

CCAMLR's Scientific Committee has agreed to the public release of this report prior to its full consideration by the Scientific Committee, so as to make available the sampling protocols for CCAMLR-related activities during the International Polar Year 2007/08.

**REPORT OF THE PLANNING MEETING OF THE
CCAMLR-IPY STEERING COMMITTEE
(Cambridge, UK, 2 to 4 May 2007)**

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CONTENTS

	Page
INTRODUCTION	1
ACOUSTIC PROTOCOLS (JOINT SESSION WITH SG-ASAM)	4
SAMPLING PROTOCOLS	4
DATA	5
OTHER BUSINESS	7
RECOMMENDATIONS TO SCIENTIFIC COMMITTEE	7
ADOPTION OF THE REPORT AND CLOSE OF MEETING	8
FIGURE	9
ATTACHMENT A: Agenda	10
ATTACHMENT B: List of participants	11
ATTACHMENT C: Information on surveys and vessels – submitted by Norway	14
ATTACHMENT D: Information on surveys and vessels – submitted by Germany	17
ATTACHMENT E: Information on surveys and vessels – submitted by New Zealand	19
ATTACHMENT F: Information on surveys and vessels – submitted by Japan	25
ATTACHMENT G: Information on surveys and vessels – submitted by Australia	28
ATTACHMENT H: Acoustic Sampling Protocols – (temporary attachment) extract from Report of SG-ASAM	33

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INTRODUCTION

The CCAMLR-IPY Steering Committee met at the British Antarctic Survey in Cambridge, UK, from 2 to 4 May 2007. The meeting was convened by Mr S. Iversen (Norway). The meeting was held in association with the 2007 meeting of SG-ASAM, with a joint session on 2 May to discuss acoustic sampling protocols.

2. Mr Iversen welcomed the participants and thanked the British Antarctic Survey for hosting the meeting.

3. The terms of reference of the Steering Committee were to:

- develop a detailed understanding of the IPY activities proposed by CCAMLR parties;
- determine the type and extent of ship-time available to the CCAMLR-IPY core project (modified acoustic research project) and document activities proposed under the AMES-IPY umbrella (Antarctic Marine Ecosystem Studies);
- finalise the survey design, sampling protocol, data reporting and logistic arrangements of the CCAMLR-IPY core project;
- outline a work plan for the analysis of CCAMLR-IPY data and reporting of results to the Scientific Committee.

4. The Steering Committee noted that Dr E. Fanta, Chair of the Scientific Committee and Co-convenor of the Steering Committee, had been unable to attend the planning meeting due to health reasons. The Steering Committee wished Dr Fanta a speedy recovery and looked forward to her further participation in IPY activities.

5. The Steering Committee noted the email from Dr V. Alder (Argentina) advising that the Argentine vessel *Almirante Irizar* was recently damaged by fire and was no longer available for IPY activities. Argentina was searching for another suitable vessel.

6. The Steering Committee discussed and adopted the agenda for the meeting (Attachment A).

7. The list of participants is in Attachment B. The report was prepared by the participants.

IPY SURVEYS

8. Presentations were given of surveys planned during IPY:

- Norway (Attachment C) – The research vessel *G.O. Sars* will conduct a pelagic survey in the northern region of Subarea 48.6 for krill (*Euphausia superba*) and mackerel icefish (*Champscephalus gunnari*). This study has adopted an ecosystem approach to look at the ecology of the region, including zooplankton and phytoplankton, and to quantify the prey available to land-based predators. The *G.O. Sars* will perform acoustic target strength (TS) studies on krill and icefish near South Georgia in Subarea 48.3. The fishing vessel *Saga Sea* will also be used as an observation platform in Area 48. A range of new environmental sampling systems will be used in the Norwegian survey, including the MESSOR and MUST plankton and environmental samplers and midwater trawl for macrozooplankton. The scientific survey is awaiting confirmation that it will proceed.
- Germany (Attachment D) – The research vessel *Polarstern* will work in the southern region of Subarea 48.6 and conduct a SYSCO benthic survey for CAML and a SCACE physical oceanography and climate survey. Opportunities exist for the collection of acoustic data and RMT samples.
- New Zealand (Attachment E) – The research vessel *Tangaroa* will conduct a CAML survey of the Ross Sea (Subarea 88.1) to measure and describe key elements of species distribution, abundance and biodiversity. A wide range of taxonomic groups from viruses to top predators will be studied, with an emphasis on the biodiversity of benthic, demersal and mesopelagic species, and on by-catch associated with the toothfish (*Dissostichus* spp.) fishery in Subarea 88.1. The survey plan is preliminary and funding is not finalised.
- Japan (Attachment F) – The research vessel *Umitaka Maru* will conduct a survey near Syowa (JARE Survey area A; Division 58.4.2) and a CEAMARC survey near

Dumont d'Urville for CAML (Division 58.4.1). This work will include pelagic sampling with RMT 8 nets and the collection of acoustic, physical and chemical oceanographic data.

- Census of Antarctic Marine Life (CAML) – CAML surveys will be conducted around Antarctica to provide a bench of current biodiversity and describe the associated processes. CEAMARC surveys (Attachments F and G) in eastern Antarctica will use the Japanese vessel *Umitaka Maru* (pelagic and mesopelagic sampling), an Australian vessel (physical and chemical oceanography, demersal and benthic sampling), and the French vessel *l'Astrolabe* (with supplementary inshore pelagic sampling). In addition, a circum-Antarctic CPR survey will be conducted with some 14 vessels likely to be involved. Full details are not yet available because CAML is still awaiting details for some vessels to be supplied, some nations are still awaiting national funding support, and the participation of some vessels is not confirmed.
- UK – The research vessel *James Clark Ross* will conduct Discovery 2010 and BIOFLAME surveys of the West Antarctic Peninsula and Scotia Sea, South Georgia and South Shetland Islands region (Area 48). All trophic levels will be studied at fixed and reactive stations, using RMT and other nets, and a full suite of acoustic data.
- Integrated Climate and Ecosystem Dynamics (ICED) Program – ICED is investigating the interactions of physical oceanography, biogeochemical cycles and the food web. This is a long-term project which will start in the IPY. ICED will provide circum-Antarctic sampling opportunities similar to CAML, and seeks to develop links with other IPY projects. Closer links could be developed between ICED, CCAMLR and CAML.

A map of known IPY survey areas relevant to CCAMLR-IPY activities is given in Figure 1.

9. The Steering Committee commended Norway for committing to the original CCAMLR-IPY proposal with the intention of undertaking a survey in Subarea 48.6, a sector that presently has no krill biomass estimate and has been little studied. The Norwegian survey plan also aims to address issues relating to TS of krill and icefish in Area 48 which have been identified as a priority by SG-ASAM. The Steering Committee also commended New Zealand for its trawl survey proposal which will provide information on by-catch data relevant to the toothfish fishery in Subarea 88.1 that has been requested by WG-FSA.

