Report of the planning meeting for the 2007/08 IWC/SOWER cruise and future cruises

Contents

Part B. Future cruises

1. OPENING REMARKS AND WELCOMING ADDRESS

The meeting was held at the Tokyo University of Marine Science and Technology, 29 September – 3 October 2006. The convenor, Kato, welcomed the participants.

On behalf of the Japanese Government, Moronuki welcomed all participants, including visitors from overseas. He referred to the Japanese Government's concerns that political confrontation within the International Whaling Commission had led to it becoming dysfunctional in the context of the objectives and provisions of the International Convention for the Regulation of Whaling under which the IWC and its Scientific Committee are established. Given his Government's concerns he expressed his sincere wish that the SOWER cruises should conduct fruitful and constructive scientific discussions.

On behalf of the IWC, Donovan noted that it was not appropriate for him to comment on political issues. He thanked the Government of Japan for once again generously providing the vessel and crew for the SOWER programme. The Commission and its Scientific Committee attach great importance to this cooperative programme and hope it will continue into the future.

Meeting participants are listed in Annex A.

2. APPOINTMENT OF CHAIR AND RAPPORTEURS

Kato was elected chair.

Bannister and Ensor acted as rapporteurs, with assistance from others where appropriate.

3. ADOPTION OF AGENDA

The agreed agenda is given as Annex B.

4. ORGANISATION OF THE MEETING

It was **agreed** that the first three days, 29 and 30 September and 1 October, would be devoted to discussion of the 2007/08 cruise, especially collaboration with the sea ice aerial survey component (Part A of this report). Options for the future SOWER programme, i.e. beyond 2008, would be discussed on the fourth day, 2 October (Part B of this report). A final day, 3 October, was available for completion of the meeting report.

5. REVIEW OF AVAILABLE DOCUMENTS

A list of documents available appears as Annex C.

A. The 2007/08 Cruise

6. REVIEW OF PLANNING DISCUSSIONS FOR THE 2007/08 CRUISE AT IWC59

The meeting reviewed the Scientific Committee's discussions at its Anchorage meeting, in particular IWC/59/Rep1 Items 10.1, 10.6.6 and 10.12, as well as Annex G, Item 5 and Appendix 2, and recommendations for the 2007/08 cruise. It noted that this planning meeting would focus on collaboration with the proposed Australian aerial survey to be operated from Casey Station, mainly within the ice, in December-January. Target species and the general order of priority would be the same as in previous cruises; the general strategy was as detailed in Annex G, Appendix 2, item 5.6. A contingency plan would be necessary should the survey not take place.

7. AVAILABILITY OF RESEARCH VESSELS

7.1 Research vessels offered by Japan

As last year, because of continuing financial constraints, only one vessel could be provided this year.

On behalf of the IWC, Donovan thanked the Japanese Government for providing the one vessel and crew, recognising that this represents a substantial cost.

7.2 Other possibilities

Donovan thanked the Government of Australia for making possible the aerial survey collaborative work. He stressed the importance of continuing to seek collaboration with other groups, such as CCAMLR and SCAR.

8. PRIORITIES FOR THE CRUISE

Given the discussions under Item 6 above, the meeting **agreed** that highest priority should be given to the collaborative study with the aerial survey. It was **agreed** that a small subgroup under Donovan should undertake an in-depth consideration of the potential priority items discussed at the Anchorage meeting (IWC SC59: Annex G, p3 and Appendix 2). The report of that sub-group was accepted by the full group and is incorporated into this report under Items 8, 10 and 11.

8.1 BT Mode

BT mode experiments in SOWER have two separate purposes. First, they can help with estimating abundance from the existing SOWER data, and provide an independent check on estimates made by other methods, which have to make extra assumptions. Second, BT mode provides a possible approach to future SOWER cruises which could allow simpler and more robust analysis methods to be used in future.

BT mode survey during the 2006-07 cruise included BT Option-II trials conducted during two days to investigate its feasibility as a method on future cruises. The following protocol was followed:

- the 'primary platform' consists of two observers in the IOP searching with naked eye (one-way communication to upper bridge);
- the 'secondary tracking platform' consists of the topmen searching as normal with 7x50s, but tracking their sightings until the sighting is abeam (two-way communication with upper bridge);
- the upper bridge acts as an additional tracking and duplicate-ID platform.

The method was easily implemented during the cruise and a substantial amount of data was able to be collected during two days of trials in an area of relatively high sighting rate of minke whales. A preliminary analysis of the experiment (SOWER/07/WP15) showed very encouraging results and the meeting **agreed** to relay thanks to its author (Burt, St Andrews). Furthermore it was **agreed** that a more in-depth analysis, incorporating consideration of measurement errors be undertaken prior to the 2008 Annual Meeting.

The 2006-07 trials were undertaken in an area of reasonably high sighting rate of minke whales and in a range but mainly good weather conditions; therefore additional trials in areas where sighting rates are lower and increased sample sizes from survey in poorer conditions would allow future analyses to include environmental covariates. As a result, the meeting **agreed** that further trials of BT Option-II would be undertaken on the 2007-08 cruise. This is also relevant to Section B of this report on the Future of SOWER.

8.2 School size estimation

SOWER/07/WP18 (included as Annex E to this report) presents a comparison of the results obtained during SS-III and SS-II trials during the 2006-07 cruise.

- SS-III mode is conducted using normal IO-mode sighting and tracking protocols (including school size estimation) until a sighting is judged likely to be abeam of the vessel, and then to attempt closing on the sighting to check and confirm the actual school size.
- SS-II mode uses normal Passing (NSP) sighting and tracking protocols followed by an abeam-closing protocol as for SS-III.

The data from SS-III and SS-II survey certainly provide more useful information for abundance estimation than the data from normal closing mode (NSC). Since school size data obtained during SS-III mode are directly comparable with those from IO mode, this suggests using SS-III as a replacement for NSC in future. However, the difficulty with SS-III is that the crew rotation schedule is the same as for IO mode and the same guidelines for the amount of continuous survey in IO mode apply (i.e. continuous survey in this mode should not exceed 100 nmiles). Therefore, given the current logistics of SOWER, it is not feasible to survey in alternating IO mode and SS-III mode (instead of IO mode and NSC mode).

Data from SS-II are no more difficult than NSC in terms of crew schedules. Although sample sizes were small, the results of SOWER/07/WP18 demonstrate that there was no evidence that SS-II will give different results about school size under-estimation that SS-III. Since the SC had recommended that NSC be replaced with an abeam-closing protocol (such as SS-III

or SS-II), it was **agreed** that, as it was logistically simpler than SS-III, the SS-II mode protocol would be used as a replacement for NSC on this cruise.

8.3 Visual dive time

The data from the visual dive time experiments in 2004/05 have already proved useful in guiding the simulation tests of abundance estimation methods. Most of the data were collected under good conditions and from school sizes greater than 1; therefore it was **agreed** that it would be useful to have more data particularly from solitary animals (in all conditions) and from a range of group sizes (in poorer conditions). It was suggested that conducting the experiment on solitary animals in poorer conditions may be very difficult and therefore it was **agreed** that it would be more efficient in terms of gathering data for the simulated data sets to initially attempt experiments on solitary individuals in good conditions. This work is valuable both in terms of obtaining abundance estimates from previous cruises and for evaluating methods for future SOWER cruises (see Section B of this report).

8.4 Biopsy sampling/photo id

The meeting welcomed progress reports on cataloguing of blue whale photo-ID sightings, from the 2006-07 cruise (SOWER/07/WP9) and for all cruises (SOWER/07/WP10). This is the first stage in examining all blue whale photographs from IDCR/SOWER cruises from 1987/88 to the present.

For the 20070/8 cruise the priority species for biopsy studies and photo id (blue, fin, humpback and right whales) remain unchanged from recent cruises.

Although not part of the planned research, during the 2006-07 cruise, Antarctic minke whales were photographed opportunistically during normal closing mode procedures to examine their potential for photo-identification studies. Discussion of the appropriateness of this had proved somewhat controversial during the 2007 Annual Meeting and the matter had been referred to the Planning Meeting where again there was a lively debate on this issue. After considerable discussion the points listed below were agreed.

(1) Potentially, valuable scientific information can be gained from photo-identification studies. This includes: the estimation of abundance and certain biological parameters such as survivorship using mark-recapture analytical techniques; information on movements and site fidelity which can prove valuable in understanding stock structure and aid in the interpretation of abundance estimates obtained using other methods; additional information towards the verification of school size.

(2) For some of these (e.g. estimation of abundance), theoretical studies can be undertaken to estimate the sample sizes necessary to obtain estimates of a suitable precision and information from previous work such as that carried out in 2006/07 as well as in the 1980s to determine the level of effort required to obtain such sample sizes.

(3) For other studies (e.g. movement and site fidelity), even small sample sizes can provide valuable information.

(4) The value of photo-identification studies increases with the length of the time series and the size of the samples.

