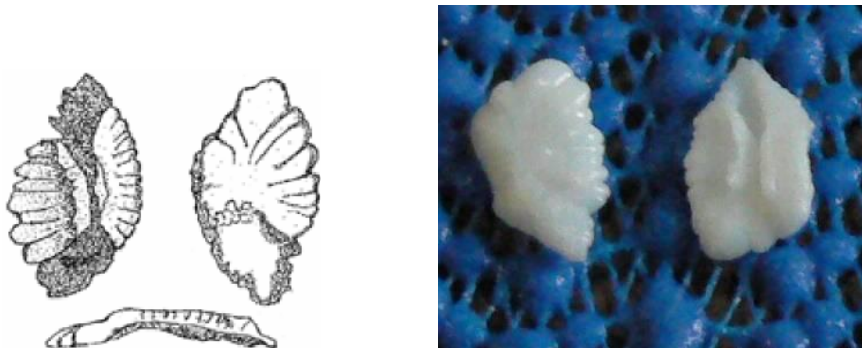


Figure 14: Otoliths of Patagonian toothfish.

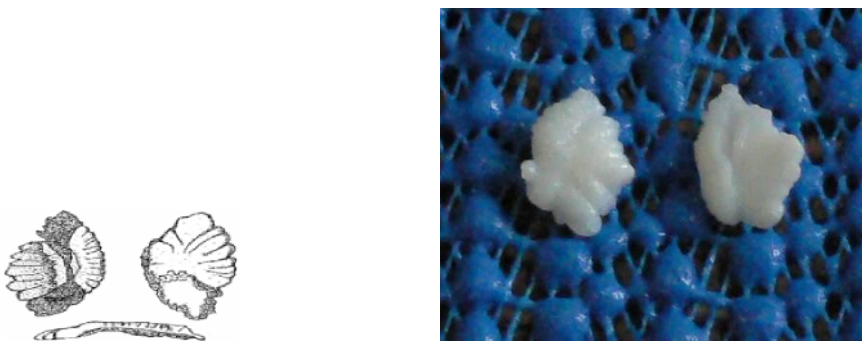
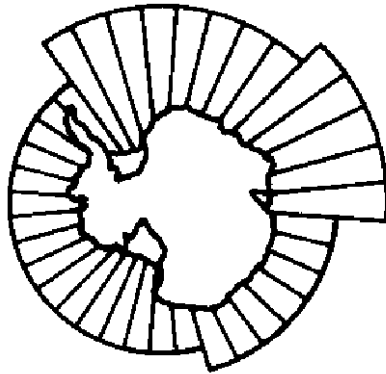


Figure 15: Otoliths of Antarctic toothfish.

ACKNOWLEDGEMENTS

8. The fish illustrations in Figures 10 and 11 are reproduced from Gon and Heemstra (1990). Details on the separation of the two species were kindly provided by J. Fenaughty and the Ross Seas MSC Client Group (New Zealand).

**Commission for the Conservation
of Antarctic Marine Living Resources**



CCAMLR SPECIES IDENTIFICATION SHEETS

Background Notes for CCAMLR Observers

The enclosed sheets have been prepared to assist in making accurate identification of as many species as possible that appear as by-catch in CCAMLR fisheries. The aim has been to compress as much information into a simple format that will allow you to identify most species as quickly as possible. Good identification to species level is important to recognise those by-catch species that need a more detailed assessment, as well as for understanding species distribution and also regional differences in biodiversity. It is also an essential part of understanding the ecosystem interactions involved in fishing in the CAMLR Convention Area.

Much of the information provided here has come from the standard reference texts which are generally based on preserved specimens. Wherever possible, additional information from direct observation on fresh caught or live fish has been included. There may be further points that you have used or noted during the course of your work that help you identify particular species – if you think that others may benefit from this knowledge, please include this information in your observer cruise report.

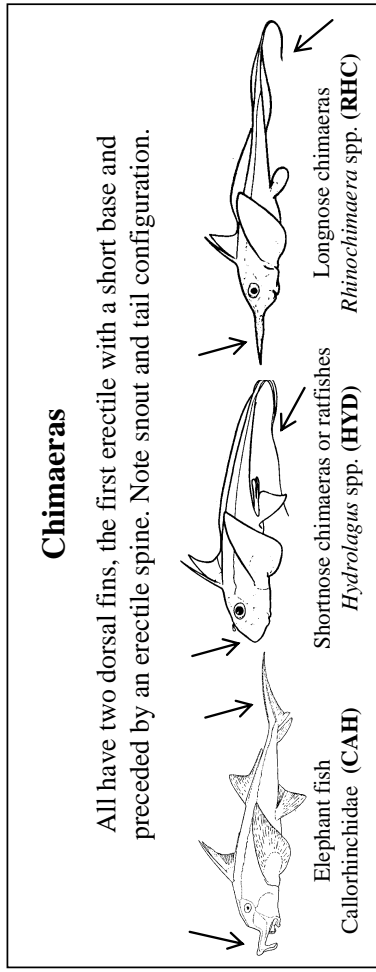
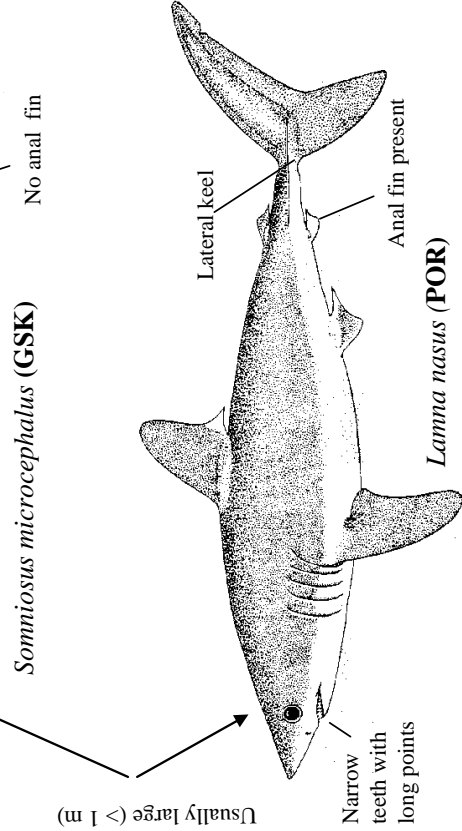
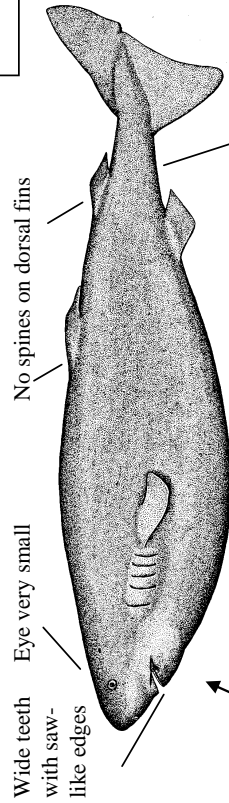
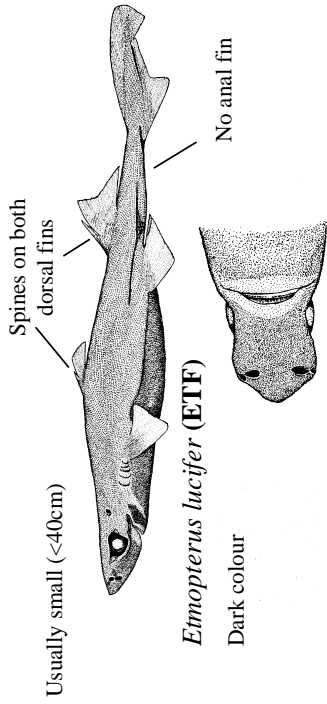
The remote regions in which CCAMLR fisheries operate mean that rare and unusual species, particularly Chimaerids, may be encountered. If this happens, please retain them for detailed taxonomic examination. Ultimately, we are looking to produce a photographic guide, so if you are able to obtain good digital images of key diagnostic features, please forward these, along with supporting information, to your technical coordinator for transmission to the CCAMLR Secretariat.