10. Many of the planned surveys will also contribute to the objectives of AMES (see Attachments C to G for details).

11. The Steering Committee noted that a number of surveys that may contribute to CCAMLR-related IPY activities are still waiting for confirmation of funding from their respective national authorities. This was of concern to the Steering Committee as the start of the main survey season for IPY work in the Antarctic is only a few months away.

ACOUSTIC PROTOCOLS (JOINT SESSION WITH SG-ASAM)

12. In the joint session, the Steering Committee and the Subgroup on Acoustic Survey and Analysis Methods (SG-ASAM) noted that the IPY surveys will have varied objectives under CAML, ICED and national programs, and will not be part of a dedicated CCAMLR research program, such as the CCAMLR-2000 Synoptic Survey of Krill in Area 48. Therefore, acoustic protocols cannot be too rigorous and prescriptive. The joint session designed a set of hierarchical protocols to be inclusive for IPY participants. It was noted that it was important to match the level of protocols with the study requirements, i.e. a qualitative description of acoustic mark types required a lower level of equipment and protocols than a quantitative analysis of acoustic backscatter. The most rigorous protocols were required for acoustic data used for biomass estimation and stock assessment. A protocol framework was agreed that defined the minimum, desirable and optimal requirements for acoustic data collected during IPY surveys. This framework, together with the complete record of discussions and recommendations made by the joint session, is reported in SC-CAMLR-XXVI/BG/2 (Report of the third Meeting of the Subgroup on Acoustic Survey and Analysis Methods – the relevant sections of that report have been temporarily included here as Attachment H).

SAMPLING PROTOCOLS

13. The Steering Committee considered sampling protocols only in the light of information necessary to interpret acoustic survey data. This included requirements for net sampling, other biological data and physical data. It was not deemed necessary to formulate protocols for chemical data.

14. The only specific physical data required were CTD data to help interpret the acoustics data. CTD protocols are well defined (e.g. see CCAMLR-2000 Survey protocols). Where possible, CTD profiles should be carried out to at least the recommended acoustic sampling depth (1 000 m).

15. As for acoustic sampling, the Steering Committee noted that CCAMLR cannot be too prescriptive with net sampling protocols. Many planned surveys will be using nets other than the RMT 8 net recommended for krill sampling, however, these nets will still provide useful samples and data. The Steering Committee noted that CCAMLR has no identified resources for processing and archiving net samples. Those surveys that can provide data on krill should consult the CCAMLR-2000 Survey protocols, and contribute data on krill distribution, abundance and length-frequencies to CCAMLR. The Committee recommended that the CCAMLR-2000 Survey protocols and CCAMLR's *Scientific Observers Manual*, which describes the krill sex and maturation stages, be placed in a public IPY-related area of the CCAMLR website. Dr G. Hosie (SCAR and CAML Liaison) agreed to include reference to the CCAMLR-2000 Survey protocols in the CAML pelagic protocols. Copies of the CCAMLR protocols and the *Scientific Observers Manual* may also be placed on the CAML website.

16. The Steering Committee noted that the IPY surveys provided a unique opportunity for a circum-Antarctic collection of krill. The Committee recommended that WG-EMM consider this opportunity and identify any specific projects (e.g. studies on krill morphometrics or genetics) which may make use of this opportunity, together with a lead investigator of each project, a collection point for samples, and advice on collection protocols for use by CAML, ICED and other relevant IPY programs.

DATA

17. The Steering Committee discussed options for data submission and archiving, and future analyses of datasets collected during IPY surveys.

18. The Steering Committee developed the following general guidelines for the archiving of CCAMLR-related data from IPY surveys. The Steering Committee urged Parties involved in IPY surveys to:

- store data in internationally recognised data repositories;
- submit metadata records to CCAMLR and SCAR-MarBIN;
- note that CCAMLR is willing to store and archive acoustic, trawl, CTD and net data under specified data access requirements;
- note that data used in CCAMLR assessments must be held by CCAMLR – both in raw and processed form.

19. The Steering Committee recognised that this proposal may have some financial implications for the Secretariat (e.g. acquisition of additional storage capacity for raw acoustic data).

20. The Steering Committee envisaged that data could be submitted to CCAMLR in either raw (e.g. ping-by-ping acoustic data) or CCAMLR formats (e.g. survey formats).

21. The Steering Committee noted that data submitted to CCAMLR would be managed under its existing Rules for Access and Use of CCAMLR Data, and data owners may attach specific conditions for the release of their data (paragraph 6, Rules for Access and Use of CCAMLR Data).

22. The Steering Committee recommended that the Secretariat prepare a summary of acoustic data and related metadata submitted to CCAMLR by Parties involved in IPY surveys and report to SG-ASAM in 2009 so that SG-ASAM can conduct a scoping study at its meeting. SG-ASAM should then advise WG-EMM on the value of the data for krill biomass assessment. The data would also contribute to the bioregionalisation of the Southern Ocean in the longer term.

23. The Steering Committee noted that the SCAR XXX and 3rd Open Science Conference will occur in St Petersburg, Russia, in July 2008 and the 10th SCAR Biology Symposium will occur in Sapporo, Japan, in 2009. There will be a strong IPY focus in both meetings and SCAR welcomed CCAMLR's participation.

OTHER BUSINESS

24. The Steering Committee noted the request from CAML to supply samples and specimens taken during CCAMLR-related activities, especially unusual specimens. Location, time and method of sampling would be required. Further details will be supplied by CAML.

25. Dr S. Hedley (IWC Observer) outlined IWC's requirements for whale observations from survey vessels. A minimum of two berths per vessel would be required for whale observers to collect data to the minimum standard endorsed by IWC. The Steering Committee noted that there were preliminary plans from some programs to have whale/marine mammal/top predator observers on board their vessels, but with the exception of Norway, no dedicated berths for IWC whale observers were available at the time of the meeting. Given the short time to obtain funding from IWC (with the IWC Scientific Committee meeting in May 2007) and a lack of committed berths, the Steering Committee agreed that it was unlikely that further formal collaborations with IWC would be made. However, it was recognised that any standardised line transect whale sighting and effort data collection that could be undertaken by non-IWC observers could be valuable to both IWC and CCAMLR. Individual scientists from the IWC Scientific Committee may be willing to offer assistance/advice with this, so that protocols could be standardised as far as possible (once further details on the surveys are known). The Steering Committee asked Dr Hedley to request a single IWC contact point for such advice.