(5) The 2006/07 study showed that suitable photographs can be obtained during normal closing mode without interfering with the sightings survey data collection or causing delay in the progress of the vessel.

(6) Such data can be collected at no extra financial cost.

(7) If it proves feasible to obtain suitable photographs during the aerial survey component, comparison of such photographs with photographs taken from the vessel may provide information on movements of animals within and outside the pack ice.

It was **agreed** that if photo id of minke whales was undertaken opportunistically on the 2007-08 cruise (as on the 2006-07 cruise), this would not use any additional research time and would not interfere in any way with the priority items of research. While there was no guarantee of success, given the potential benefits for short and long term research work on minke whales and the potential to increase our knowledge of this species, the meeting **agreed** that minke whale photo-identification should be undertaken on an opportunistic basis at the discretion of the Cruise Leader, **provided** that it did not interfere with the priority research work.

The meeting asked the Liaison Group established under Item 11.2 to consider further the technical issues surrounding the viability of obtaining suitable photographs from the aircraft.

The meeting further **recommended** that a review of the usefulness of photo-identification work on Antarctic minke whales be undertaken during the year and presented at the 2008 Annual Meeting. Such a review should incorporate the information obtained from the 2006/07 cruise as well as previous cruises. Where appropriate (e.g. for abundance estimation) the review should address the question of suitable sample sizes and the effort required to obtain them. This review will also assist in the discussions of 'Future SOWER' (see Section B of this report).

8.5 Acoustic studies

The Scientific Committee **agreed** that acoustic studies on the target species be undertaken on this cruise as on recent cruises; this could be particularly useful for potentially distinguishing 'Antarctic' from pygmy blue whales. It was **agreed** to continue opportunistic, but high-priority, deployments of sonobuoys particularly in the presence of blue whales. It is anticipated that modifications to the acoustic receivers to ensure that the equipment is capable of direction-finding will be completed prior to this cruise, and this may provide an opportunity for using this equipment for locating blue whales for photo-ID and biopsy sampling. This is also of relevance to Section B of this report.

8.6 Direct data entry

The advantages of utilising a direct data entry system are obvious, however in the light of the problems encountered on recent cruises during attempts to use direct data entry systems developed for other research programmes it was **agreed** not to attempt direct data entry during this cruise. Furthermore, due to the substantial modifications to survey protocols being evaluated recently, it was **agreed** that it is better to postpone development of a direct data entry system until such time as standardised methods have been adopted. This is also relevant to Section B of this report.

8.7 Collaboration with aerial survey (including contingency plan)

At the 2007 Annual Meeting, the Committee was pleased to receive information on a proposed aerial survey within and outside the ice to be undertaken by the Australian Antarctic Division (SC/59/IA2); this was a follow-up to SOWER/06/WP21 discussed at the planning meeting last year. Additional information is provided in SOWER/07/WP16. It was noted that collaboration between this survey and the SOWER cruise was allocated high priority as it would address priority item 3 from the Workshop on Future SOWER cruises (IWC, 2006; *JCRM* 8(suppl.): 303-12) with respect to providing information on minke whales in the ice – this is relevant to both interpretation of past cruise data and the design of future SOWER cruises.

In summary, there will be two planes available (logistics permitting) from mid-December to mid-January. If weather and other problems prevent the observers reaching Casey Station by around 25 December, the survey will have to be abandoned. The aim is to cover a minimum of 2,500 n.miles on effort within an area bounded by 105-120°E, 62-66°S. Effort will be distributed over open water and up to 5/10 ice cover. The primary search method will be double platform visual with two observers on each side of the plane (i.e. 4 in all) who will search and record independently. The survey will be conducted at 200m (about 656ft) and a speed of around 222km hr^{-1} (120kts). Unfortunately it was not possible to fit bubble windows to the aircraft which means that an area under the plane will not be searched. Data will be collected to allow for cue counting and line transect analyses. In addition, high definition video and infrared cameras will be fitted as part of a feasibility study. Ice cover will be captured via 35mm still camera.

Discussions at the 2007 Annual Meeting (IWC/59/Rep1, Annex G Appendix 2) had suggested that the aircraft should survey and obtain density estimates for the number of animals both within the ice and an open water area north of the ice. The SOWER vessel would survey the same open water area. If sufficient sample size is obtained then this should in principle allow calibration of the aerial and vessel surveys. The vessel would also survey further north (perhaps to up to 60°S). Sample size permitting, this should allow comparison of densities among the northern, southern strata and within-ice strata.

At the present meeting, discussions focused on the following issues: (a) areas to be covered by the vessel and aircraft; (b) time period and effort allocation by the vessel; (c) survey mode; and (d) cruise track design.

Area. It was agreed that the primary research area would range from 105°-120°E. The southern stratum for the vessel would cover the area 60n.miles from the ice edge and the northern stratum would comprise waters up to 180n.miles from the ice-edge (based on the 'average' location of the ice-edge in recent years this is around 62°30'S). The determination of the northern boundary was largely determined by the amount of time available to the vessel for the simultaneous component of the cruise as discussed below). The aircraft will survey the area from the coast to the ice-edge and also the southern stratum.

Time period and effort allocation by the vessel. For logistical reasons, it is not possible for the vessel to arrive at the research area before 31 December and it is not possible for the aircraft to survey in the research area beyond about 15

January. Ideally the vessel and aerial surveys should be simultaneous. However, given the longitudinal extent of the survey area and the searching speed of the vessel, it was agreed that the vessel would schedule 21 days for the 'simultaneous' survey. Consideration had been given to reducing the longitudinal range but it was agreed that this would give a too limited coverage. The amount of ship time to be allocated to each stratum was determined by examining the average encounter rates from previous SOWER and JARPA cruises and trying to ensure that sufficient coverage was allocated to give a reasonable chance of at least 15-20 sightings would be obtained (to enable reasonably precise density estimates to be obtained) – and see Item 10.1.

*Survey mode***.** It was agreed that the 'standard' protocols will be followed i.e. alternating passing (IO) and closing (SSII) modes (and see Item 11.1.2) during the collaborative survey period. Within this period a maximum of two days can be spent on photo-identification, biopsy sampling and, where appropriate, acoustic work on blue, humpback and right whales, at the discretion of the cruise leader. Photo-identification of Antarctic minke whales can be undertaken during closing mode surveys provided that this does not interfere with or delay the sightings survey work (and see Item….).

*Cruise track design***.** The limited time available for the collaborative survey meant that it was not possible to use the 'standard' zig-zag design. A number of alternative designs were discussed. The final design agreed is discussed under Item 11.1.1.

Contingency plan
It was **agreed** that in the event that the aerial component could not be undertaken for logistical reasons, it was still appropriate for the vessel component to be undertaken as planned. Not only would this provide valuable information for an area which may be a future target of aerial surveys, but the comparison allowed by covering the same area in reverse later in the cruise (see Item 11 below) would still be informative.

8.8 Other matters
SCANS-II equipment was used on the 2006/07 cruise to collect data related to distance and angle measurements from the Big eyes and from the observers in the Top platform. However few minke whale blows were detected on video from the Top platform (SC/59/IA25). The main reason for the paucity of blows recorded appeared to be related to poor image quality and the characteristics of minke whale blows. With respect to the continuing concerns related to SOWER distance and angle estimates, the SC recommended that more data related to distance and angle measurements should be obtained on the 2007/08 cruise using at least some components of the SCANS recording system. In particular, additional distance measurements using the video system attached to the 7x50 binoculars in the Top platform were required, as well as bearing measurements. It was **suggested** that possibly the best option for this cruise was to obtain measurement of bearings and ranges for one observer (rather than a more complex and expensive system for two observers). Improved equipment would be required for this experiment including a high definition video camera; allowance had been made in the budget for this.

Donovan and Ensor will liaise with Leaper on this matter.

9. REVIEW OF THE BUDGET

Donovan reported that the original proposal totalling £67,754 (SC/59/Annex G, Appendix 2) had been approved by the Commission. He noted that the fact that no attempt had been made to reduce the budget reflected the importance the Commission attached to the SOWER programme. Several items had already been acted upon, including repairs to the biopsy guns and provision of computers; sufficient funds were available to meet the expenses of the cruise.

10. CRUISE PLAN

10.1 General priorities, including allocation of research effort
The meeting reviewed the general priorities for the cruise in light of the priority items developed at the 2007 Annual Meeting and the discussions under Item 8.

A small group under Ensor developed a cruisetrack plan to be used by the ship during the collaborative survey with the aircraft. The plan was developed in relation to a mean ice edge derived from satellite imagery from the area 105°-120°E for the years 1992 – 2002.

It was recognized that the timing of the ship-based survey should be synchronized as closely as possible with the aerial survey (during approximately 15 days) and surveys from both platforms would have the same longitudinal coverage (105°-120°E) as determined by logistic constraints of the aircraft. It was apparent that the ship survey would require a longer

duration (an additional 7 days, approximately) than the aircraft survey in order to adequately cover the area of overlap with the aircraft, as well as surveying further north.