Acknowledgements

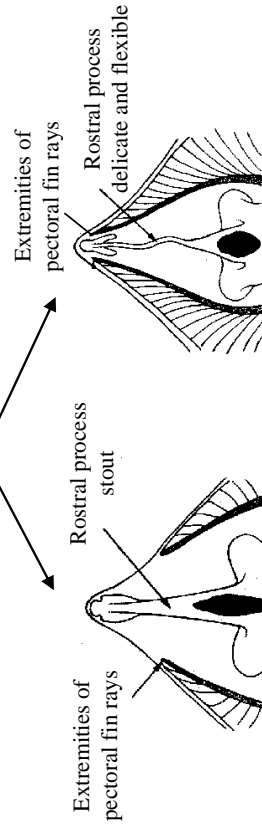
Illustrations and diagnostic features in these sheets were based largely on publications by Gon and Heemstra (1990), Fischer and Hureau (1985) and Macpherson (1988), and unpublished information provided by M. Stehmann (Federal Research Centre for Fisheries, Hamburg, Germany). CCAMLR wishes to thank the authors for their permission to use this material.

Elasmobranch 1

Elasmobranchs



Rajidae (SRX)



Raja spp. (RAJ)

Bathyraja spp. (BHY)

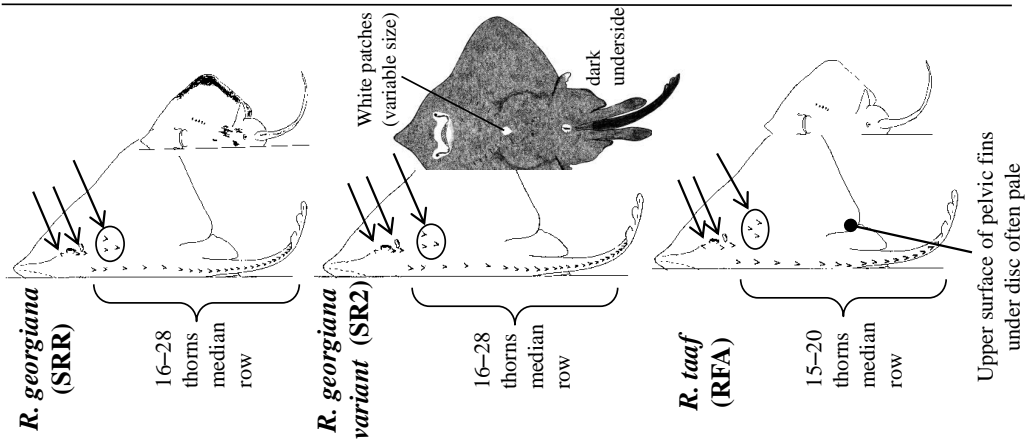
Hard-snouted rays

Soft-snouted rays

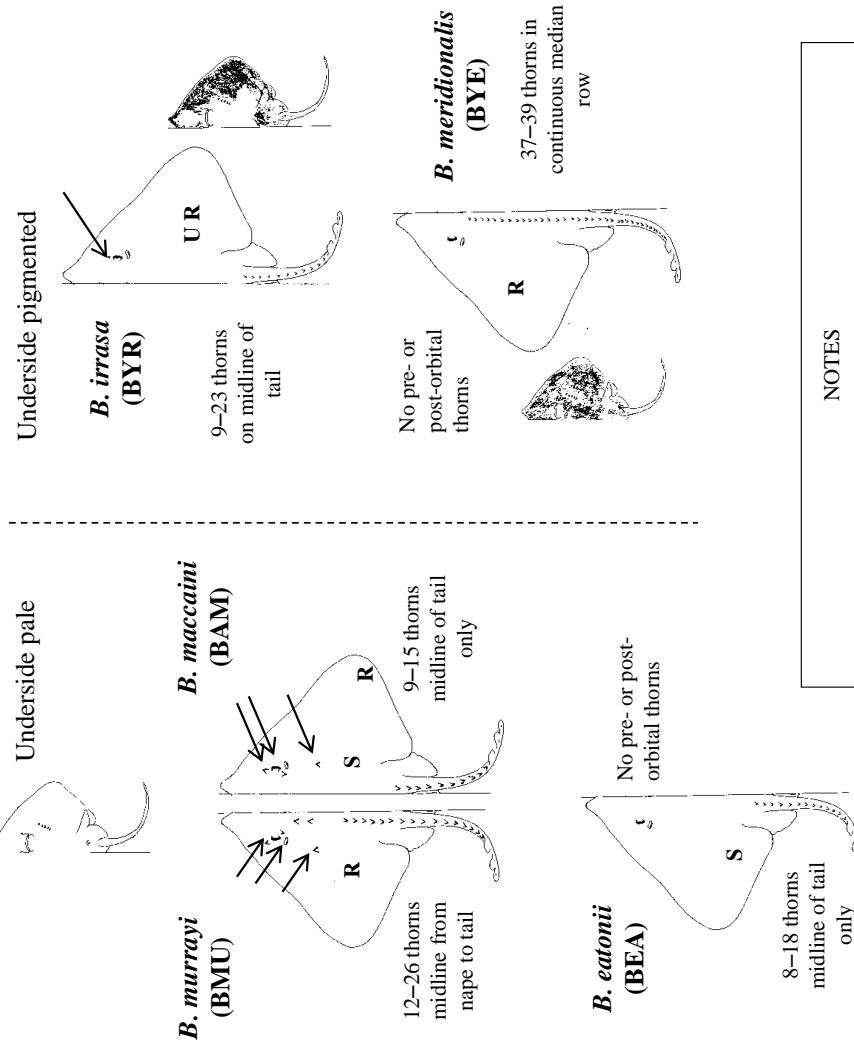
see sheet 'Rajid 1'

Rajid 1

Raja



Bathyraja

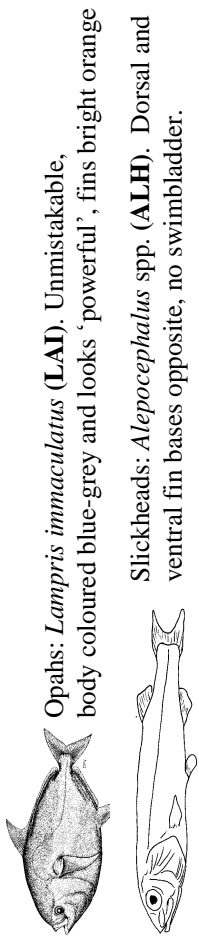


NOTES

R = rough, S = smooth, UR = uniformly rough (unshaven feel)
Arrows indicate non-median thorns or groups of thorns
Dorsal views to show distribution of thorns,
Ventral views (smaller) to show pigmentation