26. On the Norwegian vessel, two berths for IWC whale observers will be available for six weeks from mid-February 2008. The Steering Committee asked Dr Hedley to report this to the IWC Scientific Committee and, if considered of interest there, to seek funds from the IWC for two dedicated whale observers to be placed on board the *G.O. Sars* while surveying a region around Bouvet Island (Subarea 48.6). The Steering Committee recognised that this formal collaboration between IWC and Norway would provide a further avenue for standardisation of protocols across participating surveys.

RECOMMENDATIONS TO SCIENTIFIC COMMITTEE

27. The Steering Committee reiterated the recommendation from the joint session that Parties carrying out IPY surveys refer to the protocols for acoustic data collection provided by SG-ASAM (paragraph 12).

28. The Steering Committee recommended that CCAMLR-2000 Survey protocols and information on krill sex and maturity stages from CCAMLR's *Scientific Observers Manual* be provided in a public IPY-related area of the CCAMLR website (paragraph 15).

29. The Steering Committee recommended the following guidelines for archiving of CCAMLR-related data from IPY surveys (paragraph 18):

- store data in internationally recognised data repositories;
- submit metadata records to CCAMLR and SCAR-MarBIN;
- CCAMLR is willing to store and archive acoustic, trawl, CTD and net data under specified data access requirements;
- data used for CCAMLR assessments must be held by CCAMLR – both in raw and processed form.

30. The Steering Committee recommended that WG-EMM be tasked with identifying specific projects involving the collection of krill samples, and provide details, including a contact person and a repository for sample collection, to IPY participants (paragraph 16).

31. The Steering Committee recommended that the Secretariat produce a summary of all IPY acoustic data and related metadata submitted to CCAMLR, and report to SG-ASAM by April 2009. The Steering Committee further recommended that SG-ASAM should examine the available acoustic data and any analyses at its 2009 meeting and advise the Scientific Committee on their value for krill biomass estimation (paragraph 22).

ADOPTION OF THE REPORT AND CLOSE OF MEETING

32. The report was adopted. In closing the meeting, Dr Iversen thanked all participants for their valuable contributions.

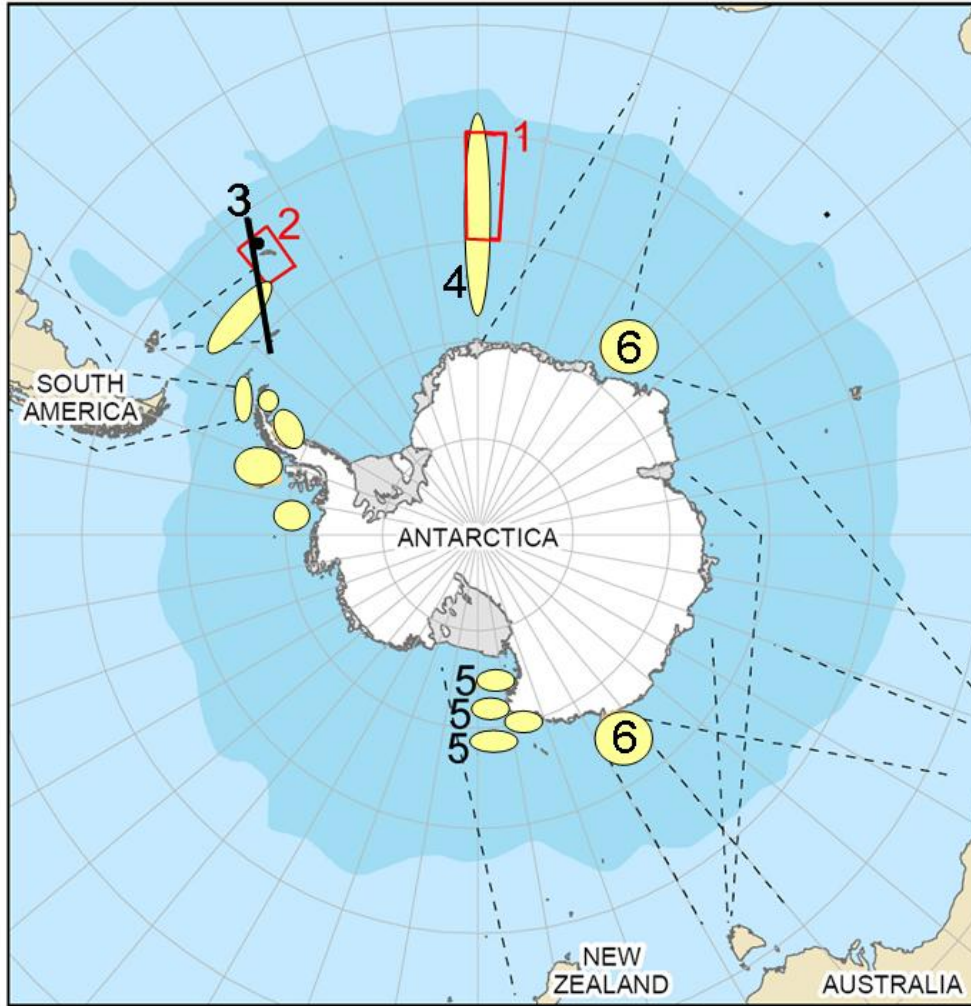


Figure 1: Location of CCAMLR-related IPY surveys proposed in 2007/08. 1: survey area for Norwegian research vessel *G.O. Sars*; 2: work area for Norwegian fishing vessel *Saga Sea*; 3: Scotia Sea repeat transect by UK research vessel *James Clark Ross*; 4: survey area for German research vessel *Polarstern*; 5: survey areas for New Zealand research vessel *Tangaroa*; 6: survey areas for Japanese research vessel *Umitaka Maru*. Shaded areas: CAML (Census of Antarctic Marine Life) survey regions. Dotted lines (-----): CPR (Continuous Plankton Recorder) track lines.

ATTACHMENT A

AGENDA

Planning Meeting of the CCAMLR-IPY Steering Committee
(Cambridge, UK, 2 to 4 May 2007)

1. Introduction
 - 1.1 Opening of the meeting
 - 1.2 Adoption of the agenda and organisation of the meeting
2. IPY surveys
 - 2.1 Presentations on surveys planned during IPY
 - 2.2 CCAMLR-IPY krill survey
 - 2.2.1 Opportunities for collaboration
 - 2.2.2 Survey design and vessel logistics
 - 2.3 Contributions to AMES
3. Acoustic protocols for *Euphausia superba* (joint session with SG-ASAM)
 - 3.1 Acoustic research and methodological developments for krill surveys
 - 3.2 Presentations and recommendations for future work
 - 3.3 Acoustic protocol for the CCAMLR-IPY krill survey
4. Sampling protocols
 - 4.1 Requirements for net sampling and biological data
 - 4.2 Requirements for physical data
5. Data
 - 5.1 Standards and reporting requirements
 - 5.2 Submission of data to CCAMLR
 - 5.3 Analysis of data
 - 5.3.1 Krill biomass
 - 5.3.2 Contribution to ecosystem studies
 - 5.3.3 Contribution to bioregionalisation studies
6. Other business
7. Adoption of report and close of meeting.