The area covered by the ship will be divided into two strata: a southern stratum and a contiguous northern stratum.

The width of the southern stratum (extending approximately 60 n.miles north of the ice edge) was chosen to ensure that its entire area is within range of the aircraft, as both the aircraft and ship will survey this stratum.

The width of the northern stratum (to be surveyed only by the ship) was established at 120 n.miles and the time allocation to strata (11 days in the northern stratum and 10 days in the south) was decided based on the requirement of achieving an adequate sample size of minke whale sightings in each stratum (at least 15 sightings). Factors considered were: the expected encounter rates for minke whales in the southern stratum (derived from JARPA, as presented in SOWER/07/WP08) and in the relevant part of the usual northern stratum (also derived from JARPA); an average trackline coverage achievable per day (53 nmiles based on previous SOWER data) and the anticipated number of survey days.

In the northern stratum (120 n.mile width and surveyed during 11 days) about 15 minke whale sightings are anticipated, in the southern stratum (60 n.mile width and surveyed during 10 days) about 40 minke whale sightings are expected. The preference was for about this balance of sightings between strata (with more sightings in the southern stratum than in the north) because, importantly, the southern stratum was the region of overlap with the aerial survey and a higher number of sightings would facilitate cross-calibration of sighting rates between the two platforms.

It was agreed that this plan for the ship survey could only be regarded as provisional due to the substantial inter-annual variability of the ice edge location and concentration of the pack ice in this region as indicated by satellite imagery.

10.2 Itinerary
The following itinerary was confirmed:

DATE	EVENT
3 December 2007	Depart Shiogama, Japan
21 December 2007	Arrive Fremantle, Australia
24 December 2007	Depart Fremantle
31 December 2007	Arrive at ice edge to commence minke whale research area
14 February 2008	Complete minke whale research and commence transit to Fremantle
21 February 2008	Arrive Fremantle
24 February 2008	Depart Fremantle
13 March 2008	Arrive Shiogama, Japan

Following discussion under Item 11.1, the 46 days in the research area were allocated as follows:

- 21 days to the collaborative survey with the aircraft
- 21 days to resurvey of the longitudinal range covered during the collaborative survey
- 3 days for blue whale and right whale research
- 0.5 days for angle and distance estimation experiments
- 0.5 days for minke whale visual dive time experiments

In addition, at the discretion of the Cruise Leader, biopsy sampling and photo-identification may be undertaken on other species (see Item 12.2.3).

10.3 Survey area
As proposed at the Anchorage meeting, it was **agreed** that the SOWER research would be synchronized within the same longitudinal area as the Australian Antarctic Division aerial survey. The research area will be in Area IV between longitudes 105°E and 120°E. The SOWER vessel will survey an area extending from the ice edge to approximately 180 n.miles north. Provided the position of the ice edge is about average this should provide approximately 60 n.miles overlap with the aerial survey.

There will not be sufficient time available for the SOWER vessel to simultaneously cover the entire area between the ice edge and the standard SOWER northern boundary at 60°S. Given average ice conditions it is anticipated that the northern extent of the SOWER survey will be at approximately latitude 62°30'S.

10.4 Research vessel

As noted above, it was confirmed that the research vessel *Shonan Maru No.2* will be provided by the Japanese Government for the 2007-08 cruise.

11. DETAILS OF THE CRUISE

11.1 Standard sightings

11.1.1. Cruise track design and Itinerary

A provisional cruise track plan was developed in relation to a mean ice edge derived from satellite imagery from the area 105-120°E for the years 1992 – 2002.

The survey will commence at 105°E and proceed eastward to 120°E. The vessel will then resurvey the area in the reverse direction.

The area covered by the ship will be divided into two strata: a southern stratum and a contiguous northern stratum. The Interstratum Boundary will be constructed in relation to the ice edge to ensure a consistent southern stratum width of 60 n.miles. The Interstratum Boundary will be constructed either on a line of latitude (if the ice edge is oriented roughly east-west) or as a locus of points equidistant from the ice edge (if the ice edge line has a large north-south variation). The cruisetrack in the Southern Stratum will be a zigzag design with survey coverage spread as evenly as possible by longitude. Due to the limited time available, coupled with the requirement to cover the entire 120 nmile width of the northern stratum tracklines in the northern stratum would not follow a zigzag pattern but will be constructed as perpendicular bisectors of the southern stratum tracklines. The tracklines in the northern stratum would be surveyed in both directions. An example of the cruisetrack design is shown in Fig. 1. A similar process will be used to design the return tracklines.

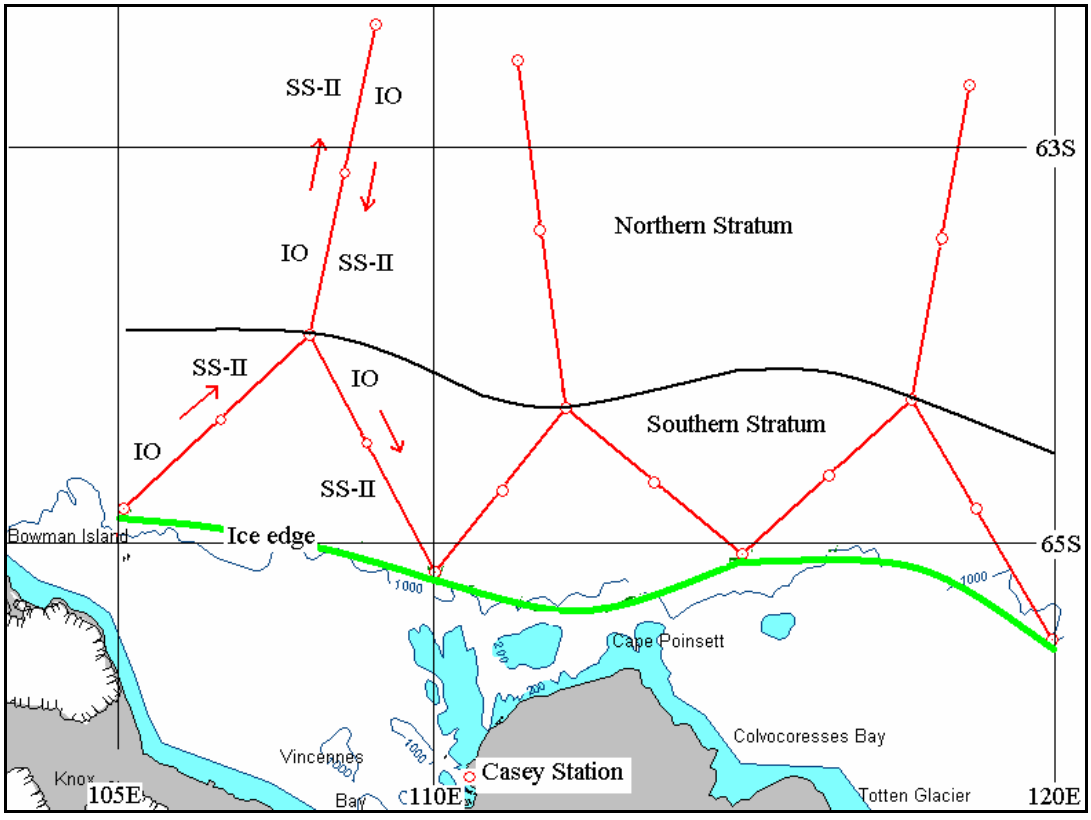

Fig.1. Provisional cruisetrack design for the *Shonan Maru No.2* during the collaborative research with the aerial survey. In this example the cruisetrack is constructed in relation to a locus Interstratum Boundary. The pattern of mode alternation is indicated only for the first three transects.

11.1.2 Survey mode and research hours

COLLABORATIVE SURVEY

The SOWER vessel will survey in alternating IO mode and SS-II mode during the collaborative survey using the normal guidelines for construction of mode change waypoints (including *inter alia* no more than 100 n.miles surveyed continuously) (see Figure1).

During survey in SS-II mode, normally closure will only be completed to whales that are believed to be minke whales.

RESURVEY

During the planned re-survey of the area following completion of the collaborative survey, the same principles will be used to construct the cruisetrack. Survey will be conducted in alternating BT option-II mode and SS-II mode.

For survey in BT Option II the duties of the TOP and IOP observers will be essentially the same as for normal IO mode. Therefore, with respect to the amount of time for continuous survey in this mode, normal IO mode guidelines will apply.

During survey in BT option-II mode normally only whales that are believed to be minke whales will be tracked.

RESEARCH HOURS

Research hours during the cruise will be the same as on recent SOWER cruises. During days when survey is conducted in IO mode (including BT option-II), research will be scheduled between 0600-1900 hours and there will be provision for two meal breaks each of 30 minutes duration. When, due to conditions unacceptable for the sightings survey, the vessel is waiting on an IO mode or BT option-II mode segment of the trackline, meal breaks will be treated in the same manner as if the vessel is surveying.