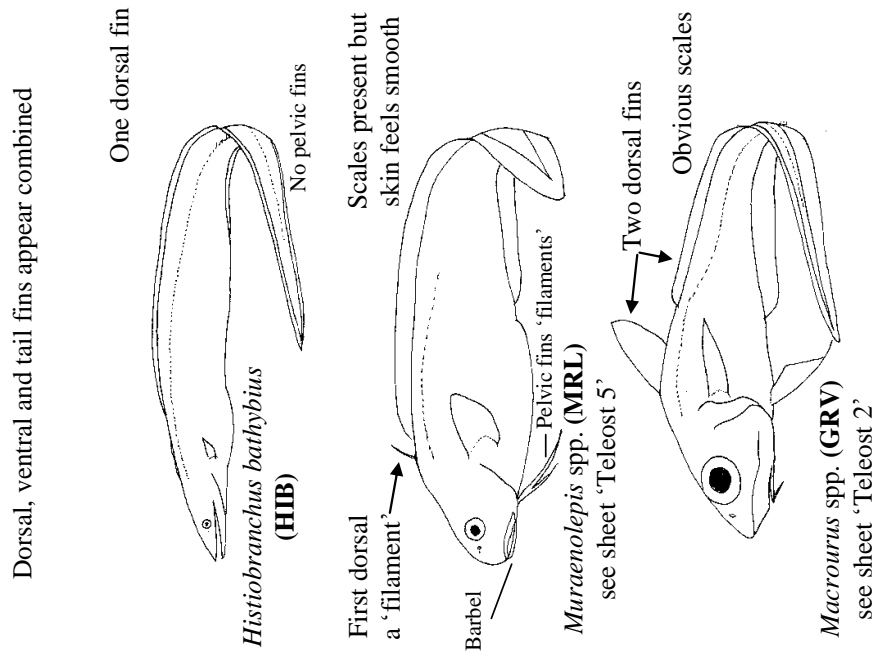
Teleost 1

Obvious tail

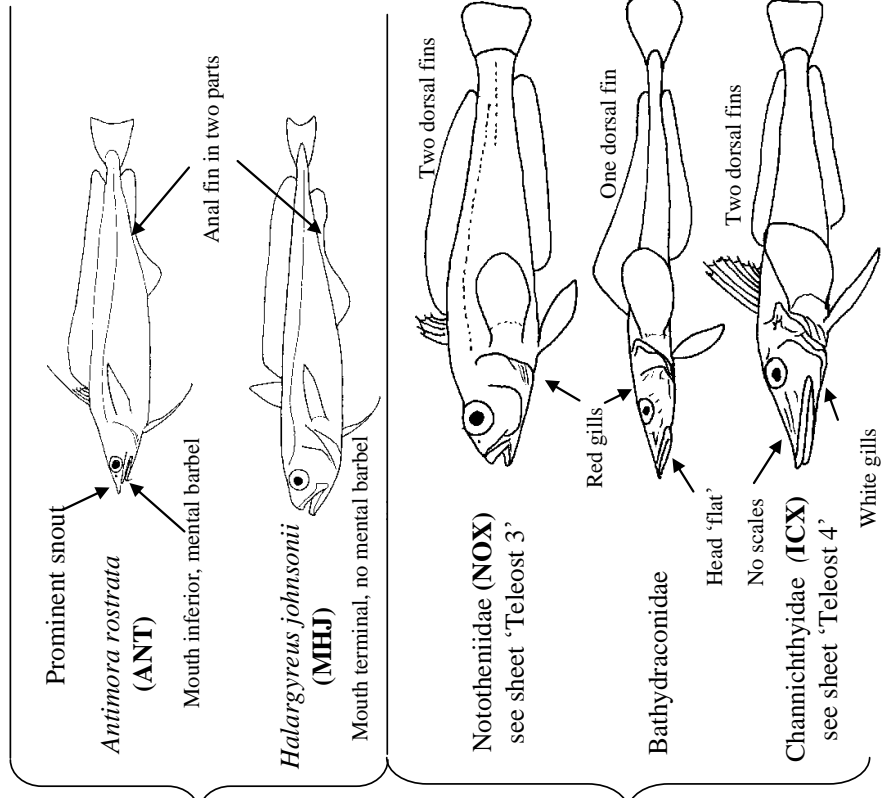


Swimbladder present – stomach usually everted through mouth when brought up from depth

No obvious tail



No swimbladder

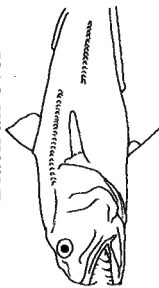


Macrouridae (Grenadiers)

Teleost 2

Large fang-like teeth, mouth terminal

Black all over



Cynomacurus piriei (MNI)

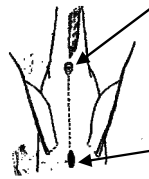
Leading edge of first dorsal smooth

Coelorinchus spp.

C. marinii (CEH)



Scaled



Position of ventral fossa relative to anus



Naked

C. fasciatus (CQF)

Leading edge of first dorsal serrated

Infra-orbital ridge, if present, never ending in spine, eyes small, row of teeth in lower jaw

Coryphaenoides spp. (CVY)

C. filicauda

Barbel thin and short, scales thin, fine and deciduous



C. ferrieri

Scales fairly firm and coarsely spinulated



C. armatus (CKH)

Snout broad and blunt No distinct terminal tubercle



C. lecointei

Snout narrow and pointed with distinct terminal spiny tubercle



Ridge from snout to pre-opercle ends in sharp point posteriorly, eyes large (NB species are difficult to distinguish)

Macrouirus spp. (GRV)

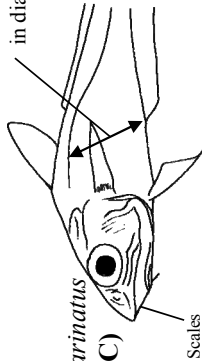
M. holotrachys (MCH)

No scales on underside of head (NB: there may be 1-3 above corner of mouth)



M. carinatus (MCC)

Less than 27 scales in diagonal line



Scales

M. whitsoni (WGR)

More than 27 scales in diagonal line

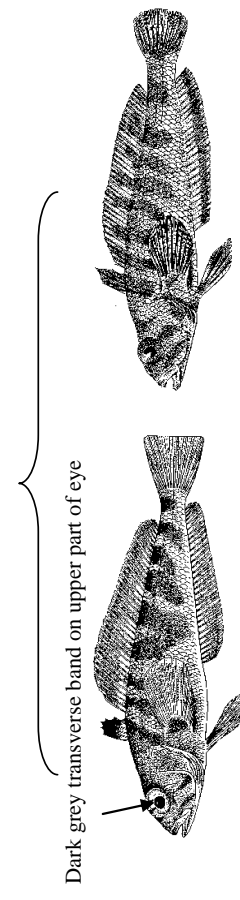
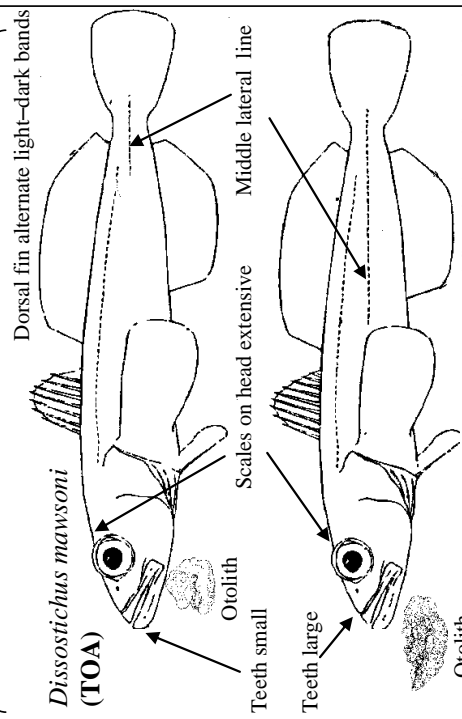