LIST OF PARTICIPANTS

Planning Meeting of the CCAMLR-IPY Steering Committee
(including the joint session with SG-ASAM)
(Cambridge, UK, 2 to 4 May 2007)

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INFORMATION ON SURVEYS AND VESSELS

(Submitted by Norway)

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Vessel

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The Fishery and Coastal Ministry in Norway has still not taken the final decision about the Norwegian survey, but IMR is optimistic because it was told to continue planning of the survey. The Norwegian commercial fishing vessel *Saga Sea* will also be used as an observation platform, particularly in relation to krill swarm studies.

Survey area

South Shetland Island, South Georgia and Bouvet Islands area about: 50–60°S, 5°W 5°E

Survey dates

Late December 2007–late March 2008, two six-week periods.

Main purpose of survey

To derive a baseline of the pelagic ecosystem components of CCAMLR Subarea 48.6, including the Bouvet Island area, that can act as a starting point for future research, monitoring and ecosystem-based management with respect to the stocks of icefish, krill and other pelagic resources in Subarea 48.6.

The specific objectives are:

- to obtain-basin scale abundance estimates and demographic data of the population of *Euphausia superba* and other key euphausiid species from surveys and on-board experiments in the Bouvet Island area;
- describe swarm, school and aggregation dynamics and obtain vital rates of krill on the fishing grounds during a full year cycle in the Scotia Sea that can be linked to other regional data of the same kind;
- to significantly improve the acoustic classification, TS and abundance estimation techniques for krill and icefish (*Champscephalus gunnari*) in the survey region that can also be applied to other concurrent IPY survey data as well as historic data;
- through an ecosystem approach identify and enumerate key zooplankton and phytoplankton species in the study region;
- to quantify and relate the distribution of pelagic resources to land-based predators of Bouvet Island;
- map and model the physical oceanographic features in the study region and evaluate how these affect the distribution of plankton, fish and feeding areas of land-based predators;
- genetics, krill and fish;
- fish pathogens;
- collect cores for reconstructing the decadal-millennial scale climate and ocean variability in the Drake Passage region through the Holocene and the last glacial cycle. These cores will provide the quantitative reconstructions necessary to first define the magnitude and expression of natural climate variability in the region, and then to clarify the nature of its coupling to changes in Antarctic water mass properties and circumpolar circulation. This project constitutes a vital component in achieving BIPOMAC's broader goal of elucidating the key polar processes influencing global climate. The key topographic constraint on circumpolar circulation, the Drake Passage, is hypothesised to influence global water mass distributions and overturning rates.

TS measurements of krill and mackerel icefish will be carried out in the South Georgia area.

Survey objectives/opportunities and logistics in relation to AMES

(IPY umbrella project) Krill abundance, krill samples, pelagic ecosystem data. A few berths on board are still available.

Availability of ship-time, sampling opportunities and proposed logistics in support of the CCAMLR-IPY krill survey

Ship-time: two six-week periods from late December 2007 to late March 2008. Acoustic krill and fish data. Plankton, fish and krill samples. Hydrography. Uncertain: systematic bird and mammal observations.

Survey equipment

Echosounders and acoustic recordings at 18, 38, 70, 120, 200 and 333 KHz.

Nets and gear for krill and zooplankton sampling: krill trawl, MESSOR and MUST towed vehicles including Multinet (MESSOR), and acoustics (38, 70, 120, 200, 333 kHz), CTDs and optical plankton recorders (OPC and LOPC), Multisampler, Mocness, WP2 nets.

Fishing gear: pelagic trawl

CTD: Sea-Bird 911 plus (temperature, conductivity (salt), pressure, fluorescence (chl-*a*), oxygen. Triaxus towed undulating vehicle with Sea-Bird 911 plus CTD.

Water sampling: nutrients (N, P, Si), chl-*a* salinity calibration.

Acoustic Doppler: Current Profiler (ADCP) – RDI – 75kHz.

INFORMATION ON SURVEYS AND VESSELS

(Submitted by Germany)

Contact person

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Vessel

RV Polarstern, DBLK

Survey area

CCAMLR Subarea 48.6 south of 60°S (Lazarev Sea)

Survey dates

28 November 2007 to 4 February 2008 (Cape Town–Cape Town)

Main purpose of survey:

SYSCO (deep-sea benthos program under CAML) and SCACE (physical oceanography and climate research)

Survey objectives/opportunities and logistics in relation to AMES

(IPY umbrella project)

Opportunity to collect RMT net samples along 0° and 3°E transects as well as acoustic data, international cruise, fully booked, no more space for additional personnel.

Availability of ship-time, sampling opportunities and proposed logistics in support of the CCAMLR-IPY krill survey

Opportunity to collect RMT net samples along 0° and 3°E transects as well as acoustic data, so these can be ancillary data to CCAMLR-IPY, however it will not be possible to conduct a full survey and the transects and station positions are fixed.

Survey equipment

Echosounders and acoustic recording: EK 60, four frequencies (38, 70, 120, 200 kHz)

Nets and gear for krill sampling: RMT 1+8, at transects 0° and 3°E between 60°S and continent every 30 n miles, standard double oblique tows 0–200 m, mainly for krill species and krill larvae.

Fishing gear: none

CTD: along 0° meridian between 50°S and continent every 30 n miles 0–1 000 m, selected stations down to bottom, 3°E transect between 60°S and continent same procedure.

Water sampling: yes for measurements of nutrients.

Other sampling: probably multinet 0–1 000 m at selected stations for smaller zooplankton species.

INFORMATION ON SURVEYS AND VESSELS

(Submitted by New Zealand)

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Vessel

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Survey area

Ross Sea region – see Figure 1. Note these study areas are still provisional.

Survey dates

29 January to 19 March 2008 (on grounds from 6 February to 11 March)

Main purpose of survey

To measure and describe key elements of species distribution, abundance (biomass and/or density), and biodiversity for the Ross Sea and Southern Ocean, between longitudes $\sim 170^\circ\text{E}$ and $\sim 175^\circ\text{W}$, and depths down to $\sim 4\,000\text{ m}$; for main habitats (water column, shelf, slope and abyssal plain) and key functional ecosystem roles, for major groups, viruses, bacteria,

archaea, phytoplankton, zooplankton, nekton, benthic fauna, fish and top predators and assess the effects of environmental factors including latitude, depth, sediment, ice regime.