When surveying in SS-II or NSP (passing) modes are the only activities of the day, research will be conducted between 0600-1800 hours.

For priority species (such as blue whales), it may be beneficial to extend research outside the normal research hours as during recent cruises. The basis for such special extension of research hours will involve mutual agreement between the Captain and Cruise Leader and, as during the last cruise, an allocation of equivalent time-off the following morning or evening.

Limited night steaming may be conducted. Night steaming will be restricted to a maximum of 30 nmiles per day and should always be completed prior to midnight.

The research day in transits will begin 30 minutes after sunrise and end 30 minutes before sunset, with a maximum of a 12-hour research day.

If necessary, time-zone changes will be in 30-minute intervals, coming into effect at midnight.

11.1.3 Number of crew on effort

Two crewmembers will be in the barrel whenever full searching effort is conducted. One crewmember will be in the Independent Observer platform whenever the IO mode is conducted. One crewmember will be at the helm on the Upper Bridge, regardless of the research mode. Also present on the Upper Bridge, whenever the sighting survey is conducted, will normally be the captain and chief engineer (or an alternate).

This is the same number of observers per platform as on previous cruises and again, in the interests of standardised data collection, the number of observers on the Upper Bridge is to be limited as above. As last year, observers should not search from the Upper Bridge during their scheduled rest periods. They may visit the Upper Bridge on a casual basis during their rest periods, but must not inform the on-effort observers of any sightings they may make, until such sightings have passed abeam, unseen by any of the on-effort observers.

There will be four researchers on the vessel. During survey in SS-II mode, the number of researchers searching from the Upper Bridge should be standardised at three. During the SS-II trials the fourth researcher will primarily be involved with supervision of the SCANS equipment on a rotational basis.

During the BT option-II trials, unlike during normal IO mode, there should be two observers in the IOP, one crew observer and one researcher. (In normal IO mode there is only a solitary observer in the IOP, since normally the number of available observers is insufficient for the rotation of two observers through this platform).

11.1.4 Navigation and research speeds

Research during transit will be conducted at an average speed of 11.5 knots.

In general, surveying in the research area will be conducted at an average speed of 11.5 knots although in NSC mode, the vessel will usually close to sightings at 15.0 knots.

11.1.5 Acceptable conditions

Search effort for minke whales will be conducted only when the Cruise Leader believes that sighting conditions are acceptable. The usual Guidelines for acceptable conditions apply, i.e. visibility (to see a minke whale) is greater than 1.5 nmiles and wind speed is <25 knots (in the vicinity of the ice-edge) and <20 knots (remote from the ice-edge); the sea state should be <Beaufort 6.

11.1.6 Estimated Angle and Distance training and Experiment

Although it was recognised that as with last year, alternative methods of assessing error and bias in estimated angles and distances may be available for this cruise (for example the modified SCANSII equipment), it was **agreed** that the normal estimated distance and angle training exercise and experiment is essential. This experiment is designed to calibrate and identify any biases in individual observers' estimation of angle and distance.

A training exercise will be conducted on a priority basis near the beginning of the minke whale component to familiarise the observers with distances, angles, and the use of reticle binoculars and angle boards. The exercise uses the estimated distance and angle experiment procedures, except that several observers can make estimates at one time, and the observers are informed of the radar values in each trial. The exercise should be done with the ship underway. The number of trials conducted is at the discretion of the Cruise Leader. It was agreed that the training exercise and experiment should also be include trials with observers stationed in the IOP making naked eye observations as for BT Option 2.

The experiment will again be conducted this year during the minke whale component following the same procedure as on recent cruises.

Table 1

The Cruise Leader should select, at random, distances from six of the following seven ranges:	Similarly the angles should be selected, at random, from six of the following seven trials:
(n.mile)	(degrees)
0.00 - 0.25	00 - 10 two trials
0.26 - 0.50	11 - 20 two trials
0.51 - 1.00	21 - 40 two trials
1.01 - 1.50	41 - 60 one trial
1.51 - 2.00	
2.01 - 2.50	
2.51 - 3.00	

A large buoy with a radar transponder is used as the sighting target. At pre-determined distances and angles from the buoy (Table 1), visual observations by the observers are taken simultaneously with radar readings. Six trials per observer, per sighting platform, are scheduled. Observers should be tested from platforms where they normally conduct sighting effort and should use the same procedures and equipment as in their normal sighting procedures. The experiment should be conducted during weather and sea conditions representative of the conditions encountered during the survey.

11.1.7 BT mode

Survey in BT option-II will be conducted on this cruise in accordance with the recommendation of the Scientific Committee to examine potential methods for future survey. During the planned re-survey of research area following completion of the collaborative study, survey in BT option-II will alternate with SS-II mode. Thus, potentially about 50% of the constructed trackline will be covered using BT option-II during the 21 days allocated to the re-survey.

The protocol for BT option-II mode survey as documented in the Instructions for Researchers will be the same as used during the 2006-07 cruise.

11.1.8 School size estimation

It was **agreed** that instead that Closing mode (NSC) will be replaced with SS-II (abeam closure from Passing mode), to investigate the important question of the difference between confirmed school sizes of minke whales (normally obtained during Closing Mode) and unconfirmed school sizes (mainly obtained during Passing Mode) will be undertaken during this cruise. Although the protocol of the experiment will be the same as the SS-II trials conducted during the 2006-07 cruise, abeam closure will only be attempted on sightings believed to be minke whales.

The protocol for survey in SS-II mode is documented in Instructions for Researchers.

11.1.9 Visual Dive Time

The purpose of this activity is to collect data on the surfacing rate of minke whales for use in estimation of $g(0)$ and to assist in developing realistic simulated datasets. Whilst VHF telemetry provides biological surfacing rate data for individual animals, visual recordings are useful since they provide data on cue availability in different weather conditions and for different school sizes, as well as on school synchrony and dive behaviour.

Research time has been allocated to the dive time experiment on this cruise. Dive time data collected on the 2004-05 cruise were restricted to observations in good conditions only (mainly sea states 0, 1 and 2 on the Beaufort scale). Emphasis during this cruise should be on conducting trials on a range of group sizes in poorer conditions, within the standardized range of acceptable searching conditions (sea states 3 and 4). As there were few successful trials on solitary animals during the 2004-05 cruise, it was **agreed** that trials on solitary animals should have priority this year and that initial emphasis should be for trials on solitary animals under the good weather conditions.

The protocol for the visual dive time experiment will be unchanged from recent cruises.

11.1.10 Data format

The survey will be conducted using the same data forms as on the last cruise. Donovan will provide to ICR the Data Records and Usage notes as soon as possible.

11.1.11 Computer Data Entry

In the absence of a customised direct data entry system, it was **agreed** that trials with direct entry of data would not be conducted on this cruise. It was **agreed** that input of effort, weather and sightings data would be completed using the Moon Joyce program.

11.1.12 Biopsy sampling

Three days of research time has been allocated to research on blue and right whales to include biopsy sampling and photo-identification.

Within the period allocated to the collaborative survey with the aircraft, biopsy sampling should be restricted to a total of two days.

As appropriate and decided by the Cruise Leader, time will also be allocated for biopsy and photo-identification of humpback and fin whales.

Opportunities should be taken for collection of biopsy samples from sperm and killer whales and other 'incidental' species during the normal process of confirming species identification and numbers, or if animals approach the vessel while off-effort.

Photo-identification studies should be conducted at the same time as the biopsy sampling. Priority species are blue, humpback and right whales, in that order of priority.

Photographs of killer whales can also be taken on an opportunistic basis. Their purpose is not primarily for use in photo-identification studies but as an aid for the development of a visual recognition key for the three killer whale forms known to occur in the Antarctic. It is important to take photographs of animals from which biopsy samples are obtained, to determine their type.

Photographs will become the sole property of the IWC. Dedicated camera equipment will be supplied. (Researchers must use their own film and camera equipment for private photography).

Release of photo-identification photographs will be under the standard IWC Guidelines.

11.1.13 Video taping

Where biopsy and photo-identification studies of blue whales are attempted video filming should also be conducted using the same procedures as in recent blue whale research.

11.1.14 Oceanographic survey

No oceanographic sampling will be undertaken, as on last year's cruise.

As last year, a request was made for deployment of two floats under the *Argo* oceanographic programme, outside the Australian EEZ. Deployment at the target latitudes would be made during the transit to (or from) the Antarctic. The floats will be placed on board in Japan.

The meeting **agreed** to cooperate with this internationally important programme, the results of which are available (http://www.argo.ucsd.edu/) at no cost and almost immediately.

11.1.15 Acoustics

As discussed under Item 9.7, the main focus of the acoustics research during this cruise will be similar to during the 2006-07 cruise. Acoustics recording will not usually be conducted on a routine basis and will generally be conducted only in the presence of blue whale sightings.