Nototheniidae

Red blood, two dorsal fins, scales on body

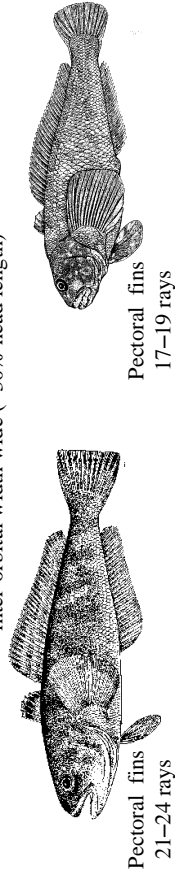
Small villiform teeth, ctenoid scales over body and head, inter-orbital width narrow (< 12% head length)

Large canine-like teeth



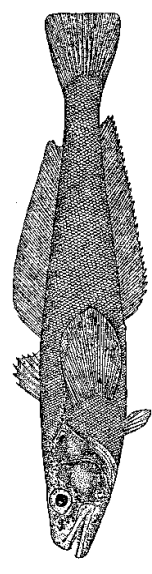
Lepidonotothen kempi (NOK) *Lepidonotothen squamifrons* (NOS)

Cycloid (smooth) scales over body, few scales on head, inter-orbital width wide (~30% head length)



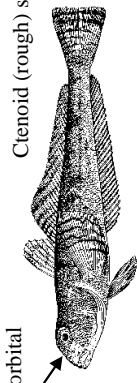
Notothenia rossii (NOR) *Notothenia coriiceps* (NOC)

No scales on head except for small patch posterior to eye



Gvozdarus svetovidovi (GZV)

Narrow inter-orbital 'humphead'



Gobionotothen gibberifrons (NOG)

Channichthyidae (ICX)

White blood and gills, two dorsal fins, no scales, opercular spines

Middle pelvic fin rays longest

No RS
2 LL
Champtocephalus gummari (ANI)

Head depth = Snout *C. gummari*; Head depth < Snout *C. esox*
P 25-28; A 35-40 = *C. gummari*; P22-24; A 31-35 = *C. esox*

RS
3 LL
Pseudochaenichthys georgianus (SGI)

RS
2 LL with bony plates
Channichthys rhinoceratus (LIC)

Leading pelvic fin rays longest, no spine on subopercle or interopercle

No RS
2 LL
Chaenocephalus aceratus (SSI)

RS reduced to small knob or absent
3 LL
Chionobathyscus dewitti (CHW)
Resembles *Chaenocephalus* but has 3 LL

3 LL
Cryodraco spp.
P Long (reaches A)
P Short (just reaches A)

Spines on subopercle and interopercle, 3 LL

RS blunt, reduced to Tubercle
Five pelvic fin rays
Chionodraco myersi (MIC)

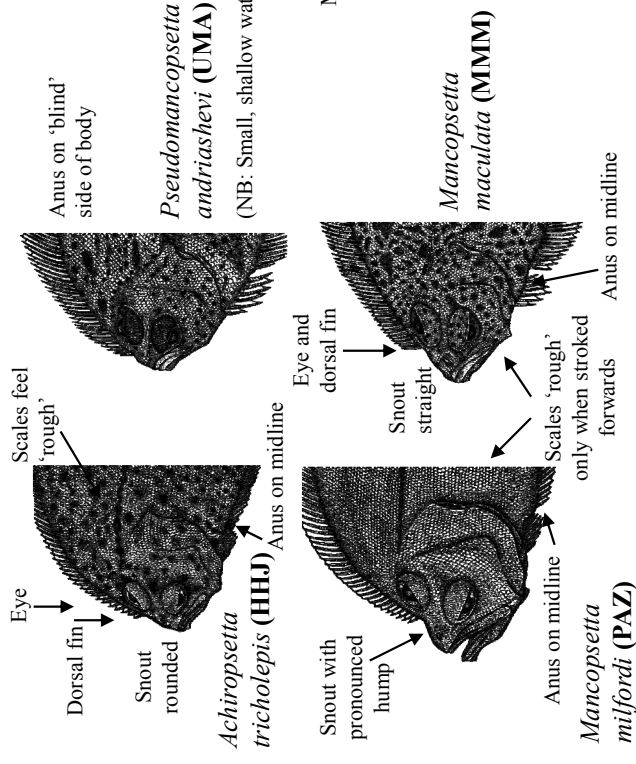
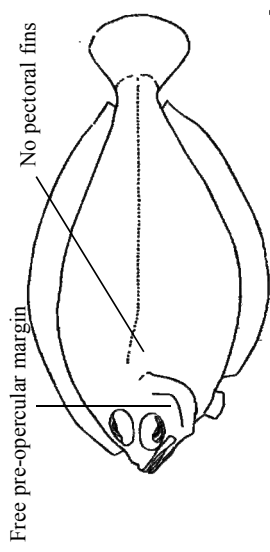
RS points backwards
Five pelvic fin rays, gill rakers vestigial
Chionodraco hamatus (TIC)

Five pelvic fin rays, gill rakers dentigerous
Chionodraco rastrospinosus (KIF)

RS present, points forward
Four pelvic fin rays
3 LL
Chaenodraco wilsoni (WIC)

Notes
A=Anal fin; P=Pelvic fin;
LL=Lateral Line; RS=Rostral Spine; SP=Spine

Bothidae (Lefteye or armless flounders)