Survey objectives/opportunities and logistics in relation to AMES

The provisional survey objectives in relation to AMES are given below. It should be noted that these objectives are still very preliminary and will be reviewed in May 2007. However, the key components of the work are likely to include:

- (i) a core ‘biodiversity’ survey, which will link strongly with CAML objectives 1 and 3. In addition to biodiversity, the aim of this approach will be to estimate density (e.g. ‘wet weight per m²’, or similar), of all species collected in the pelagic and benthic habitats at the core stations;
 - (ii) a ‘demersal’ survey, which will determine the spatial distribution and abundance of key demersal fish, squid and large macro-invertebrates within the shelf and slope study areas;
 - (iii) a ‘mesopelagic’ survey, which will determine the spatial distribution and abundance of the key mid-trophic level mesopelagic species assemblages (in particular krill and Antarctic silverfish (*Pleuragramma antarcticum*)) using a quantitative acoustic survey (with targeted mark identification) within the shelf and slope study areas.
1. To undertake routine identification and abundance estimates of marine mammal and seabird species to generate spatially and temporally explicit population biomass and foraging distribution estimates for top air-breathing predators.
 2. To undertake automated water sampling (CPR) in order to monitor the identities and spatial and temporal distributions of plankton near the surface in the Ross Sea region and to allow ground-truthing of data collection from satellites (e.g. surface seawater temperature and chlorophyll concentration).
 3. To determine the spatial distribution, abundance and size structure of epipelagic, mesopelagic (and possibly bathypelagic) species using acoustics.

4. To identify and measure diversity, distribution and densities of mesozooplankton and small macrozooplankton using nets.
5. Measure environmental parameters such as salinity, temperature, chlorophyll *a* and chlorophyll *a* fluorescence, nutrients and beam transmissometry to provide a hydrological/chemical setting for the biological sampling.
6. Measure diversity, distribution and densities of all size ranges of viral, bacterial, phytoplankton and microzooplankton species, including identification of species in the whole water column.
7. To determine the spatial distribution, abundance and size structure of shelf and slope demersal fish species.
8. Define trophic relationships to better understand ecosystem functioning by collecting samples for stable isotope analyses of tissue samples, gut contents, biomarkers for as many species as practical, especially from toothfish, demersal and pelagic species, key benthic species, sediments and potential primary food sources, to identify food-web linkages.

Availability of ship-time, sampling opportunities and proposed logistics in support of the CCAMLR-IPY krill survey

It is envisaged that the ship-time will be fully utilised meeting all of its objectives (including the subset identified above). It is anticipated that samples of krill (either *Euphausia superba* and/or *E. crystallorophias*) will be collected from each of the study areas during the survey. All acoustic data will be stored in a format suitable for subsequent analysis.

Survey equipment

Echosounders and acoustic recording:

- Custom CREST or Simrad EK60 echosounders with 12, 38 and 120 kHz hull-mounted transducers.
- Acoustic data would be logged continuously at each of these frequencies using NIWA's CREST system.

- Dedicated acoustic transects using a zig-zag pattern will be used to estimate backscatter within the slope and shelf study areas.
- Data collected at 12 and 38 kHz during steaming will not be quantitative because of interference from the multibeam sounder.

Nets and gear for krill sampling:

- Targeted trawling for species identification will be carried out in the shelf and slope study areas.
- Most target trawls will be made using NIWA's 'mesopelagic' fish trawl with a codend mesh size of 10 mm. (Note, this is similar to the IGYPT trawl.) It is anticipated that this mesh size will retain larger *E. superba*.
- There is a current proposal to purchase a multiple opening closing net (MOCNESS or similar)
 - If a multiple opening closing net is available, it will be deployed at each of the core stations at a series of discrete depths from 800 m to the surface. By using a mesh size of 0.5 mm and attaching a strobe light to the net it is believed that this will sample most life stages of krill.
 - If the net is not available, existing 2 m x 2 m plankton net with a mesh size of 2 mm will be used instead.

Fishing gear:

- A mesopelagic fish trawl (mesh size 10 mm) will be used for sampling epipelagic and mesopelagic fish.
- A rough bottom trawl (mesh size 40 mm) will be used for sampling demersal fish, squid and larger macro-invertebrates. Note this net is also likely to catch moderate numbers of Antarctic silverfish (*Pleuragramma antarcticum*).

CTD:

CTD casts will be made at each core station from the surface to the seabed. A CTD data logger will also be attached to the net headline for each trawl deployment.

Water sampling:

Water samples will be collected at pre-defined depths at each core station from the surface to the seabed.

Other sampling:

A vertical haul with a WP2 net will be made from 800 m to the surface at each core station. A range of benthic sampling devices will also be used at each core station.