Shimada and Ensor will make arrangements for sending the sonobuoy receivers to Greeneridge for modification to ensure they are capable of receiving direction-finding signals. It was noted that this modification would potentially allow this equipment to be used for locating blue whales for photo-ID and biopsy sampling. The Australian Antarctic Division has offered a supply of sonobuoys for the cruise. A new computer with appropriate specifications has been provided by the IWC.

The meeting welcomed the comments from the Chief Operator on the vessel (Y. Tsuda) that as on the 2006-07 cruise, he would be willing to assist with the recording of these data.

11.2 Collaboration with the aircraft

Details of this discussion can be found under Item 8.7 and Items 11.1.1 – 11.1.2. The cruise tracks for the aerial component of the survey have not yet been established but will probably reflect straight lines parallel to the ice-edge. This issue, that of the logistics involved in attempting to obtain photo-identification photographs from the aircraft and other questions that may arise prior to the survey has been passed to a liaison group (Kelly, Donovan, Ensor, Murase, Matsuoka and Nishiwaki).

11.3 Cooperative strategy with JARPA

The last time the SOWER and JARPA vessels operated in the same general area was in 2002/03. Donovan reported that the situation in 2002/03 was a little different from the present situation but that the general principles and guidelines developed at that time still apply. The meeting therefore **agreed** that the primary rule is that the SOWER vessel always precedes the JARPA vessel. If there are circumstances that arise where that is not possible the JARPA vessel will not operate in the same area as the SOWER vessel within seven days of the SOWER vessel or *vice versa*. For this general protocol to be applied successfully, close co-operation is needed between the SOWER Cruise Leader and the JARPA cruise leader.

12. INTERNATIONAL RESEARCHERS AND ALLOCATION OF RESEARCH PERSONNEL

12.1 Number of researchers

The single vessel available this year can accommodate four researchers.

12.2. Nomination and allocation of researchers

A subgroup under Bannister (Bravington, Brownell, Donovan, Ensor, Kato) reviewed possible candidates on the basis of their experience and expertise.

This year preference was given to those with experience on previous IDCR/SOWER cruises or the equivalent. Experience in BT or similar mode surveys such as recent SCANS2 surveys, and in acoustics, were also considered. From the 12 applicants the subgroup recommended appointments as below:

Ensor (New Zealand) - Cruise Leader Sekiguchi (Japan) Olson (USA) (previous SOWER and NOAA surveys, acoustics) Stafford (USA) (previous SOWER and NOAA Surveys, acoustics)
Reserves – Morse (USA) (previous SOWER, acoustics); A N Other (to be determined)

The meeting accepted the recommendations. Donovan undertook to inform all applicants of the outcome immediately, asking the appointees to forward necessary personal details, including passport numbers, where these were not already available, to Shimada as a matter of urgency. Dietary requirements are to be forwarded to Matsuoka. As in past years, letters of appointment will emphasise the need to follow the previously adopted technical and personal guidelines.

13. GENERAL PREPARATIONS FOR THE 2006/07 CRUISE

13.1 Identification of home port organiser
Bannister undertook to act as home port organiser in Fremantle.

13.2 Entry and other permits
Fremantle port access permits will be sought by the Fisheries Agency of Japan. Given the time constraints in reaching the research area from Fremantle there will be no possibility of undertaking closing mode operations in the Australian EEZ so no permit for that activity would be required; only passing mode would be undertaken there. Donovan undertook to arrange for the IWC to approach the Australian Commissioner to IWC to seek cooperation as necessary. Copies of permits should be sent from the Fisheries Agency of Japan to the IWC Secretariat.

13.3 Review of recommendations from the 2006-2007 cruise (SC/59/IA1, p21)

Acoustics

1. VHF radio DiFAR modification: Shimada agreed to send the sets immediately to Greeneridge for modification; costs to be met from the budget.
2. Dedicated acoustics computer, headphones, external hard drive and all necessary software: Donovan reported that the computer had already been obtained, headphones were to be purchased, and he would liaise with Stafford over software.
3. Stereo sound card for the dedicated computer: already obtained.

Biopsy/photo-identification

1. Biopsy equipment, including ammunition: Donovan reported that the darts and propelling plugs had already been ordered, and a source for the appropriate ammunition was being sought.
2. External hard drive storage: Donovan agreed to liaise with Olson over purchase in the US; funds are in the budget.
3. Servicing of the Larsen guns: Best has already arranged this in Cape Town
4. Stronger line for the Paxarms tethered system: to be arranged by the researchers
5. Servicing IWC Canon 20D cameras and lenses: already arranged by Best in Cape Town
6. Additional camera batteries, card reader and storage cards: Donovan would liaise with Olson over purchase in the US.

Blue whale video recording

1. Acquisition of I-link cable: Shimada undertook to arrange this.

General

The meeting noted the recommendation that in future planning, consideration should be given to research in the area covered in the 2004-5 and 2005-6 cruises, for the reasons given in SC/59/IA1, p 21.

14. IN TRANSIT SURVEY

14.1 Japan to Fremantle
As last year, in the absence of researchers, Closing mode sightings operations will be conducted by the crew. Such surveys would only be conducted outside any EEZs intersected.

14.2 Fremantle to Research Area
Passing mode only will be adopted given the time constraints in travelling from Fremantle to the research area (see also Item 13.2).

14.3 Antarctic to Fremantle

Passing mode only will be adopted given the time constraints in travelling from the research area to Fremantle (see also Item 13.2).14.4 Fremantle to Japan
As for Item 14.1.

14.5 Necessary permits
There is no requirement for CITES permits until after the vessel's return to Fremantle (but see Item 15.2). Bannister undertook to check on the Australian requirements for transhipment of biopsy samples in Fremantle for forwarding to the US (SWFC) direct, rather than from Japan as last year.

Individual researchers are responsible for obtaining any permits required by their home countries to take part in the cruise.

15. TRANSPORTATION OF DATA, SAMPLES AND EQUIPMENT

15.1 Details
The meeting reviewed an equipment list (SOWER/07/WP13) prepared by Matsuoka. As in past years, ICR and The Institute of Far Seas Fisheries will supply many of the essential items for the cruise.

Best should be asked to forward the equipment still in Cape Town (see SOWER/07/WP13) to the shipping Agents in Fremantle (Annex D). Bannister will contact Best informally on the matter.

15.2 Necessary permits
If biopsy samples are off-loaded in Fremantle for shipment to the US (SWFC), CITES permits will be required (see item 14.5). Bannister would be responsible or shipment. The matter should be reviewed at the pre-cruise meeting.

Half samples would be retained for on shipment to Japan. Hyugaji reported that the Japanese Government would provide the necessary permits for import of specimens into Japan from the high seas.

15.3 Responsible persons
The meeting noted the following: in Fremantle – Bannister; at sea – Cruise Leader.

The Cruise Leader and Japanese researcher will be responsible for data transport after the cruise.

15.4 Other matters
None were raised.

16. COMMUNICATIONS

16.1 Safety aspects
Formats and schedules for communicating between the research vessel and JARPA (*Nishiin Maru*), and with the cruise organisers, were reviewed – Murase to supply and include in Annex D.

There will be a daily report from SM II to the *Nisshin Maru*, which will be operating under JARPA in the same general area.

16.2 Between Cruise Leader and IWC
The Cruise Leader will send a weekly progress report to the IWC Secretariat and to the Steering Group (Bannister, Best, Bravington, Brownell, Clark, Donovan, Hedley, Kato, Palka). A report will also be sent after the completion of each phase of research as appropriate. Matsuoka will forward copies of those reports to The Institute of Cetacean Research, the Fisheries Agency of Japan, the National Research Institute of Far Seas Fisheries and Kyodo Senpaku Co. Ltd.

16.3 Ice information
When required, SSM/I ice data, obtained by the radio operator from the internet, will be transformed using computer programs on board the vessel.

The Liaison Group (see Item 11.2) will arrange for exchange of ice information between the plane and the vessel.

16.4 Other official communication
Email, telephone and facsimile will be available. The vessel's email address will be available at a later date.

All official communications by the Cruise Leader, relevant to the cruise, will be paid for by the IWC. Communications can be by radio, telephone, email, or fax.

16.5 Private communications
Researchers and crew may send and receive private communications, including email, at their own expense.

16.6 Terms of payment of communication cost
Accounts must be paid by researchers before leaving the vessel at Fremantle. Payment is required in US dollars. Payment may be made by credit card. The researchers are requested to make payment if possible on the day prior to port entry.

16.7 Coordination with the aerial survey.
This will be the responsibility of the Liaison Group (see Item 11.2).

16.8. Other Matters

Communication between the vessel and *Nisshin Maru* (see Item 16.1) will be by Inmarsat, using the same protocol as in 2002-3. [Murase to provide – in Annex D]

17. MEETINGS

17.1 Pre-cruise Meeting
A pre-cruise meeting will be held in Fremantle on 22-23 December 2007 at a venue to be arranged by Bannister. Sekiguchi will undertake translation to and from Japanese at the meeting. The cost of hiring transport for the researchers and crew while in Fremantle (e.g. to attend the meetings) will be met by the IWC.