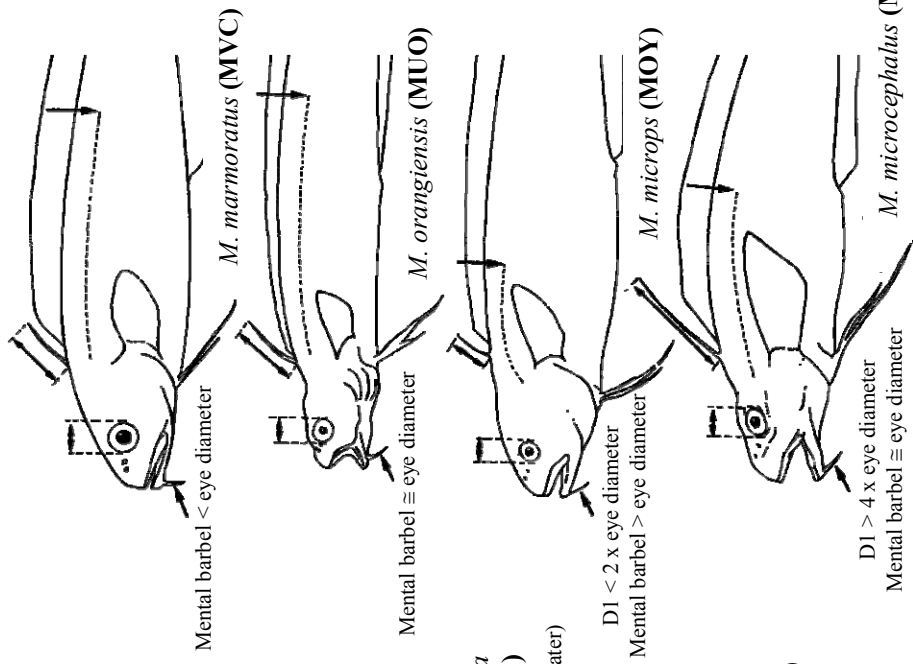
Achiropsetta tricholepis (HHH)

Pseudomancopsetta andriashevi (UMA)
(NB: Small, shallow water)

Mancopsetta maculata (MMM)

Mancopsetta milfordi (PAZ)

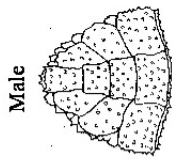
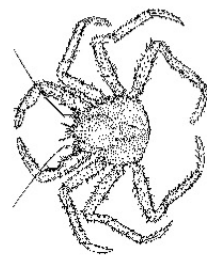
***Muraenolepis* spp. (MRL)**



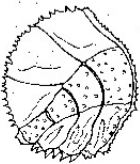
Distinct lateral line reaching to middle of D2

Indistinct short lateral line, normally no more than 2 pores

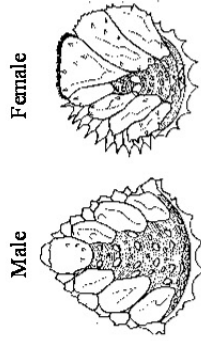
Lithodidae (Stone crabs, KCX) Crab 1



Male



Female



Male Female

Abdomen without membranous areas, the calcareous plates being continuous

Paralomis spp. (PAD) or *Neolithodes*

1. Carapace pear-shaped, covered by spinous tubercles:

P. aculeata (KCU)

Rostrum



2. Carapace rounded, more or less covered with numerous granules:

P. anamerae (KDD)



3. Entire dorsal surface of carapace covered with numerous spines:

P. spinosissima (KCV)



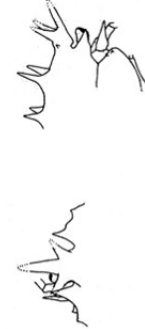
4. Carapace more or less pentagonal, as long as wide surface covered with small granules and a FEW spines:

P. formosa (KCF)



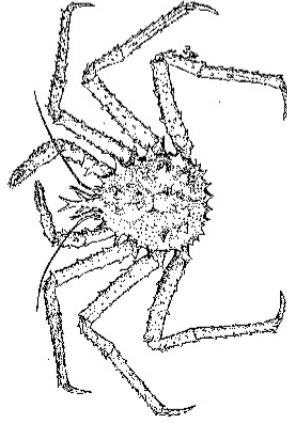
5. Carapace more or less pentagonal with many large spines, walking legs long:

Neolithodes diomedaeae (NDW)



Abdomen with membranous region containing calcareous nodules

Lithodes spp. (KCZ)



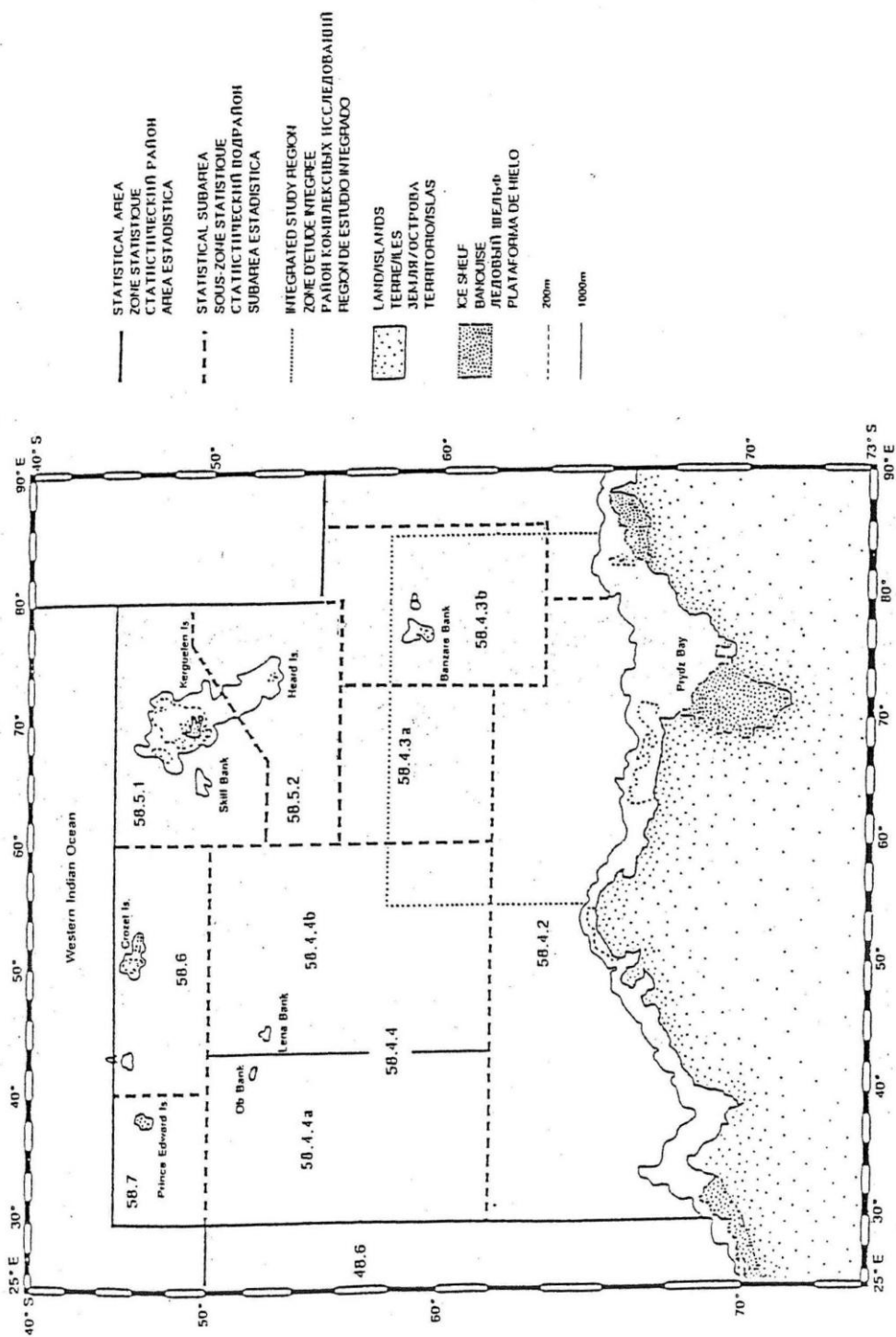
Carapace and legs with unequal spines (sharp) and tubercles

L. murrayi (KCM)



Rostrum

Dorsal + Lateral views



Map of the Western Indian Ocean sector.