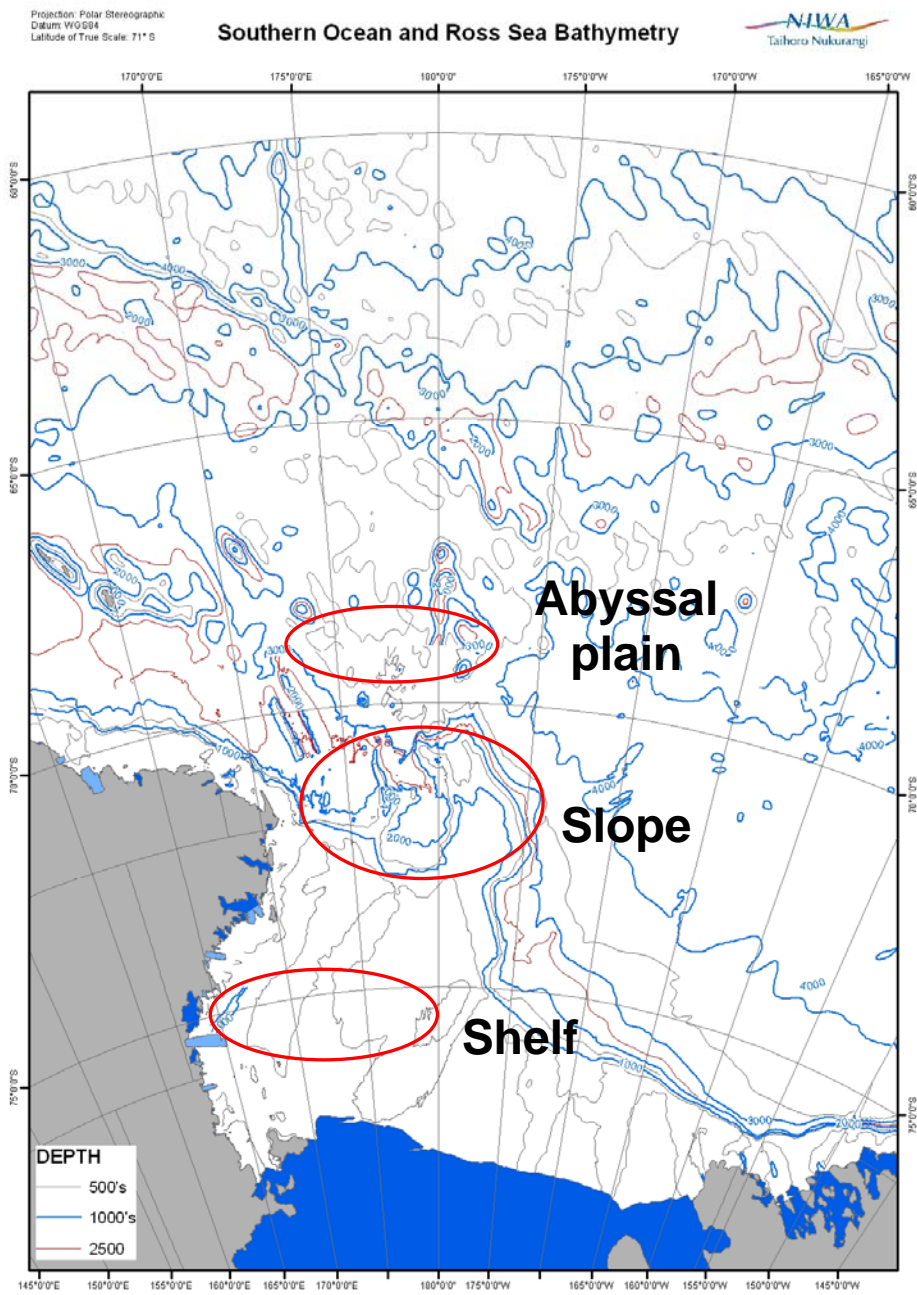


Figure 1: The Southern Ocean and Ross Sea bathymetry with approximate locations of the three proposed study areas on the abyssal plains, slope and shelf.

INFORMATION ON SURVEYS AND VESSELS

(Submitted by Japan)

Contact person

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Vessel

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Survey area

A: Off Luzow-Holm Bay (Showa Station) and Mawson Station; the area covers the meridian 35° and 70°E from ice edge to 60°S.

B: Off Adélie Land and George V Land; the area covers the meridian of 135° and 145°E from ice edge to 60°S. CEAMARC Survey.

Survey dates

24 December 2007	Departure from Cape Town
29 December 2007	Arrival at research area A
7 January 2008	Departure from research area A
18 January 2008	Arrival at Fremantle
23 January 2008	Departure from Fremantle

29 January 2008	Arrival at research area B
13 February 2008	Departure from research area B
17 February 2008	Arrival at Hobart

Main purpose of survey

The Indian Ocean sector of the Antarctic Ocean is one of the least studied areas in the Antarctic Ocean and its circulation system and ecosystem dynamics are not well elucidated. In the austral summer of 2007/08, a series of ship operation will be conducted in cooperation with the National Institute of Polar Research (JMSDF *Shirase*), Japan Agency for Marine-Earth Science and Technology (RV *Hakuho Maru*), the Australian Antarctic Division (RSV *Aurora Australis*) and Tokyo University of Marine Science and Technology (RTV *Umitaka Maru*).

The following will be investigated in this project: (i) ocean circulation and deep water formation, (ii) optical characteristics of seawater, (iii) distribution of macronutrient, carbon dioxide, and dimethyl sulfide, (iv) primary production and carbon biomass and species composition of phytoplankton, and (v) biomass and species composition of zooplankton and nekton in epi- and mesopelagic zone.

Survey equipment

1. Physical oceanographic observations by CTD and LADCP at fixed stations, and by XBT, XCTD, and ship-mount ADCP during cruising.
2. Optical observations by spectral radiance/irradiance meter.
3. Water samplings for the analyses of macronutrients, carbon dioxide, dissolved inorganic carbon, dimethyl sulfide and photosynthetic pigments.
4. Water samplings for the measurements of suspended solid and spectral absorption by phytoplankton and coloured dissolved organic matter.
5. Water samplings and net samplings for a phytoplankton study.

6. Zooplankton samplings by a multi-opening/closing net.
7. Nekton samplings by a midwater trawl net.
8. Continuous surface monitoring of the water temperature, salinity, in vivo chlorophyll fluorescence, and size and concentration of zooplankton.
9. Collection of zooplankton with a continuous plankton recorder.

INFORMATION ON SURVEYS AND VESSELS

(Submitted by Australia)

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Vessel

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Survey area

Area north of the Terre Adélie and George V Land coasts, between approximately 135 and 146°E and south of 65°S. Known as the CAML Collaborative East Antarctic Marine Census (CEAMARC) survey area.

Survey dates

Ship departs Hobart on 30 November 2007 and returns on 30 January 2008. The CEAMARC Survey will occur between approximately 26 December 2007 and 23 January 2008.

Main purpose of survey

The voyage has three major components:

1. CASO (Climate in the Antarctic and Southern Ocean) CTD survey (27 days) between Hobart and DDU along SR3 Transect and two transect to the east of SR3 and south of 62°S (Figure 1).
2. GEOTRACES – with CASO.
3. CEAMARC survey of the demersal fish and benthic communities in support of CAML (20 days) (Figure 2).

Survey objectives/opportunities and logistics in relation to AMES

The CEAMARC survey is the Australian–French–Japanese collaborative contribution to CAML. Three ships are involved *Umitaka Maru* (Attachment F) conducting pelagic and mesopelagic sampling, *Aurora Australis* conducting physical and chemical oceanography, demersal and benthic sampling, and *l’Astrolabe* with supplementary inshore pelagic sampling. CAML will investigate the distribution and abundance of Antarctica’s marine biodiversity, how it is affected by climate change, and how change will alter the nature of the ecosystem services currently provided by the Southern Ocean for the benefit of humankind. It will provide a robust benchmark against which the effects of future change can be measured. Includes leaving legacy sites and transects. Approximately another 14 vessels are expected to participate in CAML.

Availability of ship-time, sampling opportunities and proposed logistics in support of the CCAMLR-IPY krill survey

No dedicated ship-time can be offered to CCAMLR-IPY. There will be no pelagic sampling on the *Aurora Australis*. The hydroacoustic system will be turned on but not manned. It will not be calibrated. Last calibration was in the 2005/06 season.

Survey equipment

EK500 with 38, 120 and 200 kHz split-beam transducers – uncalibrated.

There will be no krill or other plankton/pelagic nets on board.

Beam trawls 2.8 and 4.2 m wide – mesh size to be advised.