Japanese translations of the Planning Report and the Data Records Usage Notes will be made available to the ship's crew before the meeting.

Attending the pre-cruise meeting will be: all researchers, plus the captain, boatswain, chief (or second) officer, chief operator, and chief engineer. The radio operator and chief engineer will probably be required for the first part of the meeting only. Bannister is invited to attend.

As necessary, arrangements will be made by Ensor for training in use of the SCANS system.

17.2 Post-cruise Meeting
As there is again only one vessel, it should be possible to complete the Cruise Report during transit from the Antarctic to Cape Town. Therefore a post-cruise meeting will only be necessary if that is not possible. If a post-cruise meeting is necessary, it will be held in Fremantle on 22-23 February 2007 at a venue to be arranged by Bannister; all researchers, the captain and radio officer would be required to attend. Bannister would also be invited to attend.

17.3 Home port arrangements
The vessel owners will consult with the home port shipping agents to make the necessary arrangements for a berth for the research vessel.

17.4 Responsible persons
Hotel reservations for all researchers in Fremantle will be made by Bannister. Donovan will inform him immediately of the names of the researchers for him to make provisional hotel bookings for the pre-cruise period 21-23 December. Donovan will ask researchers to confirm their arrival dates with Bannister as a matter of urgency. As early as possible during the cruise, the Cruise Leader will confirm the researchers' post-cruise reservation requirements (see Item 18.2) and forward them to Bannister.

The home port contact details, including those for Bannister, are given in Annex D**.**

18. REPORTS

18.1 Planning meeting report
A copy of the final version will be emailed by the IWC Secretariat to the Steering Group, the Chairman of the Scientific Committee, ICR, the home port organisers, all researchers and reserves, the Australian Government and the Australian Antarctic Division, attention Dr Nick Gales.

18.2 Cruise report
A draft of the cruise report will be prepared, in accordance with the guidelines documented in IWC (1993), prior to arrival in Fremantle and, as necessary, the draft will be reviewed during the Post-cruise Meeting (either on board the vessel or in Fremantle) – see Item 17.2.

The Cruise Leader will email the final report to IWC from Fremantle.

Copies of the final report will be forwarded by the IWC Secretariat to all Steering Group members, all researchers, the captain, the Australian Government and the Australian Antarctic Division, attention Dr Nick Gales.

19. OTHER LOGISTICS

19.1 Press release
The Cruise Leader, in consultation with Kato and the IWC Secretariat, will draft a pre-cruise press release for issue by the IWC Secretariat. The statement should be available in Fremantle at least one week prior to the ship's arrival. A press release will be sent by the Cruise Leader to Bannister near the end of the cruise, so that it can be available in Fremantle prior to the ship's arrival. Copies of all press releases will be sent to the Steering Group and the IWC Secretariat, and placed on the IWC website.

Statements to the press during the cruise and while the ship is in port will be made only by the Cruise Leader.

The Japanese Consul General in Perth should be asked by the IWC Secretariat to assist as necessary with press relations in Fremantle.

19.2 Security
Extra security, as provided on previous cruises, may be helpful in Fremantle. As on previous cruises, the display of 'Research' on the side of the vessel and the display of the IWC flags are intended to help reduce security problems in port. Large IWC banners for display on the ship when in port are also available. The IWC Secretariat is asked to contact the Australian Government to request that adequate security arrangements be made for the vessel. The meeting noted that the Japanese Government will also contact the Australian Government on the matter.

Some concern was expressed over the implications of the events involving the *Sea Shepherd* and the vessels of the JARPA programme which occurred last year. Whilst the Commission itself has passed a resolution on this matter with respect to safety at sea, the worry was that *Shonan Maru No. 2* might be targeted mistakenly as a JARPA vessel. Donovan undertook to draft a letter for perusal by meeting members in the context of the IWC Resolution 'Safety at Sea'. A copy of the letter will be sent to the Australian Government.

19.3 Accommodation and food costs
The daily subsistence charge aboard the ship will be ¥2500 per day for each researcher. The IWC will make direct payment of these fees to the Institute of Cetacean Research for the IWC-funded researchers.

As last year, a charge for alcoholic drinks will be made except on special occasions.

19.4 Other matters
The meeting noted that any change of plan, e.g. unavoidable delay in departure of vessels from port, be communicated to the Japanese authorities by the Cruise Leader through Kato, with a copy to Matsuoka by email beforehand.

B. Future Cruises

1. TERMS OF REFERENCE

In this context the meeting reviewed the Scientific Committee's discussions in Anchorage (SC/59/Rep 1, Item *10.12.2. Recommendations for the long-term*). It also referred to the discussions in 2004 (see SC/57/Rep 1) where a general objective for the future programme was developed, together with a framework for future work, including sub-objectives as well as short and long-term priorities (including species priorities).

The long-term objective of any future SOWER programme as agreed by the Scientific Committee at its 2004 meeting is

to provide information to allow determination of the status of populations of large whales that feed in the Antarctic waters. The programme will primarily contribute information on abundance and trends in abundance (including of Antarctic minke whales), learning from both the successes of past IDCR-SOWER cruises and the difficulties in interpreting previous results (IWC, 2004: 35).

Sub-objectives are: to consider methodological developments and improvements in abundance estimation and its interpretation; stock structure; abundance estimates and trends in abundance.

The meeting noted that the long-term objectives are broad and ambitious. It is important to be clear about how thoroughly and how quickly a future SOWER programme could realistically meet these objectives, given the likely constraint of one vessel, as well as the extent to which the objectives are likely to be addressed by other Antarctic research programmes, including JARPA. When the long-term objectives were agreed in 2004, there was considerable uncertainty about a number of biological, statistical, and logistic issues, which made it difficult at that stage to develop a demonstrably viable and concrete plan for the future SOWER programme. SOWER cruises since 2004 have included experiments to address some of those issues, and parallel efforts have been made on statistical issues for future survey design (e.g. improved methods of survey, improved analysis methods, likely CV that could be achieved); progress on these items is discussed below.

2. OBJECTIVES

With the above as background the meeting reviewed progress on the six short-term priority items discussed last year (SOWER/07/WP05, Item B2), as follows.

Priority item 1: Determining the proportion of Antarctic minke whales in the ice

Considerable progress towards addressing this item is being made, as already discussed under items 8.7 and 11.2. While the outcome will be heavily dependent on good weather, the results from this year's collaborative survey could be of great value for future SOWER work (as well as the interpretation of past data), and the collaboration with the Australian Antarctic Division is to be applauded. In particular, the results could have a major bearing on whether the future SOWER programme would be viable with only one vessel.

Priority item 2: Determining the best way of estimating g(0) and school size

The experiments undertaken during the last two cruises have been undertaken successfully, and have provided valuable results both in terms of planning future work as well as in interpreting past results. One example of this is the work undertaken on options for BT mode. The experimental work revealed that BT mode using 'big eyes', which potentially had been a future survey technique, was not practical for use on the SOWER cruise; this in itself is a valuable result and has helped to limit the options for future survey modes. The work on BT Option-II, by contrast, has revealed this to be a very promising approach; a successful outcome to the work planned for this year's cruise (see Item 8.1) and analyses of those and earlier data from that, and from the SS-II experiments, will allow final decisions to be made on future methods.

Priority item 3: Collecting data necessary to understand stock structure

Pastene spoke to SOWER/07/WP17 which he had prepared in response to Planning Meeting recommendations in 2005 and 2006. The document reviewed stock structure information for Antarctic minke, humpback, fin and Antarctic blue whales. The available information varied in amount by species and area. For minke whales there is good information (both genetic and non-genetic) for Antarctic Areas IIIE-VIW, between the ice edge and 60°S; a hypothesis on stock structure there is now available, but not for other areas, for which no DNA data are available. Conversely there is much historical information on distribution, movements and stock structure for humpback whales, recently refined by DNA and photo-identification studies; available DNA sample coverage is relatively comprehensive for all Areas except Area IW and all of Area II. Some

historical information is available for feeding ground distribution and movement of blue and fin whales, but no genetically- or other biological marker–based information on stock structure. As for minke whales, the exact breeding ground locations of blue and fin whales are unknown; given the difficulty of obtaining genetic samples from those species on the breeding grounds, satellite tracking combined with feeding ground biopsy sampling would provide valuable migratory destination and stock structure information for those species.

The meeting thanked Pastene for the considerable amount of work involved in undertaking his review. Pastene, Donovan and Ensor **agreed** to undertake certain necessary follow-up work to document the availability (and ownership) of samples/photographs at a smaller temporal and geographical scale. Within feeding ground movements will also be summarised. The revised paper will clearly specify the SOWER biopsy and photo-identification data. It will also provide draft recommendations for the collection of future samples and estimate the effort required based on past SOWER experience.

Priority Item 4: Development of telemetry techniques
Kelly reported that the work expected to be undertaken by Australia, referred to in last year's report, will now proceed during 2008/9 and will be yacht-based.