SECTION 2

WORLD TIME ZONES

It is important to record the time at which events occurred in a uniform manner, especially where daily reporting of catches is involved. The time zones in the Convention Area are provided in Figure 16 and the time zones for the southern hemisphere (to allow reference to local time in ports) are provided in Figure 17.

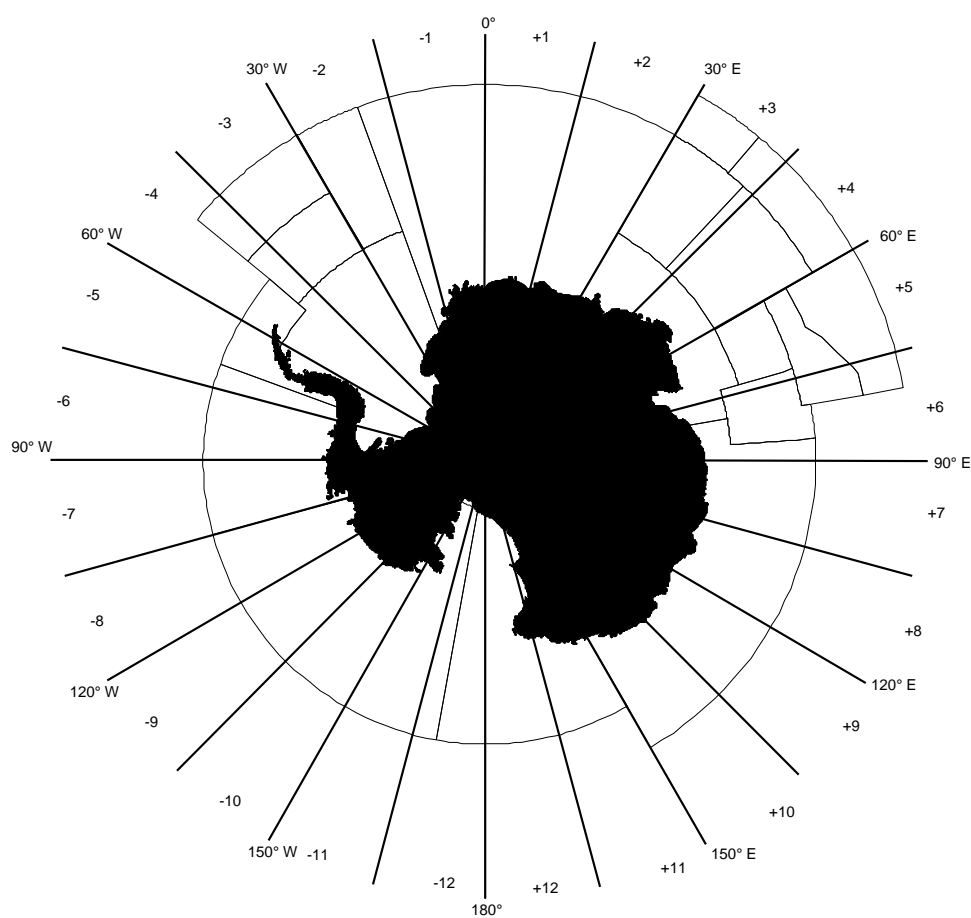


Figure 16: Time zones in the Convention Area (+ or – UTC).

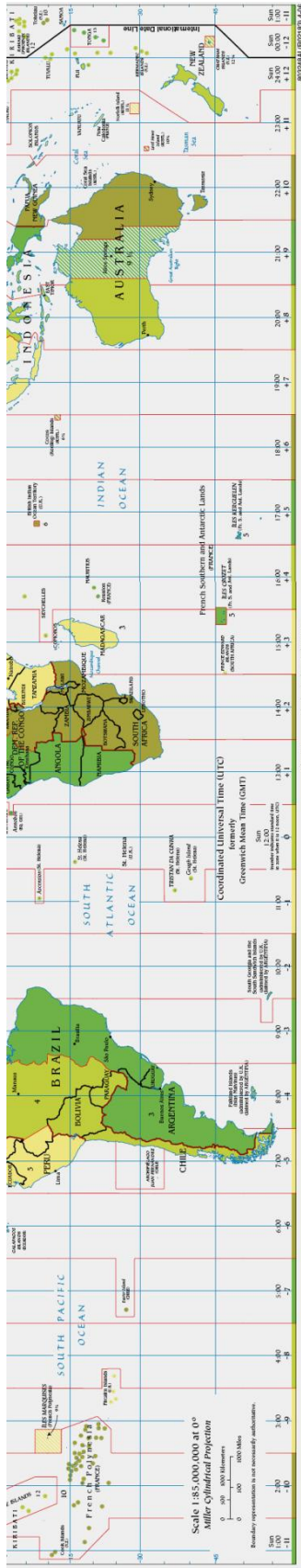


Figure 17: Time zones in the southern hemisphere.

SECTION 3

BEAUFORT SCALE OF WIND FORCE

Beaufort no.	Descriptive term	Mean wind speed (knots)	Probable wave height* (m)	
0	Calm	<1		
1	Light air	1–3	0.1	(0.1)
2	Light breeze	4–6	0.2	(0.3)
3	Gentle breeze	7–10	0.6	(1)
4	Moderate breeze	11–16	1	(1.5)
5	Fresh breeze	17–21	2	(2.5)
6	Strong breeze	22–27	3	(4)
7	Near gale	28–33	4	(5.5)
8	Gale	34–40	5.5	(7.5)
9	Strong gale	41–47	7	(10)
10	Storm	48–55	9	(12.5)
11	Violent storm	56–63	11.5	(16)
12	Hurricane	>64	14	(-)

* This table is intended as a rough guide for the open sea. Figures in brackets indicate the probable maximum wave heights.

DEFINITION OF SEA HEIGHT AND SWELL

‘Sea waves’ and ‘swell waves’ may be observed and defined as follows:

- (i) Sea waves are generated locally and move in the same direction as the surface wind.
- (ii) Swell waves have been generated elsewhere and have travelled out of the area in which they were generated.
- (iii) Waves of both types travel in groups, each group being made up of a number of waves of varying height, with the higher waves occurring in the centre of the group. The groups are separated by a relatively flat area, consisting of two or more waves of slight development. Sea waves have a more irregular appearance than swell waves.
- (iv) Swell waves travel in regular succession and in a well-defined direction, and generally have long and rounded crests. Good examples of swell waves may be observed when there has been little or no wind for several hours.