CTD – WOCE standard with 24 bottle (10 l) rosette. Casts will be made on SR3 transect at approximately 60–70 sites on the continental shelf between 135° and 146°E.

Water sampling will be collected for physical-chemical analyses, including nutrients and trace metals. Phytoplankton and pigments will also be studied.

Other sampling – epibenthic sleds, box grabs, side-scan sonar and underwater video recording.

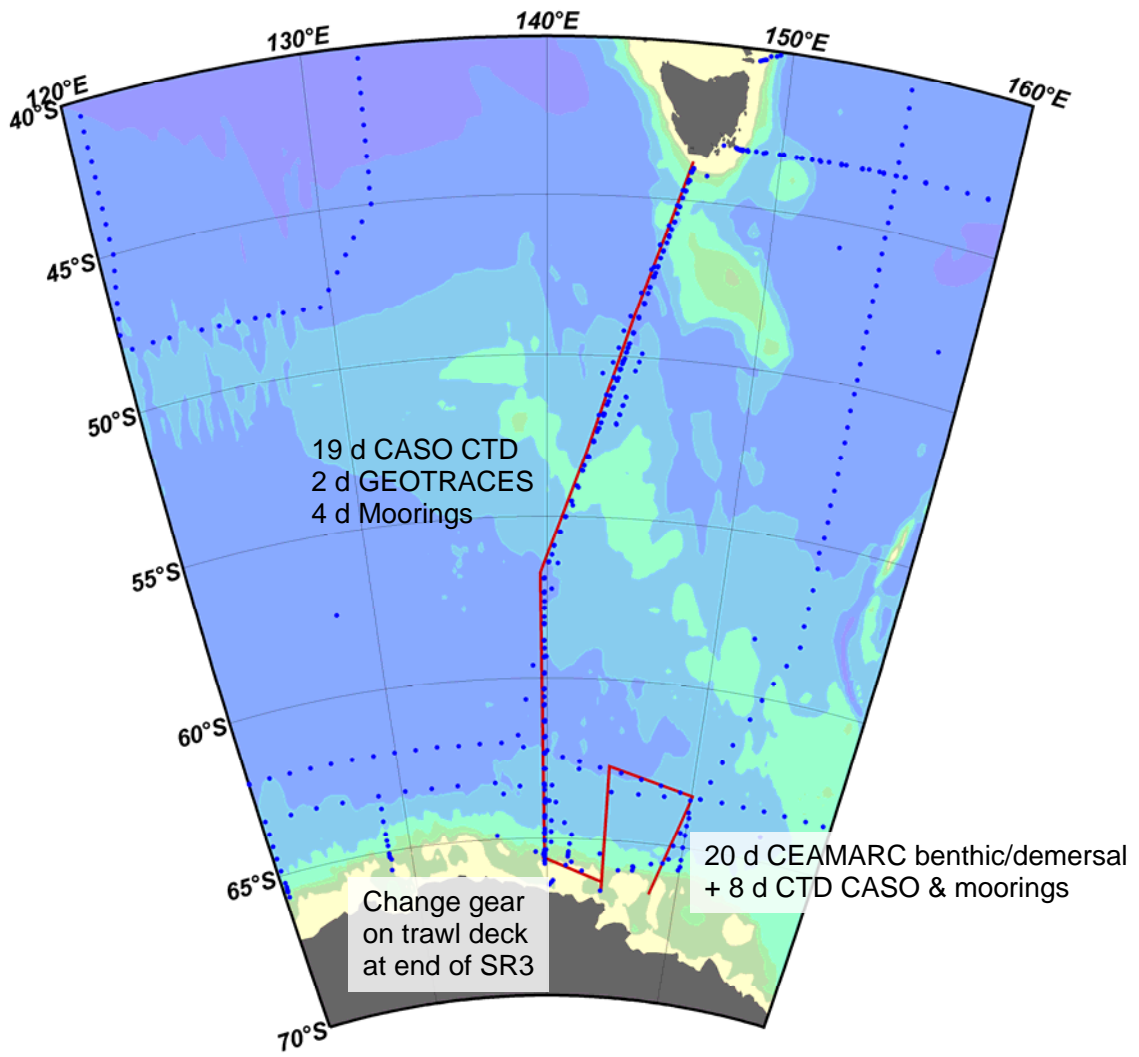


Figure 1: Cruise track for CASO CTD sampling (solid line).