Nishiwaki reported that development of a satellite tagging system for use in JARPA and JARPN was still underway; some results may be available at the 2008 Annual Meeting.

Bannister reported that Gales was currently undertaking humpback whale satellite tagging off the Western Australian coast.

Brownell referred to work being undertaken by researchers from New Caledonia, Cook Islands, Brazil and the US, where satellite tags are being placed on humpback whales off New Caledonia and the Cook Islands to track breeding season movements, and to assess migratory destinations. Whilst some tags last from just days or weeks, others may last a few months or more and thus provide details of whale movements over long periods and distances. The work is currently in progress and will be reported at the 2008 Annual Meeting.

It was **agreed** that continued development of such techniques should be **strongly encouraged**, although as recognised previously, the SOWER programme is not an appropriate vehicle for development of such techniques *per se*.

Priority Item 4: Development of telemetry techniques

Following discussions at last year's planning meeting, Hedley and Bravington had presented a paper (SC/59/IA3) to the Scientific Committee in Anchorage, giving preliminary results on what precision (CV) of minke whale abundance might be achievable with one SOWER vessel in future. The authors used existing SOWER data to investigate different possible longitudinal ranges (10, 30, and 60 degrees) over which abundance estimates might be desired, and considered the effects of changes in the proportion of Closing to IO mode, as well as changes in the amount of survey effort per day. One of the key issues is how clustered minke whales tend to be in different parts of their latitudinal range; this affects how closely survey legs need to be spaced in that part of the range, which has implications for efficiency of the overall design. The Meeting noted that precisely this issue of clustering had been considered in qualitative terms when designing the cruise tracks for the 2007-8 survey.

Preliminary results in SC/59/IA3 were encouraging, suggesting that a substantially redesigned SOWER survey with just one vessel may be able to achieve useful CVs for Antarctic minke whales. However, this conclusion is tentative, because significant further work remains to be done. The extra work includes incorporation of spatial variability in school size distribution, and making proper allowance for longitudinal travel time.

The meeting **strongly encouraged** the authors to continue the work not only for minke whales but also for other species, even if only in a preliminary study for the latter, and to present the results to the 2008 Annual Meeting.

Priority item 6: Development of methods to integrate acoustics with sightings surveys
The meeting noted that there had been few developments since it last met, but there should be further progress on this year's cruise if the DIFAR system can be made operational. It reiterated its previous comments (SOWER/07/WP05), viz. that there was little possibility of such integration assisting in studies of fin whales. It would be of much greater benefit in research on humpbacks and blue whales, particularly the latter. It again noted that the use of acoustics in abundance estimation, if achievable, is likely to be in the long-term.

3. METHODS TO ACHIEVE THE OBJECTIVES

Donovan drew attention to SC/57/Rep 1, where the logic of the original proposal is detailed, and the various elements are integrated. He referred particularly to the flow chart in SC/Rep 1 on p 6.

There had been encouraging recent progress on a number of fronts, including methodology and stock structure. As a result, discussions at the 2008 Annual Meeting should be able to focus more specifically on what can be achieved on future SOWER surveys. New, better and easier to interpret estimates of abundance were now possible. Nevertheless future planning needs to take into account other, parallel, programmes being undertaken or developed, particularly under JARPA but also by CAMMLR and SO-GLOBEC, as well as by national bodies such as the Australian Antarctic Division.

Bravington emphasised the need to bear in mind the question of the proportion of minke whales in the ice, as is being addressed in the collaborative programme with the aerial survey this year. The meeting **strongly recommended** that every effort be made to code the data and undertake at least a preliminary analysis of that programme's results by the 2008 Annual Meeting.

The meeting **reiterated** its **very strong recommendation** from the last two years that

1. the Japanese Government be requested to consider whether it might in future be able to provide a second vessel; and
2. other IWC nations be requested to contribute vessels, or equivalent ship time, to the programme.

Under item 2 there had been particularly encouraging cooperation with Australia this year, but attention was drawn to the fact that it had not been possible to tie in with the proposed CAMMLR krill survey within the International Polar Year, as it had not taken place.

It was noted that there had been little action on the recommendation two years ago to maximise observer efficiency and use of research time, in particular to investigate maximum use of daylight in high latitudes. Shigemune reported that increasing working hours would entail employing more crew, which it was not possible to accommodate on SMII. It was pointed out that given SMII's limited life expectancy, any plans for a replacement vessel should take into account the possibility of employing a larger crew.

Concerns were expressed at the lack of time during a normal Annual meeting for in-depth discussion of future plans, but given the extra day available next year the meeting **recommended** that time should be made available for a more thorough discussion. Kato undertook to bring this matter to the attention of the Convenors' Group.

C. Concluding remarks

On behalf of the IWC, Donovan reiterated his remarks of previous years that the Commission continues to regard the cruises as an extremely important element of its scientific work. He thanked all those involved for their contributions to the meeting, in particular Kato as meeting chairman; also the President, Tokyo University of Marine Science and Technology and his staff, Morimoto and his staff at ICR, and the Government of Japan, for their assistance and hospitality throughout the meeting. He noted that the success of the cruises is very dependent upon the cooperation of crew and researchers and expressed his appreciation for the contribution to the meeting of those crew members who had been able to attend. He thanked the scientists who had come to the meeting and who put in much time on the cruise's behalf between meetings. In particular, he thanked the interpreters for undertaking their most difficult task so cheerfully and efficiently.

Captain Minami responded on behalf of his colleagues at the conclusion of discussions under Part A. He expressed appreciation to all members for their keen participation in the meeting, especially those from overseas. His crew were currently preparing the vessel, and he looked forward to a successful cruise. He and his crew were particularly looking forward to collaborating with the aerial survey. He welcomed this year's researchers under the Cruise Leader, Ensor, who were all well known to the crew from past cruises.

Kato expressed his personal thanks to all participants. This was the third occasion on which such a meeting had been held at the University. He wished everyone a safe journey home, and the forthcoming cruise every success.

The meeting concluded at 1500 hrs on 2 October 2007.

Annex A

List of Participants

John Bannister	Western Australian Museum, Australia
Mark Bravington	CISRO, Australia
Robert Brownell	Southwest Fisheries Science Center, U.S.A.
Greg Donovan	Head of Science, IWC, United Kingdom
Paul Ensor	Cruise Leader, New Zealand
Natalie Kelly	Australian Antarctic Division, Australia
Joji Morishita	Fisheries Agency of Japan, MAFF
Hideki Moronuki	Fisheries Agency of Japan, MAFF
Jiro Hyugaji	Fisheries Agency of Japan, MAFF
Tomio Miyashita	National Research Institute of Far Seas Fisheries
Hiroyuki Shimada	National Research Institute of Far Seas Fisheries
Hiroshi Okamura	National Research Institute of Far Seas Fisheries
Hidehiro Kato	Tokyo University of Marine Science and Technology
Seiji Ohsumi	The Institute of Cetacean Research
Shigetoshi Nishiwaki	The Institute of Cetacean Research
Luis Pastene	The Institute of Cetacean Research
Koji Matsuoka	The Institute of Cetacean Research
Takashi Hakamada	The Institute of Cetacean Research
Hiroto Murase	The Institute of Cetacean Research
Saeko Kumagai	The Institute of Cetacean Research
Hirohisa Shigemune	Kyodo Senpaku Co., Ltd.
Kenichi Hosone	Kyodo Senpaku Co., Ltd.
Kiyokuni Minami	Kyodo Senpaku Co., Ltd., Captain
Hidenori Kasai	Kyodo Senpaku Co., Ltd., Chief Officer
Yasunari Tsuda	Kyodo Senpaku Co., Ltd., Chief Operator
Kozo Hasebe	Kyodo Senpaku Co., Ltd., Quartermaster
Nobuyuki Shikama	Japan Agency for Marine-Earth Science and Technology
Yoko Yamakage	Interpreter
Hiroko Yasokawa	Interpreter

Annex B

Agenda

1. OPENING REMARKS AND WELCOMING ADDRESS
2. APPOINTMENT OF CHAIR AND RAPPORTEURS
3. ADOPTION OF AGENDA
4. ORGANIZATION OF MEETING
5. REVIEW OF AVAILABLE DOCUMENTS

Component A, The 2007-2008 Cruise

6. REVIEW OF PLANNING DISCUSSIONS FOR THE 2007-2008 CRUISE AT IWC 59
7. AVAILABILITY OF RESEARCH VESSELS
7.1 Research vessels offered by Japan
7.2 Other possibilities
8. PRIORITY FOR THE CRUISE
8.1 BT Mode (option2)
8.2 School size estimation
8.3 Visual dive time
8.4 Biopsy sampling/photo id
8.5 Acoustic studies
8.6 Direct data entry
8.7 Collaboration with the aircraft (including contingency plan)
8.8 Other matters
9. REVIEW OF THE BUDGET
10. CRUISE PLAN
10.1 Several priorities, including allocation of research effort
10.2 Itinerary
10.3 Survey area
10.4 Research vessel
10.5 Other matters
11. DETAILS OF THE CRUISE
11.1 Standard sightings
    - 11.1.1 Cruise track design and Itinerary
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3. Report of the small group for future SOWER planning, including the 2007/08 cruise (Appendix 2 of Annex G, 59th IWC/SC report)
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5. Report of the Planning Meeting for the 2006/2007 IWC/SOWER Cruise and future cruises
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Contact details for the cruise

Homeport organiser

J. L. Bannister
c/o Western Australian Museum
Francis Street
Perth, WESTERN AUSTRALIA 6000
Australia
Phone: 0061 89 212 3800
e-mail: bannisj@bigpond.com

Shipping agents

Hetherington Kingsbury Shipping Agency Responsible person: Laurie Rebisz
Address: Suite 2, 18 Norfolk Street,
Fremantle WA 6160, Australia
Postal:
PO Box 391, Fremantle WA 6160
Telephone:
61 8 9335 6111
Facsimile:
61 8 9335 3196
Mobile:
0419 637 081
Email:
lrebisz@hksa.com.au

ADDITIONAL INFORMATION TO COME FROM MURASE

Annex E

Is SS2 an adequate replacement for SS3 as a way of implementing closing-when - abeam protocols?