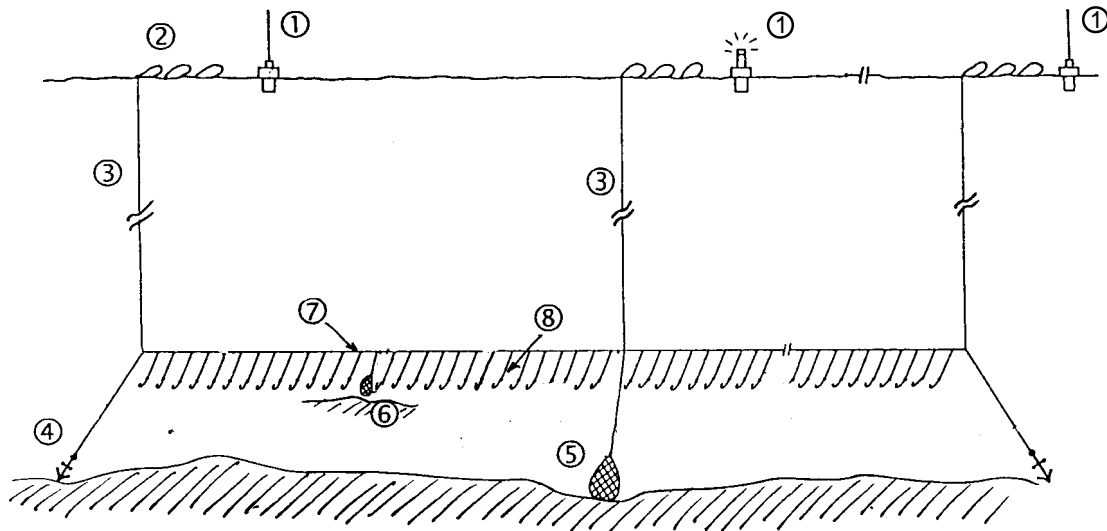
2. If only one wave system is observed, it should be classified as 'sea waves' if the surface wind is blowing in the same direction as the waves are moving; otherwise it should be recorded as 'swell waves'.
3. When the waves move in more than one direction, the sea waves will be those which are aligned with the surface wind direction, or those with the more irregular wave forms. Swell waves will in general have a more regular pattern.
4. If two wave forms are observed and their movement is in the direction of the surface wind, the system which has the longer distance between crests and the more regular form is considered to be the swell.
5. To estimate the height of a wave system, only the well-developed waves in the centre of the groups should be averaged. Wave height is measured as the distance from the trough to the crest of the wave.
6. Observations of waves are to be made where they are not deformed by shallow water, nor reflected or deflected by rocks, breakwaters or other such objects. The observation point must be exposed to seaward and not sheltered by headlands or shoals.

SECTION 4

LONGLINE DESIGNS USED IN THE CAMLR CONVENTION AREA

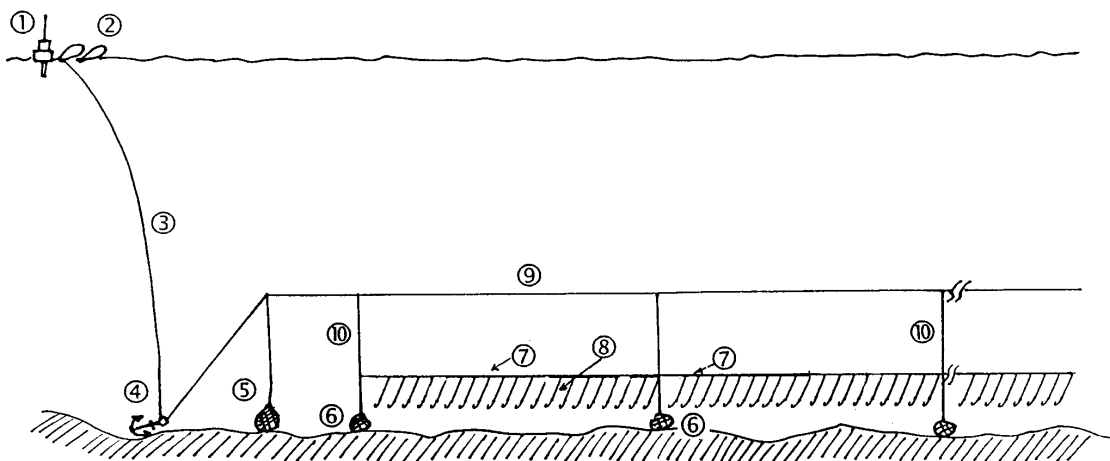
Configuration of a 'traditional' bottom longline.

- ① – Buoys; ② – Floats; ③ – Buoy line; ④ – Anchor; ⑤ and ⑥ – Stone anchors;
⑦ – Main line (ground line); and ⑧ – Branchlines (snoods) with hooks.



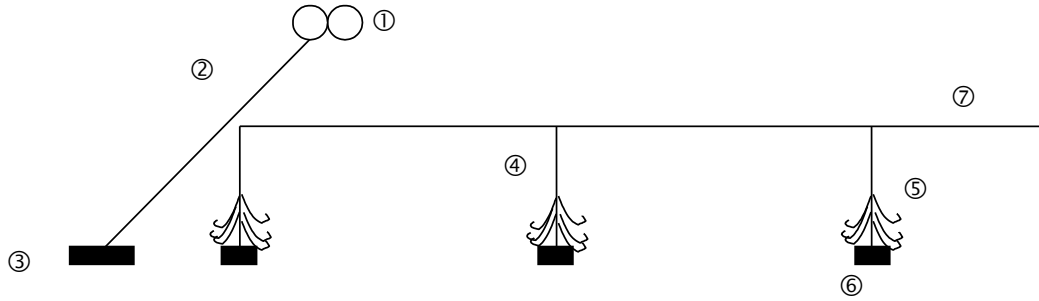
Configuration of a 'Spanish type' bottom longline.

- ① – Buoy; ② – Floats; ③ – Buoy line; ④ – Anchor; ⑤ and ⑥ – Stone anchors;
⑦ – Fishing line; ⑧ – Branchlines (snoods) with hooks; ⑨ – Main line; and
⑩ – Railing.



Configuration of a trotline.

① – Floats; ② – Buoy line; ③ – Anchor; ④ – Trot or vertical dropper; ⑤ – Hooks;
⑥ – Anchors; ⑦ – Main line.



SECTION 5

RULES FOR ACCESS AND USE OF CCAMLR DATA

The following Rules for Access and Use of CCAMLR Data were adopted by the Twenty-second Meeting of the Commission (CCAMLR-XXII, paragraphs 12.1 to 12.6)*:

It is recognised that:

1. All data submitted to the CCAMLR Secretariat, and maintained by the CCAMLR Data Centre, shall be freely available to Members for analysis and preparation of documents for the Commission, Scientific Committee and their subsidiary bodies.
2. Such data may be analysed in respect of:
 - (a) work specifically outlined and endorsed by the Commission or Scientific Committee;
 - (b) work not specifically endorsed by the Commission or the Scientific Committee.
3. Inclusion of data, analyses or results from data held in the CCAMLR Data Centre into Working Papers, Background Papers, and any other documents tabled at meetings of the Commission, Scientific Committee or one of their subsidiary bodies does not constitute publication and therefore is not a release into the public domain.
4. Inclusion of data held in the CCAMLR Data Centre into the published reports of the Commission, Scientific Committee, Working Groups, *CCAMLR Science*, the *Statistical Bulletin* or any other CCAMLR publication constitutes release into the public domain.
5. Inclusion of data held in the CCAMLR Data Centre in any publication outside CCAMLR constitutes release into the public domain.
6. Subject to paragraphs (1) to (3), originators/owners of data have the right to:
 - (a) be consulted (including assignation of authorship) on the preparation, if necessary including publication, of documents describing analyses and interpretation of their data;
 - (b) approve the level of detail revealed in documents using their data;
 - (c) stipulate terms and/or levels of data security if necessary.