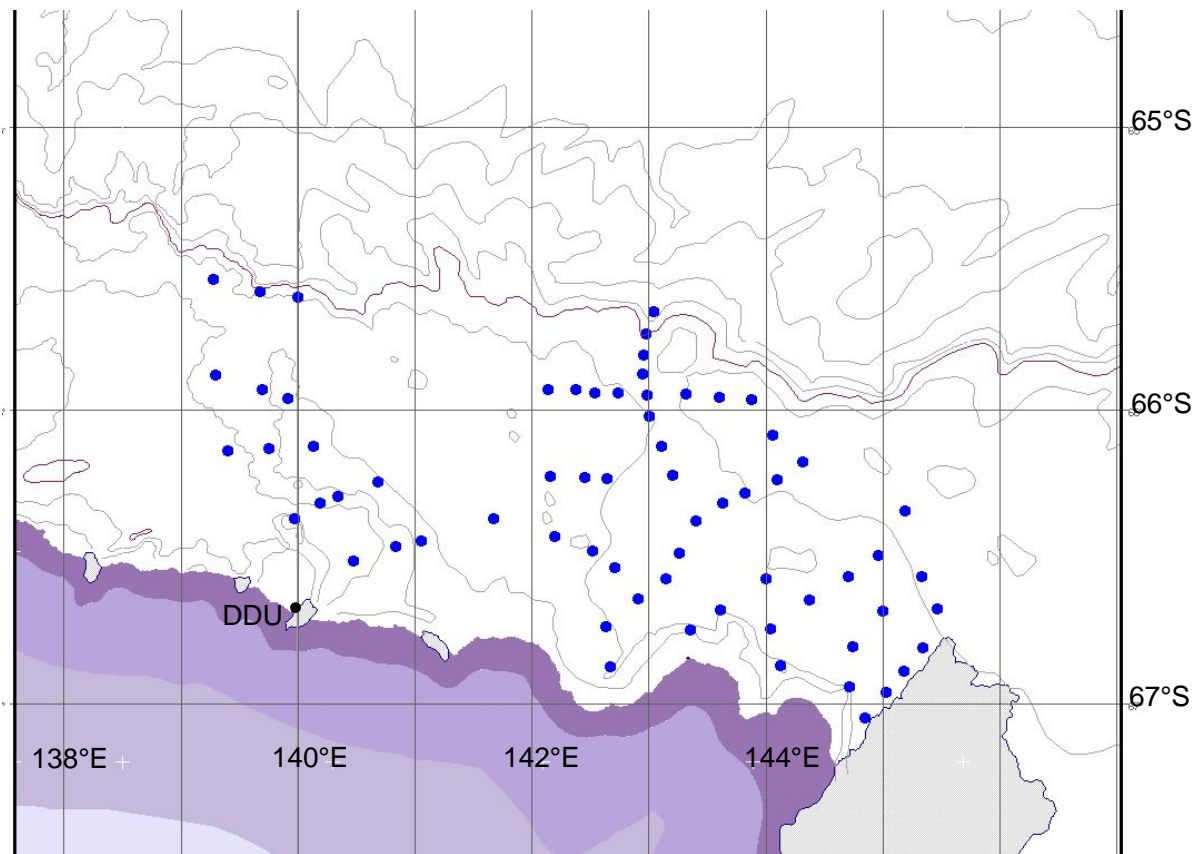


Figure 2: Proposed sampling sites between Dumont d'Urville and Mertz Glacier for demersal and benthic sampling using beam trawls, sleds and box grabs, plus video imaging. Exact sites are likely to change slightly.

ACOUSTIC SAMPLING PROTOCOLS

(Extract from the *Report of the Third Meeting of SG-ASAM – SC-CAMLR-XXVI/BG/2*)

**JOINT SESSION REVIEW OF THE ACOUSTIC SAMPLING PROTOCOLS
FOR KRILL FOR USE BY CCAMLR-IPY PROJECTS**

72. Mr S. Iversen (Co-convener, CCAMLR-IPY Steering Committee) welcomed participants to the joint session held on 2 May 2007 and outlined the background behind the formation of the CCAMLR-IPY Steering Committee.

73. At the start of the meeting four Members (New Zealand, Japan, Norway and Germany) had notified the CCAMLR-IPY Steering Committee of their intention to undertake surveys during IPY. Other Members (Argentina, Brazil, India, Italy) and Peru have previously expressed an interest in participation in CCAMLR-IPY surveys. In addition, Dr Watkins indicated that the UK will be undertaking acoustic survey work which will have relevance to IPY programs.

74. The joint session noted that these IPY surveys will have varied objectives under CAML, ICED and national programs and will not be part of a dedicated CCAMLR research program such as the CCAMLR-2000 Survey. Therefore acoustic protocols cannot be too rigorous and prescriptive.

75. Dr Watkins proposed hierarchical protocols to be inclusive of all IPY participants. He pointed out that even opportunistic acoustic observations may be valuable, especially in areas where there is little previous information (e.g. Bellingshausen Sea). The joint session agreed with this proposal.

76. The joint session noted that it is important to match the level of protocols with the study requirements. For example, qualitative description of mark types requires a lower level of equipment and protocols than quantitative analysis of backscatter. The most rigorous protocols are required for acoustic data used for biomass estimation and stock assessment.

77. The joint session agreed to a protocol framework that defined the minimum, desirable and optimal requirements for acoustic data collected during IPY surveys (Table 3). These categories correspond to the study requirements for descriptive analysis, quantitative analysis of backscatter and biomass estimation.

78. The joint session recommended that Members carrying out IPY surveys refer to, and follow, the acoustic protocols in Table 3. Protocols should be matched to the particular study requirements of the acoustic data. There may also be opportunities for collection of acoustic data from fishing vessels in CCAMLR waters and the joint session encouraged this collaboration. The joint session recognised that these protocols may be useful for other groups undertaking IPY surveys.

79. The joint session emphasised the need for centralised data archiving of raw acoustic data and metadata collected during IPY surveys. The joint session recommended that protocols and arrangements for data archiving be discussed and agreed between relevant IPY parties (e.g. CAML, CCAMLR, ICED).

80. The joint session did not specifically address protocols for acoustic data processing from IPY surveys. It recommended that a future workshop should be held with all interested parties to discuss processing of data from IPY surveys in general, as well as specific CCAMLR study requirements (e.g. krill biomass estimates).

Table 3: Recommended protocols for acoustic surveys in CCAMLR-IPY projects.

Study requirements	Descriptive	Quantitative analysis of backscatter	Biomass estimations
Frequency	Any, single	Single or multiple; preferably 38 and 120 kHz with 70, 200, 18 or others.	38 and 120 kHz essential; others (e.g. 70, 200, 18) desirable
Calibration* ¹	Instrument recently calibrated	Calibrated within survey period; record raw calibration files and data.	Multiple calibrations in survey period; history of stable performance
Echosounder settings	Documented	Power* ² (25 kW m ⁻²) Pulse length 1 ms Ping interval ≤4 sec	Power* ² (25 kW m ⁻²) Pulse length 1 ms* ³ Ping interval optimised for study requirements
Data depth	Sea floor or minimum of 1 000 m	Sea-floor or minimum of 1000 m	Sea floor or minimum of 1000 m
Noise		<90% good pings triggers remedial action (e.g. slowing speed, locating and eliminating source of noise)	Minimise noise. Noise recordings required
Ancillary data	GPS	GPS Meteorological data	GPS Transducer motion Meteorological data Record relative (3-D) position of transducers
System integration	Time synchronised	Synchronised acoustic systems or turning off interfering equipment	Synchronised acoustic systems or turning off interfering equipment
Data format	Raw, un-thresholded ping-by-ping sample data	Raw, un-thresholded ping-by-ping sample data	Raw, un-thresholded ping-by-ping sample data
Survey type	Opportunistic	Transect(s)	Designed survey
Additional acoustic-related data			<i>In situ</i> and/or <i>ex situ</i> TS measurements; parameters required for TS model (e.g. observations on tilt; density and sound-speed measurements)
Biological sampling		Target and/or stratified net hauls	Target net hauls with opening and closing nets
Biological sample processing		Species composition	Species composition; length-frequency data for target species; length-weight relationship for target species
Oceanographic data	Typical salinity and temperature data required for calibration	Observations of temperature and salinity to sampling depth during cruise	Multiple, on-transect measurements of temperature and salinity to sampling depths
Vessel speed		Constant speed if possible	Constant (optimised for survey coverage and to minimise noise)

*¹ Calibration should be undertaken using standard methods (Foote et al., 1987) with sphere at a depth of 15–25 m below transducer and be fully documented.

*² Maximum power should not exceed 25 kW m⁻². Recommended power settings: 18 kHz with 11° beam angle (2 kW); 38 kHz (2 kW); 70 kHz (750 W); 120 kHz (250 W); 200 kHz (110 W); 333 kHz (40 W) all with 7° beam angle. Source Korneliussen et al. (2004).

*³ A shorter pulse length will be necessary for *in situ* target strength measurements.