Mark Bravington (CSIRO CMIS, Hobart, TAS)

In the SOWER/IDCR surveys, the minimum school size estimates made during IO mode tend to be underestimates of true school size. To obtain accurate school size estimates, Closing mode is used instead. By comparing the reported school size distributions in IO mode with those in Closing mode (while allowing for sighting distance, environmental conditions, and for local spatial variations in school size distribution– in principle, anyway), it is possible to infer the extent of under-estimation in IO mode. However, the comparison is only indirect, because we can only compare frequency distributions of reported school sizes in the two modes. This is a result of the particular protocols of Closing mode, whereby both platforms' normal observation processes are interrupted whenever either platform makes a sighting; hence we do not know what the reported school size of each sighting made in Closing mode would have been if the sighting had been made in IO mode instead. Underestimation of school size is an important "parameter" of all the new methods being developed for SOWER/IDCR analyses, so it is important to get a better handle on it than can be obtained from standard Closing/IO comparisons. There are three uses: direct inclusion in, or diagnostic checks for, the new methods; guiding the development of realistic simulation trials; and variations of Closing mode protocol in future surveys, so that the utility of the school size data can be improved.

In 20067, therefore, the SOWER cruise included some experiments to try to assess directly the extent of underestimation in IO mode. Statistically, the ideal way to infer underestimation in IO mode would be to run some of the survey using exactly the same platform setup and school size estimation protocols as in standard IO mode until the sighting comes abeam of the vessel, at which point closing is attempted. That way, each school size estimate can be made using IO protocols and then compared directly with the true school size obtained after closing. This direct sighting by sighting comparison is much more statistically powerful (and simpler) than the indirect comparison between frequency distributions required with standard Closing mode data. This approach is called "SS III", because it is a successor to the "SS II" experiments conducted in the mid1980s. The difference between SS II and SS III is that the IO barrel operates in SS III but not in SS II.

The SS III experiment in 20067was conducted successfully, and there were not many cases of inability to close after waiting for the sighting to come abeam (note that there are always some sightings which cannot be closed on anyway, even with the protocol is to close immediately on sighting). Since the data from SS III provides is definitely more useful for abundance estimation than the data from standard Closing mode, this suggests using SS III as a replacement for Closing mode in future. However, the problem with SS III is that it requires the same number of on duty crew as IO mode, so in the context of a regular survey it does not provide adequate rest breaks. Given the current logistics of SOWER, it is not feasible to operate SS III as a replacement for Closing mode.

For this reason, the 20067 survey also ran an experiment in SS II mode, i.e. without IO, and this was also operationally successful. Since SS II is no more difficult than Closing mode in terms of crew schedules, it could potentially be used as a replacement for Closing mode in future. However, the lack of an IO means that the sample of sightings, and the process of estimating school size itself, is not exactly the same as in IO mode. Potentially, therefore, SS II data might give a biased picture of underestimation compared to the "gold standard" of SS III. This seems unlikely a priori, because relatively few sightings are made by the IO alone, and most (all?) of the school size estimation process does not depend on the IO. However, to fully justify a switch away from historical Closing mode to SS II (a.k.a. Closing abeam) mode, it is necessary to check whether the results of the recent SS II and SS III experiments are consistent. This working paper reports on some analyses.

DATA & METHODS

There were 90 sightings in SS 3 mode and 28 in SS 2 mode. True school size is an important covariate for the probability of underestimation (clearly, if the true school size is 1, the probability of underestimation is 0). To prevent the sample size per "stratum" becoming too low, I grouped school size into four categories (1, 2, 34, 5+) and only consideration under-estimations that crossed a category boundary. Other potentially important covariates include Sightability (cut into 23, with 43 sightings, and 4, with 75 sightings), and perpendicular distance at first sighting.

6 of the 118 sightings had a post closure estimate lower than the pre abeam estimate (4 of 9 in SS 3, 2 of 28 in SS 2). In 3 of the cases, the overestimation was proportionally low (5 vs 4, and 40 vs 35); in the other 3, the pre abeam was recorded as 2 and the post closure as 1. (It may be that the schools genuinely changed in size between the two measurements.) A 3% rate of substantive overestimation seems low enough to ignore, so I did; all overestimations were treated as correct.

For each sighting in either mode, we can determine whether the pre abeam school size (category) estimate was lower than the post closure size. A natural way to model the probability of this happening, is to use a logitlink binomial GLM, with covariates formed by school size, Sightability, and perpendicular distance in various combinations and interactions. To check whether the results are affected by Mode (SS2 or SS3), we can choose one model and refit it with Mode as a covariate. We can investigate the Mode effect by comparing goodness of fit using AIC, or the significant via formal analysis of deviance, or informally by looking at the standard error and point estimate of the Mode coefficient ("Wald's test").

I tried a number of different models with and without interactions between perpendicular distance, school size, and Sightability, plus different category boundaries for school size and Sightability. In all cases, the Mode effect was insignificant; its standard error was always greater than the absolute value of its point estimate. While this is reassuring and perhaps not unexpected a priori, it should be noted that none of the other more obvious covariates emerged as significant, either; the sample sizes are quite limited. AIC always favoured the simpler models. On commonsense grounds, it seems unreasonable to exclude school size, perpendicular distance, or Sightability as covariates, whatever AIC says; the results from the simplest (i.e. no interaction) model that includes these factors is given in Table ??. A priori, we might expect the probability of underestimation to increase with perpendicular distance (which it does somewhat, in the table), and to decrease in good sighting conditions (which it doesn't). The most likely explanation for counterintuitive results is limited sample and the resulting very high parameter uncertainty. However, one can easily imagine that there might be a genuine interaction between Sightability and perpendicular distance, in that sightings with large perpendicular distances (where underestimation is more likely) may only occur under good Sightabilities. The sample size is too small to reliably fit interaction models even when they are intuitively reasonable, so it is not surprising that some strange point estimates occur with over simplified models.

Table 1:

Coefficients etc from a binomial GLM: base case for factors is Sch Size=2, Sightability=23, Mode=SS2

	Estimate	SE	Pr(>|z|)
(Intercept)	0.72	0.63	0.25
SchS=34	0.07	0.53	0.90
SchS□ 5	0.35	0.55	0.47
Perpdist	0.31	0.53	0.55
Sightab=4	0.52	0.44	0.24
SS3	0.34	0.50	0.50

DISCUSSION

There is no evidence that SS II will give different results about underestimation than SS III will. Admittedly, the sample size is very limited (more so for SS II) and so the power to detect a small difference would not be high. Nevertheless, even if the two protocols would really give slightly different results with a large enough sample, it is important to note that SS II is still a better basis for comparisons with IO mode than standard Closing mode is; both SS 2 and Closing lack an IO and are therefore not strictly comparable with IO mode anyway, but direct estimation of school size underestimation is much more powerful than indirect estimation, so any bias variance trade off is likely to be in favour of SS II.

With respect to the potential impact of protocol changes on comparability between past and future SOWER surveys: it is important to note that, based on simulation results in IWC SC IA, the "standard method" is very unlikely to continue to be used for agreed estimates of minke whale abundance from either past or future surveys. The new methods that are being developed all attempt to estimate absolute abundance, and so offer comparability "by design"; they are all (or should be) capable of coping appropriately with these different protocols. The advantages of switching to Closing abeam are that the precision of estimates should be improved appreciably, that analysis of (future) data will be simplified, and that straightforward diagnostics of each method's model for underestimation of school size become available.

Overall, given the lack of evidence against and the strong in principle logic in favour, it seems appropriate to support the Scientific Committee's conditional recommendation of 2007, that Closing mode protocols be changed to the Closing abeam protocol of SS II.