Accordingly,

7. Requests to the Secretariat for access and/or use of data maintained by the CCAMLR Data Centre by individual Member scientists/officials shall be approved in writing as

* These rules replace those adopted at the Eleventh Meeting of the Commission (CCAMLR-XI, paragraph 4.35). The current 'Rules for Access to CDS Data' (CCAMLR-XIX, paragraph 5.23) should remain in place alongside the new standard rules until such times as all aspects of CDS data handling are duly taken into account in the new standard rules (CCAMLR-XXII, paragraph 7.22).

appropriate by that Member's Commission Representative, Scientific Committee Representative, or CDS Officer in consultation with the Commission Representative. Members are responsible for informing individual scientists or individuals requesting data of the rules governing access and use of CCAMLR data and for obtaining agreement to comply with such rules.

8. Requests in support of analyses endorsed under (2)(a) above should include the type of data requested, the degree of data aggregation required, the spatial and temporal detail required, and the anticipated format to be used in presenting results of the analyses. For such requests, the Secretariat shall ensure that each request meets the conditions of the approval granted for the original endorsement, and, if so, release the data and inform the data owner(s)/originator(s) accordingly. Release of data by the Secretariat to the requestor does not constitute permission to publish or release data into the public domain. Such permission remains a matter to be determined between the requestor and the data originator(s).

9. Requests in support of non-endorsed analyses under (2)(b) above should include the information listed in (8) as well as details of the analytical procedures to be used and the opportunity for data owner(s)/originator(s) to be involved. For such requests, the Secretariat shall be satisfied that each request contains the required information before forwarding it to the data originator(s) for approval within a specified time period. Once approval has been received the Secretariat shall release the data. Release of data does not constitute permission to publish or for release into the public domain. Such permission remains a matter to be determined between the requestor and the data owner(s)/originator(s).

10. If approval for data release under (9) is not forthcoming within the specified period, the Secretariat shall initiate and facilitate consultation between the data requestor and data owner(s)/originator(s). The Secretariat shall not release data without the written approval of the data owner(s)/originator(s). Failure to achieve agreement shall be brought to the attention of the Scientific Committee and Commission.

11. The following statement shall be placed on the cover page of all Working Papers, Background Papers and any other papers tabled at meetings of the Commission, Scientific Committee or their subsidiary bodies:

‘This paper is presented for consideration by CCAMLR and may contain unpublished data, analyses, and/or conclusions subject to change. Data in this paper shall not be cited or used for purposes other than the work of the CCAMLR Commission, Scientific Committee or their subsidiary bodies without the permission of the originators and/or owners of the data.’

SECTION 6

SELECTION OF CCAMLR DATABASE CODES

TAXONOMIC CODES

The list provided here is of the most frequently used taxonomic codes, a full list of codes can be found in the observer logbooks on the CCAMLR website (www.ccamlr.org). This list is updated annually to include new taxa and to reflect changes in the taxonomy and classification of species.

The unique 3-letter codes are provided by FAO and each has an associated 10-digit numeric code for classification purposes.

The scientific names for each species/taxa are given as well as an English name where available. It is important to recognise that the 'English' names of fish can vary from location to location and fishery to fishery.

Scientific name	CCAMLR/FAO code	English name
<i>Antimora rostrata</i>	ANT	Blue antimora
<i>Bathyraja eatonii</i>	BEA	Eaton's skate
<i>Bathyraja irrasa</i>	BYR	Kerguelen sandpaper skate
<i>Bathyraja murrayi</i>	BMU	Murray's skate
<i>Chaenocephalus aceratus</i>	SSI	Blackfin icefish
<i>Chaenodraco wilsoni</i>	WIC	Spiny icefish
<i>Champscephalus gunnari</i>	ANI	Mackerel icefish
Channichthyidae	ICX	Icefish spp.
<i>Channichthys rhinoceratus</i>	LIC	Unicorn icefish
<i>Chionobathyscus dewitti</i>	CHW	Icefish spp.
<i>Dissostichus eleginoides</i>	TOP	Patagonian toothfish
<i>Dissostichus mawsoni</i>	TOA	Antarctic toothfish
<i>Euphausia superba</i>	KRI	Antarctic krill
<i>Macrourus carinatus</i>	MCC	Ridge-scaled rattail
<i>Macrourus holotrachys</i>	MCH	Bigeye grenadier
<i>Macrourus</i> spp.	GRV	Rat tails, Grenadiers
<i>Macrourus whitsoni</i>	WGR	Rat tail
<i>Muraenolepis</i> spp.	MRL	Moray cods
<i>Notothenia gibberifrons</i>	NOG	Humped rockcod
<i>Notothenia squamifrons</i>	NOS	Grey rockcod
<i>Pseudochaenichthys georgianus</i>	SGI	South Georgia icefish
<i>Raja georgiana</i>	SRR	
<i>Raja taaf</i>	RFA	Whiteleg skate
Rajiformes	SRX	Skates and rays

Common species associated with incidental mortality (seabirds and marine mammals)

<i>Arctocephalus gazella</i>	SEA	Antarctic fur seal
<i>Daption capense</i>	DAC	Cape petrel
<i>Diomedea exulans</i>	DIX	Wandering albatross

Diomedeidae	ALZ	Albatrosses
<i>Macronectes giganteus</i>	MAI	Southern giant petrel
<i>Macronectes halli</i>	MAH	Northern giant petrel
<i>Macronectes</i> spp.	MBX	Giant petrels spp.
<i>Mirounga leonina</i>	SES	Southern elephant seal
<i>Phoebetria fusca</i>	PHU	Sooty albatross
<i>Procellaria aequinoctialis</i>	PRO	White-chinned petrel
<i>Procellaria cinerea</i>	PCI	Grey petrel
<i>Procellaria</i> spp.	PTZ	Procellaria petrels
Procellariidae	PRX	Petrels and shearwaters
<i>Thalassarche chlororhynchos</i>	DCR	Yellow-nosed albatross
<i>Thalassarche chrysostoma</i>	DIC	Grey-headed albatross
<i>Thalassarche melanophris</i>	DIM	Southern black-browed albatross

FISHING GEAR CODES

<u>Bottom trawls</u>	
Otter trawls	OTB
Bottom trawls nei	TB
<u>Midwater trawls</u>	
Otter trawls	OTM
Midwater trawls nei*	TM
Trawls nei	TX
<u>Hooks and Lines</u>	
Set lines (longlines set)	LLS

* Not elsewhere included.

CATCH PROCESSING CODES

Headed and gutted	HAG
Filletted	FLT
Head and tail removed (trunked)	HAT
Whole	WHO
Squid mantle (tubed)	TUB
Tentacles	TEN
Gutted	GUT

LENGTH – TYPE OF MEASUREMENT CODES

Total length of a fish is from the most anterior part of the mouth to the most posterior of the caudal fin when this fin is extended along the length of the body. Fork length is from the most anterior part of the mouth to the end of the rays at the deepest part of the fork in the

caudal fin. Standard length of a fish is from the most anterior point of the mouth to the end of the vertebral column. Standard length of krill is the total length from the front of the eye to the tip of the telson (see Figure 1).

Total	T
Fork	F
Standard	S
Unknown	U

SECTION 7

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